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The Prospects for Consumer-Oriented Social Media

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Abstract

The term 'social media' refers to a cluster of applications and online services that support human interaction and content broadcasting and sharing. Current services are isolated islands or 'walled gardens', and are based on a business model that is highly exploitative of individuals and their data. An alternative, consumer-oriented approach is feasible, involving open architecture, inter-operability and portability features, fair terms and privacy-sensitivity. Key impediments to the emergence of such services are identified, and means of overcoming the impediments are outlined..

Keywords: Social media, social networking service, interoperability, terms of service, privacy

1. Introduction

Social media is a collective term for a range of services that support users in interacting with one another, and in exchanging content and pointers to content. Some social media services have proven to be short-lived fads. Some appear to be instances of longer-lived genres, although, even in these cases, waves of specific services have been crashing over one another in quick succession. Some aspects may mature into long-term features of future services, because they satisfy a deeper human need rather than just a fashion-driven desire. During the first decade, 2004-14, social media has been a cauldron of innovation and early death. See, for example, the Wikipedia 'graveyard lists' of discontinued social networking sites, photo-sharing sites, video-sharing sites, and Google services. Which current services will be survivors, and which will rapidly decay and disappear, is hotly-debated and highly unclear.

Social media services have stimulated a revival of the aura of excitement that preceded the dot.com boom c. 2000. Many have had no discernible business model beyond the presumption that 'there must be a way to monetise this somehow'. Successful services, however, are predicated on what is referred to in this paper as 'the exploitative business model' and described in s.2.2 below. An epithet commonly applied to it is 'If you're not paying, you're the product' (e.g. Schneier in Shane 2010).

A proportion of users understand that they are being exploited by social media service providers. The boldness and even arrogance of many of those providers have given rise to a growing body of utterances by influential commentators, which has caused a lot more users to become aware of the extent of the exploitation. Consumer and privacy issues are legion, and give rise to doubts about whether sufficient trust exists to sustain the momentum achieved during the first decade of social media usage.

The research reported on in this paper was motivated by the need to move beyond mere criticism of existing social media services. The research builds on a substantial prior program of research and publication in related areas, which has given rise to a dozen refereed papers over the last decade. The research question that this project sought an answer to was 'How can consumer-oriented social media be achieved?'. This was decomposed into the following sub-questions:

- What are the desirable features of consumer-oriented social media?
- What impediments exist to the emergence of services that exhibit those features?
- What means exist to overcome those impediments?

Reviews of refereed literature have been undertaken on several occasions during the period 2012-13. Despite the vast amount published about social media, the aspects being considered here are not yet an established field of research, and relatively few relevant papers are to be found. The majority of social science and business literature works within the industry's existing frame of reference, rather than questioning its underlying assumptions. In more technical areas, on the other hand, a limited literature exists. The most relevant papers are cited at the appropriate point in the development of the analysis.

A moderate number of social media services have been conceived that are reasonably described as 'consumer-oriented', and some of them have been launched; but none appear to have reached a critical mass of users or traffic. In order to complement the limited relevant literature and the small empirical base available for inspection, recourse was also taken to media reports. This is particularly important in a field that is so highly dynamic, that owes little to academic research and is largely pragmatically developed, particularly given the long lag of 2-3 years that exists between developments occurring and refereed articles being published that examine those developments.

The available information was then subjected to analysis, including reflection based on prior research conducted by the author. This enabled the identification of required characteristics of consumer-oriented social media, and of barriers to emergence and adoption of such services. That provided a basis for the proposition of means to overcome those barriers.

The following section examines the nature of social media, and distinguishes genres. This leads to the identification of five clusters of characteristics that would together deliver an appropriate orientation towards consumer needs. Key impediments that have held back the emergence of such services are then outlined, and possible means of overcoming them are presented.

2. Social Media

This section reviews the origins and nature of social media services, and proposes a classification scheme for service-features. It also considers the means whereby service-providers fund their operations. Finally, consideration is given to the adaptation to the mobile context that is currently in train, which involves increasing location-awareness among social media services.

2.1 Definition and Categorisation

Searches for formal literature that uses the term 'social media' in the relevant way have uncovered very little prior to 2004. Even the term 'social networking' only emerged about that time – although there is a prior literature on the notion of 'social networks' (e.g. Rheingold 1993, Wilde & Swatman 1999). The 'social media' meme emerged in conjunction with the 'Web 2.0' notion, during 2004-05 (O'Reilly 2005). As shown by Clarke (2008b), there was little terminological clarity or coherence during the first several years of discussion of the approaches adopted by marketers during this period. Even in 2010, the available definitions remained primitive, e.g. "Social Media is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content" (Kaplan & Haenlein 2010, p.61). Those authors did, however, apply theories in the field of media research (social presence, media richness) and social processes (self-presentation, self-disclosure), in order to propose the classification scheme in Table 1.

Table 1: Kaplan & Haenlein (2010)'s Categorisation of Social Media

		Social presence / Media richness		
		Low	Medium	High
Self-presentation / Self-disclosure	High	Blogs	Social networking sites (e.g. Facebook)	Virtual social worlds (e.g. Second Life)
	Low	Collaborative projects (e.g. Wikipedia)	Content communities (e.g. YouTube)	Virtual game worlds (World of Warcraft)

The Kaplan & Haenlein classification scheme may be a good fit to the perspectives of corporations. On the other hand, through its commitment to the mass-marketing, 'consumer as prey' tradition, it fails to adequately reflect the interests of the users who social media exploit. A classification scheme was accordingly sought that is oriented towards the interests of the users of social media.

No appropriate model came to light in the literature. The approach adopted was therefore to search for and inspect lists of services described as social media, and identify their key characteristics from a user's perspective. During the process, reference was made to a related scheme developed two decades earlier in Clarke (1994). This included a large number of the concepts evident in the 'social media' cluster. Ideas that were not evident two decades ago were glogs, wikis, crowdsourcing, folksonomies, indicator-sharing, and high-quality animation and hence avatars. The classification scheme arising from the study is depicted in Table 2. It is based on two factors: the cardinality of the relationship among the parties, and the nature of the exchange.

Table 2: A Participant-Oriented Categorisation of Social Media

Category	Cardinality	Nature of the Exchange	Examples
Interaction (Semi-Closed)	1 <——> 1 OR 1 <——> a few		App. 1
Broadcast (Open)	1 ——> many		App. 2
Collaboration or Sharing (Semi-Open or Open)	1 <——> few or many	Content	App. 3
		Indicator	
		Action	

Within each of the major categories, a variety of tools are available. These differ in terms of the a/synchronicity of the communications, the nature of the exchange – including both syntactic aspects such as whether it comprises text, sound, image and/or video, and semantic aspects such as the implications of the content – and the key functionality that they offer. Some are inter-personal messaging tools, whereas others are content-publishing tools – many of which also offer content-preparation functionality. Some are applications of 'crowdsourcing' (Howe 2006), enabling large-scale aggregation of, in some cases, substantial content (e.g. Wikipedia), but in many cases much more limited signals such as declarations of approval or disapproval, or actions in an online game.

Appendices 1, 2 and 3 present the currently-available service-genres in the approximately chronological order in which they emerged, together with examples of each genre. The classification scheme provided in Table 2 and the Appendices distinguishes functions. A great many social media services – especially those that have survived longer than 1-2 years – have adapted and expanded, and hence offer multiple functions. Any given social media service may therefore have features that at least superficially qualify it for inclusion in multiple categories.

2.2 The Conventional Business Model

The term 'business model' refers to "a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams. [It is] the missing link between strategy and business processes" (Osterwalder & Pigneur 2002), or "the method of doing business by which a company can sustain itself -- that is, generate revenue" (Rappa 2003). Rappa went further, by distinguishing a set of categories, comprising Brokerage, Advertising, Infomediary, Merchant, Manufacturer (Direct), Affiliate, Community, Subscription and Utility. A useful simplification that has been applied in a variety of eBusiness contexts is that a business model is the answer to the question 'Who pays, for what, to whom, and why?" (Bambury 1998, Clarke 2004b).

The earliest reference on business models for social media is usually regarded as being O'Reilly (2005). The widespread understanding is that "social networking sites can generate revenues through advertising, subscription, and transaction models" (Enders et al. 2008). Most commonly, variants of the advertising agency business model are applied, which involve renting out space on pages on web-sites, usefully referred to as an 'advertising syndication' approach (Clarke 2008b, s. 4.2). The model's downsides for consumers is discussed in s.4.2 below.

Marketer enthusiasm for so-called 'Web 2.0' business models has attracted criticism, e.g. "We need to carefully dismantle the claims of Wikinomics, 'We-Think' and Convergence Culture in order to better understand the kind of brave new worlds to which we are being welcomed" (van Dijck & Nieborg 2009), and "[business models for] monolithic, company-owned social networking websites ... are generally based on gathering, using, and monetizing data about you" (Esguerra 2011).

More specifically, the model depends on the following propositions:

- individuals' voyeuristic tendencies are engaged by conveying the message that 'you will find something interesting here'
- 'you will find something interesting here' is a self-fulfilling prophecy, because the exhibitionist tendencies of many of the people who come result in them contributing 'something interesting':
    - about themselves; and
    - about other people
- people who come to the site can be enticed to click on advertisements
- the information available about each person can be used as a basis for selecting the ads that appear on their screen, which is referred to as 'targeted advertising'
- clicks on advertisements can be 'monetised', i.e. revenue can be gained from them
- revenue and market-share reflect the accuracy of the targeting
- the accuracy of the targeting depends on the volume and the nature of information available about each individual

Mainstream, exploitative social media service providers have available to them a variety of sources of data. These include the profile-data that each individual has supplied, the content that each individual has posted – whether publicly or 'privately', their online behaviour while using the service, in some cases their online behaviour more generally, plus the information disclosed by other users about them.

In addition to the manipulation of consumer behaviour that is inherent in targeted advertising, substantial privacy intrusions arise, and so do freedom of expression issues: "The social networking company might cause you to overshare information that you don't want shared, or might disclose your information to advertisers or the government, harming your privacy. And conversely, the company may force you to undershare by deleting your profile, or censoring information that you want to see make it out into the world, ultimately curbing your freedom of expression online. And because the company may do this, governments might attempt to require them to do it, sometimes even without asking or informing the end-user" (Esguerra 2011).

The possibility exists of a middle path, whereby corporations' ability to exploit data can be sustained, while users' control is improved and at least some of the more extreme privacy incursions are reduced. For example, Wilson et al. (2011) proposed "a distributed OSN architecture that significantly improves user privacy while preserving economic incentives for OSN providers ... by using a standardized API to create a competitive provider marketplace for different components of the OSN, thus allowing users to perform their own tradeoffs between cost, performance, and privacy". However, the Polaris architecture those authors proposed is based on the spurious notion that privacy concerns only arise in relation to a few specific data-items, and that all other data can remain free for exploitation. Other such pseudo-solutions that seek to sustain the dominance of the exploitative business model are bound to emerge.

2.3 Location-Aware Social Media

As is evident from the early dates in Appendices 1-3, the origins of all categories of social media service are in the era of desktops and laptops. As the mobile era emerged, and as smartphones and tablets proliferated, location and tracking techniques were developed, which gather and disclose the geographical movements of devices, and hence of their users.

Throughout the network-based telecommunications era, each person's network address has always been visible, as a necessary element of the services. Since around the turn of the century, however, each person's physical address, or geo-location, has progressively become available, and in the case of cellular phone networks knowledge of the geo-location of a device is intrinsic to the operation of the infrastructure. This has enabled a variety of location-based services. Some of these services are much-appreciated by consumers, such as those that provide navigation assistance, and assist in emergencies. Novelty apps have attracted attention, such as notification services when someone in the person's address-book is in their vicinity.

However, all such services, whether it is understood by the user or not, gift rich streams of personal data to service-providers. The primary uses of geo-location are in consumer marketing, and while some aspects of this are positive for the user, many are not. A

further major application of person-location and tracking capabilities is law enforcement and national security (Clarke 1999, Clarke & Wigan 2011, Michael & Clarke 2013). This may on rare occasions deliver social value; but every shortfall in data quality, in decision quality, and in control over abuses, affects the individual, and potentially in ways that are seriously detrimental to their interests.

A few recently-emerged social media services are 'born mobile', with geo-location intrinsic to their design. Foursquare is a high-profile example. The challenges that these new entrants posed to established players was so great that they adopted anti-competitive methods, with Dodgeball acquired by Google and closed down, and Gowalla purchased by Facebook and abruptly killed. However, during 2013, Google closed down its interim Latitude service in favour of partially-integrated features within Google+, and Facebook declared itself to be in transition to a much stronger orientation towards mobile users (Womack 2013).

Despite the enormous privacy-sensitivity of location data to a wide variety of user-categories, all major social media service-providers encourage disclosure of location, and all have very lax privacy controls. This creates considerable vulnerabilities for every user, and has very serious implications for some, particularly those in the many categories of persons-at-risk (Clarke 2001, GFW 2011).

3. The Emergence of Consumer-Oriented Social Media

The social media services that emerged during 2004-2010 benefited from what transpired to be massive user enthusiasm for the services' mix of voyeurism and exhibitionism, and the thrill of being 'connected' with 'friends'. The widespread and rapid adoption brought with it a range of problems. Concern has been increasingly evident among commentators, and increasingly among users as well (e.g. Opsahl 2010, O'Connor 2012).

There is a considerable lag before critical articles appear in the refereed literature. For example, in the Bled Proceedings, 'social networking' appeared for the first time only in 2008 – 4 years after the term entered mainstream use – and during 2009-13 the term appeared in the Abstract of only 12 papers (5.5%). The phrase 'social media' first appeared only in 2010, with 13 papers during 2010-13 using it in the Abstract (7.8%). Mentions in the text, however, were consecutively 6, 11, 20 and 15 (i.e. 33% of all papers during that period). Moreover, a review of these papers found that all adopted a business perspective, and none addressed the topic focussed on in the present paper. The research work of which this paper is an outcome treats consumer needs as the primary driver of design. The service-provider's desire for market-share, revenue and profit is accepted as being a relevent factor, but is regarded as constraint rather than as objective.

Academic literature relevant to the analysis being conducted here is in short supply, in the Bled Prcoeedings as elsewhere. Regard was had to the technical media. A review was also undertaken of the considerable number of tools, prototypes and services that have emerged that are intended to be, or are at least projected as being, consumer-oriented. The origins of those projects vary, but an important stimulus has been the

desire for tools for communication and collaboration among groups that perceive themselves to be under threat from governments or corporations.

Table 3 presents a list of relevant services, drawn from the formal literature and the media of the period since 2005. The field has featured a scatter of many, small initiatives, and hence an exhaustive list is infeasible. The list is, however, reasonably comprehensive. There are very substantial differences among the projects in the list. Some are user-facing, whereas others are infrastructural in nature; some are operational, whereas others are 'in beta', and some are merely aspirational; and some are related to mainstream commercial products, whereas others expressly blend social with economic objectives, and some are expressly or at least inherently counter-cultural.

Table 3: Consumer-Oriented Social Media Services

Appleseed	Defunct?
Crabgrass	"Social networking, group collaboration and network organizing ... tailored specifically to meet the needs of bottom up grassroots organizing"
cyn.in	"Open source collaboration software"
Diaspora*	"A distributed social network", "reengineering the way online socializing works"
Duuit	Dormant?
elgg	“A social networking engine, delivering the building blocks for fully-featured social networks and applications"
Friendica	"Think WordPress or Drupal, but for social"
GNU social	Merged into StatusNet in June 2013
identi.ca	Previously a front-end to StatusNet, now to pump.io
Kune	For collaborative management of a collective
Lorea/N-1	A fork of Elgg
OneSocialWeb	Dormant
OpenSocial	"Standards-based component model for cloud based social apps"
Personal Containers	"Federated data sources"
pump.io	"Social Server with an ActivityStreams API"
StatusNet	"Free and Open Source social software", whose commercial target is enterprise social networking
Tent	"A protocol for open, decentralized social networking"
Thimbl	"Distributed micro-blogging platform"

An indication of the level of academic interest in these initiatives is provided by searches in Google Scholar. The most prominent of the services is Table 3 is Diaspora* – the asterisk is part of the name that the team uses for the product (Bleicher 2011, Cox 2013 pp. 60-80). Diaspora* has been addressed in very few academic papers, and very few of the papers that mention it have more than a handful of citations. It appears that StatusNet has recently been attracting some attention, in particular as infrastructure over which research experiments can be performed.

An indicator of the level of use of these services can be gained from Wikipedia catalogues. Some, but by no means all of them, appear in the Wikipedia Comparison of software and protocols for distributed social networking. On the other hand, in February 2014, the Wikipedia catalogue of social networking sites identified only two as having a substantial user-base – Diaspora and identi.ca, each with a little under 400,000 users. Of the other 16 services listed in Table 3, only Friendica even appeared in the catalogue. The catalogue contained 100 services whose user-base was claimed to be in excess of 400,000. Each of the top 60 was shown as having in excess of 5 million users, and their total user-count was shown as 5.5 billion. If those numbers were treated as being authoritative, the users of existing consumer-oriented social media would appear to number of the order of 0.01% of the total social networking services user-base.

The following section utilises the sources discussed above to identify key features of consumer-oriented social media. The subsequent sections then turn to the question of why these services are being used by so few people, and what can be done about the impediments to adoption.

4. Features of Consumer-Oriented Social Media

There are five broad areas in which features of existing social media services are at least unsatisfactory in terms of their fit to consumers' needs, and are arguably seriously detrimental to consumers' interests. These areas are:

- Distributed Architecture
- Interoperability
- Portability
- Terms of Service
- Privacy

The following sub-sections consider each in turn.

4.1 Distributed Architecture

Almost all social media services to date have used client-server architecture. This provides the service-provider with control over the individual's content. A fully peer-to-peer (P2P) architecture, on the other hand, leaves that control in each individual's hands. Alternatively, and more practicably in large-scale applications, semi-P2P architectures distribute content and control across many participant-controlled devices and thereby greatly reduce the power of the service-provider over the users' data. Narayanan et al. (2012) examines characteristics of distributed architectures for social networking.

The following summary of the argument appears in Moglen (2010):

" ... if you have a system which centralizes servers and the servers centralize their logs, then you are creating vast repositories of hierarchically organized data about people ... that they do not control and ... will not understand the comprehensiveness of, the meaningfulness of, ... the aggregatability of.

" ... we built a network out of a communications architecture design for peering which we defined in client-server style, which we then defined to be the dis-empowered client at the edge and the server in the middle. We aggregated processing and storage increasingly in the middle and we kept the logs ... in centralized places far from the human beings who controlled or thought they controlled the operation of the computers that increasingly dominated their lives. This was a recipe for disaster.

"We need to re-architect services in the Net. We need to re-distribute services back towards the edge. We need to de-virtualize the servers where your life is stored and we need to restore some autonomy to you as the owner of the server ... This is technical challenge for social reason.

"We need a really good webserver you can put in your pocket and plug in any place ... a freedom box".

Inspired by Moglen, and fuelled by one of the many rounds of privacy-invasive behaviour by Facebook, Diaspora* implemented a distributed architecture (Musiani 2010, Franchi & Tomaiuolo 2012). Indeed, the name implies it, because 'disapora'means dispersion or scattering. A user may install a 'pod' (server) on their own device, or may instead use a 'community pod'. A pitch by the Diaspora* team ran "In real life we talk to each other. We don't need to hand our messages to a hub and have them hand it to our friends. Our virtual lives should work the same way" (Bleicher 2011, p. 50).

4.2 Interoperability

Most services have worked very hard to capture their users within a 'walled garden', with pages pasted on the inside wall and denied to outsiders, and users' interactions trapped inside the service-provider's proprietary messaging scheme. The originator of the Web has criticised this approach for many years, e.g. Cox (2007). He has summarised the problem as follows: "closed, 'walled gardens', no matter how pleasing, can never compete in diversity, richness and innovation with the mad, throbbing Web market outside their gates. If a walled garden has too tight a hold on a market, however, it can delay that outside growth" (Berners-Lee 2010, p. 83).

In a consumer-friendly design, not only does the user determine the degree of openness, but the content and messages are open to other people who the user authorises, irrespective of whether those people are connected to, or even members of, that user's service-provider. This requires the use of open protocols such as http and smtp/pop/imap and/or associated open standards for inter-operation among multiple services. A model of interoperable social media architecture is in Yeung et al. (2009), an outline of the 'federated social network' notion is in Esguerra (2011), and further discussion and a case study are in Cabello et al. (2013).

All forms of interoperability are naturally opposed by those with dominant market-shares, because it reduces the exclusivity, and hence the value, of their 'walled gardens', increases customer 'churn', increases the cost of acquiring and retaining customers, and shifts power back towards consumers.

4.3 Portability

Existing services not only trap a user's profile-data, messages and content inside the provider's walled garden, but also provide inadequate means for them to be rescued and transferred across into an alternative environment. A limited exception is Google, which supports export of some forms of data from a small number of Google services by means of its Takeout Product.

Portability is vital to enable user choice. This is not merely a social argument; it is well-grounded in economics. Monopoly prevents the efficient use of resources. Competition is crucial, and competition depends heavily on 'switching costs' being low. If social media users cannot extract their content and postings, the costs of switching from one service-provider to another include the abandonment of their entire archive.

4.4 Terms of Service

The contract between users and the service-provider is dictated by the Terms of Service imposed by that organisation. Previous research has identified a substantial set of problems from the perspective of consumers, across the entire range of consumer protection areas (Clarke 2008a, Svantesson & Clarke 2010, Clarke 2010a, 2010b, 2011).

A 'Bill of Rights for Users of the Social Web' (Smarr et al. 2007) asserted rights of ownership (whatever that might mean in the context of data), control of whether and how much personal data is shared with others, and the 'freedom to grant access' to personal data. This fell a long way short of being an effective or a sufficient formulation from the viewpoint of consumer rights, however. An alternative and somewhat more workable formulation, arising from a session of the Computers, Freedom & Privacy Conference (CFP 2010), is reproduced in Table 4. Another expression of users' requirements is in Exhibit 4 of Clarke (2011).

4.5 Privacy

There has been, and continues to be, a great deal of abuse by social media service-providers of their users' privacy (Handel 2011), and a great deal of media coverage has resulted. There have been claims that privacy norms and laws need to be adapted to reflect the circumstances of social media. For example, Cox (2013, pp. 81-82) refers to data protection, as that term is implemented in Fair Information Practices instruments, as 'institutional privacy', and identifies additional needs, referred to as 'social privacy' relating to the unintended or otherwise inappropriate re-posting of personal data. A deeper assessment is in s.2 of Clarke (2014), and a catalogue of specific issues is provided in a companion Working Paper arising from this research project, in s.4.3 of Clarke (2013).

Table 4: A Social Network Users' Bill of Rights

1. **Honesty**: Honor your privacy policy and terms of service.
2. **Clarity**: Make sure that policies, terms of service, and settings are easy to find and understand.
3. **Freedom of speech**: Do not delete or modify my data without a clear policy and justification.
4. **Empowerment** : Support assistive technologies and universal accessibility
5. **Self-protection**: Support privacy-enhancing technologies.
6. **Data minimization**: Minimize the information I am required to provide and share with others.
7. **Control**: Let me control my data, and don't facilitate sharing it unless I agree first.
8. **Predictability**: Obtain my prior consent before significantly changing who can see my data.
9. **Data portability**: Make it easy for me to obtain a copy of my data.
10. **Protection**: Treat my data as securely as your own confidential data unless I choose to share it, and notify me if it is compromised.
11. **Right to know**: Show me how you are using my data and allow me to see who and what has access to it.
12. **Right to self-define**: Let me create more than one identity and use pseudonyms. Do not link them without my permission.
13. **Right to appeal**: Allow me to appeal punitive actions.
14. **Right to withdraw**: Allow me to delete my account, and remove my data.

Existing services offer a variety of features that address particular aspects of the privacy-intrusiveness of exploitative social media. For example, Diaspora* incorporates not only the scope to operate isolated sub-services run on a local server (or 'pod'), but also better control over groups (called 'aspects'), recoverability of postings, and specific support for pseudonyms.

5. Impediments

There is a degree of clarity about the appropriate features of consumer-oriented social media, and a considerable number of projects have been commenced to deliver services with various sub-sets of those features. A proportion of those services have been launched, yet very few have significant numbers of users. This section draws on the results of the analysis to identify what appear to be the key impediments.

One of the few teams to have addressed this question identified the following reasons for the delay in the emergence of 'free Social Networking Services': "a lack of material and economic resources; a lack of interest in what many considered to be a teen fad with little potential for the self-organization of civil society; or the inability of social movements to capitalize and innovate on the fundamental principles they practice within cyberspace: participation, horizontality and collective intelligence" (Cabello et al. 2013). This section considers the following factors:

- lack of effective demand drivers
- dominance of the exploitative business model
- lack of service quality
- lack of scalability

5.1 Demand Drivers

Adoption of a category of services is predicated on the existence of factors that drive users to those services. Effective demand is dependent on a number of pre-conditions, such as awareness, perceived usefulness and perceived ease-of-use (Chuttur 2009). It would require empirical research to test the assumption, but it appears that relatively few users would currently adopt such services even if they were aware of them. There is a lack of understanding of the problems with existing services, and of the availability of alternatives that do not suffer from those problems. There are also strong counter-drivers, because existing services are designed to be compelling, to serve individuals' hedonistic needs, to fit with whatever passes for fashion at the time, and to fit conveniently with individuals' life-patterns.

A further, important factor is that the network effects involved in social media favour incumbents. As long as the small number of services that have achieved dominant market-share remain closed, 'walled gardens' – by denying interoperability and portability – new entrants, not only those that are conventionally exploitative but also those that are consumer-oriented, are unable to achieve penetration.

5.2 Business Model

Although the closedness of the dominant social media providers is a major factor, so too is the success of their business model. Research is needed into the keys to that success. It appears to be a combination of marketing and design that targets individuals' hedonist impulses and the current penchant for self-exposure and outright exhibitionism, linked with the super-profits that arise from monopoly, and the over-valuation and consequential high capital-raising capabilities that arise from the prospect of super-profits.

A deeper appreciation of the conventional model can be informative to endeavours to develop, promote and sustain services without exploiting personal data in ways that conflict with users' needs and reasonable expectations.

5.3 Quality

Diaspora* and similar services have suffered from the same problem as most other software developed over the last one to two decades. Software development is dominated by quick-and-dirty coding methods, glorified as 'rapid application development', which features the substantial absence of requirements analysis, requirements statements, architectural frameworks, and design specifications, and a failure to deliver product and service documentation, resulting in dependence on crowd-sourced FAQs. This results in poor fit to users' needs, a high incidence of design errors and coding errors, the continual emergence of security vulnerabilities, instability in architecture, and unpredictability of the scope of bug-fixes and changes.

Commercial enterprises that are suitably capitalised and/or achieve substantial revenue flows can limp along for many years, coping with low software quality by throwing resources at the problems. Suppliers of consumer-oriented social media have to date lacked large-scale funding, are unable to buy their way out of software quality problems, and hence the service-quality problems remain, fester, damage customer

loyalty, and result in drift of users away from the site, which leads to negative network effects, decline, and death.

5.4 Scalability

With only rare exceptions, consumer-oriented social media have been developed using tools that are to hand, rather than tools that have been carefully selected to fit the need. Services developed using such tools seldom run efficiently. Those services that achieve significant adoption quickly run into the problem that demand grows exponentially, and the service's inefficient back-end software and data management cannot support it.
It is common for successful services to be in a state of continual redevelopment, including frequent upgrading or replacement of infrastructure, in order to keep the service running as increasing numbers of users adopt it. This requires significant levels of funding, which are often not available to most providers of consumer-oriented social media. As a result, users suffer slow service, customer loyalty is affected, users drift away, and success breeds failure.

6. Means of Overcoming the Impediments

In order for the impediments identified in the previous section to be overcome, it appears that three sets of measures are necessary. Designs need to address needs, public understanding needs to be much-enhanced, and alternative business models need to be articulated and implemented, sufficient to support professional levels of quality and scalability.

6.1 Design

To project themselves as being consumer-oriented, service-providers need to exclude those features that are associated with exploitation, and incorporate a sufficient sub-set of the features described in section 4 above.

Interoperability and portability are highly advisable features. Peer-to-peer architectures, beyond denying data control to the service-provider, are inherently scalable. If a distributed architecture of that kind is not implemented, then a much larger sub-set of consumer-friendly terms of service and privacy features is likely to be needed.

6.2 Understanding

Academics and some of the more thoughtful media commentators have documented the negative aspects of exploitative social media, and the harm that they embody. But intellectual discourse has little impact in the marketplace. Adoption of consumer-oriented social media depends on users feeling the difference, and hearing and seeing the messages, in language that relates to their worlds, and conveyed by people who they regard as influencers. Rather than being aimed at users generally, they need to be targeted at user segments that have a need for the features that they offer. The various categories of persons-at-risk are identified in Clarke (2001) and GFW (2011).

Key aspects of marketing communications theory and practice need to be applied, in order to achieve 'mindshare' among target audiences, and among channels to those target audiences. Media are to a considerable extent regurgitators of media releases.

Promoters of consumer-friendly social media services need to project themselves as organisations of substance, and present their case in forms that fit to the channels' self-image and formats, and that reflect the fashions of the moment. It is essential to be ready to leverage off the public relations disasters that exploitative social media continually create for themselves. In effect, promotions need to be 'in the can', ready to launch, when an opportunity presents itself.

6.3 Alternative Business Models

A new service needs to launch with a critical mass of features, with a user interface that is better than merely adequate, with service-quality comparable to that of existing services, and with the capacity to scale with demand, and to fix bugs, add features, and adapt interfaces – and even offer alternative interfaces. That requires a sufficient investment prior to launch, and a sufficient set of resources during the ramp-up phase.

Many alternative business models are available, well beyond what this paper has referred to as the exploitative model that dominates contemporary social media services. A framework was provided by Exhibit 4 of Clarke (2004b), comprising answers to the questions 'Who pays? For what? To whom? and Why?'. The application of the framework to 'content commons' was documented in Clarke (2007). Examples provided in those articles and the sources that they reference include support by government agencies for services that fulfil their mission statements, government subsidies, corporate cross-subsidies (i.e. business enterprises supporting loss-making services that are complementary to their other products and services), sponsorship and patronage e.g. by philanthropic and religious organisations, advertising that offers less-precisely-targeted placements for lower costs than exploitative outlets, and subscription fees for value-added services such as 'vanity press' blogs.

As the benefits of consumer-friendly social media become more widely understood, some mainstream commercial providers may be tempted into the field – particularly those that are unable to gain sufficient market-share to reap monopoly profits. For example, the prospect exists that corporations that sell 'enterprise social media' and 'teamworking support tools' (such as Box, Chatter, Jive, MangoApps and Yammer – see YA 2014) may support gratis open services as a viral marketing channel, promoting the brand and associating a 'feel-good' factor with it.

Naturally, as alternative approaches begin to represent a threat to powerful corporations, those organisations will adopt countermeasures as they seek to protect or at least prolong their monopolies. Because of the scale these organisations have achieved, their economic power over Congress, and their surveillance significance to the US Administration, the companies will be able to enlist government support for their stifling of competitors.

7. Conclusions

Consumer-oriented social media services are needed, as an antidote to the exploitative approach adopted by providers during their first decade. Public understanding of the nature of existing social media services appears to be increasing. The dominant service-providers, particularly Facebook and Google, show no signs of reducing the exploitative

nature of their business models, and hence it appears likely that the proportion of the customer-base that will seek alternatives will increase. A key question is how consumer-oriented social media services will come into being, and survive long enough, to establish critical mass. The research reported on in this paper has consolidated the information available in the area. It suggests that the articulation of alternative business models is the single most important factor that will determine ventures' success or failure, and that a market focus, and appropriate architecture and design features are also significant considerations.

Opportunities for research present themselves in relation to the ease of delivery of infrastructure, adaptability and scalability. Social science research is needed in order to determine the trade-offs among various features. Surveys provide data of only limited quality, and controlled experiments appear to be a much more promising technique. Deep case studies are needed of successful and failed projects. Relevant information generated by well-conceived instrumentalist research could make valuable contributions to overcoming the impediments that have held back the emergence of consumer-friendly social media.

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Appendix 1: 1-with-1-and 1-with-Few Interaction Tools

- since the early 1970s, networked text **email** (asynchronous)
- since **t**he mid-1970s, networked text **chat / IM** (synchronous)
- since the mid-1980s, **SMS / texting** from mobile phones
- since the early 1990s, **email-attachments** in any format (asynchronous)
- since the early 2000s:
  - **voice** over the Internet (VoIP and Skype) (synchronous)
  - **voice tele-conferencing** over the Internet (VoIP and Skype) (synchronous)
- since the mid-2000s:
  - **videophone** over the Internet (such as Skype Video) (synchronous)
  - **video-conferencing** (such as Skype Video) (synchronous)

Appendix 2: 1-to-Many Broadcast Tools

- since the late 1970s, bulletin boards systems (**BBS**)
- since the early 1980s, **Usenet** / netnews
- since the mid-1980s, **email lists**
- since the early-to-mid-1990s, **web-pages**
- since the mid-to-late 1990s, discoverable by means of **search-engines** (Lycos, Altavista, Google, Bing, etc.)
- since the early 2000s:
    - **blogs** (such as WordPress and Blogger). See also the Wikipedia catalogue
    - **micro-blogs** (such as Twitter and Tumblr). See also the Wikipedia catalogue
    - **glogs** (originally 'cyborg-logs' generated by means of wearable wireless webcams – Mann 2002, but recently also retro-nymed as 'graphical blogs')
- since the mid-2000s, **'content communities'**, e.g.
    - for **images** (such as deviantArt, Flickr, Picasa, Pinterest and Instagram). See also the Wikipedia catalogue
    - for **videos** (such as YouTube, Flickr and Instagram). See also the Wikipedia catalogue
    - for **slide-sets** (such as Slideshare). See also the Wikipedia catalogue
    - closed (or 'walled-garden') **'wall-postings' within 'social networking services'** (such as Plaxo, MySpace, LinkedIn, Xing, Facebook, Google+ and Foursquare). See also the Wikipedia catalogue

Appendix 3: 1-with-Many Sharing Tools

- **Content Collaboration**
    - since the mid-1990s, **wikis**, most strikingly in Wikipedia and related communities. See the Wikipedia catalogue
    - since the late 1990s, **social news sites**, such as Slashdot, Reddit and Newsvine. See also the Wikipedia catalogue
    - since the mid-2000s, **online office applications**, such as Zoho, Google Docs and MS Live Office
- **Indicator-Sharing**
    - since the mid-2000s, **'social bookmarking'** (such as Delicious) – short, free-text tags assigned by users to content in order to produce folksonomies that support searching (Smith 2004). See also the Wikipedia catalogue
    - since, the mid-2000s, recording of **approvals and disapprovals** (such as Digg's digging and burying, Reddit's up and down rankings, StumbleUpon's thumbs-up and thumbs-down, Facebook's Like button, and Google+'s +1 button), and more complex **'rating'** mechanisms

- **Action**, especially that associated with Multi-Player Networked Gaming
  - since the early 1990s, text-based Multi User Dungeons and Dragons (**MUDDs**)
  - since the early 2000s, **social gaming** sites such as Friendster
  - since the early 2000s, high-quality animation Massively Multiplayer Online Games (**MMOGs**), particularly Role-Playing Games (MMORPGs), e.g. World of Warcraft
  - since the early 2000s, **online virtual worlds** such as Second Life

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Inhibitors, enablers and social side winds Explaining the use of exercise tracking systems

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Abstract

There has been a vast research interest in exercise tracking systems as they are hoped to boost motivation for exercise and thus improve users' health. However, research activity on actual use and experiences on using such systems has been mild: one has been more interested in the consequences of use than the use itself. To address this gap, we report a study, in which we examined the use of exercise tracking systems (i.e. physical devices with connected services and information systems) in their contexts of use. The study was based on diary data collected in Finland. Analysis of the data was based on a framework describing various techno-determinant inhibitors and enablers of technology use. Our study showed that the use could not be described by techno-deterministic factors only. Therefore, as a theoretical contribution, to capture the whole diversity of exercise tracking systems use, we supplemented the framework with two new categories, social and self. The results are discussed in the light of motivational factors of technology use, social participation and the evolving role of information technology as it comes pervasive and ubiquitous. Exercise tracking system providers may utilise our context-specific findings to improve their products and services.

Keywords: Inhibitors, enablers, social, sport technology, technology use

1 Introduction

Changes in work and everyday life have had a substantial effect on the physical activity and exercise habits of people in western societies: the level of physical activity of individuals has dropped drastically over the past twenty years. As work as such has changed, more and more people work sedentary and even the leisure time is dominated by sitting: one is often spending time sitting in front of a television or a computer. Thus, researchers have started to talk about

sedentary lifestyle. (Matthews et. al. 2008, Juutinen-Finni 2010.) These changes in the way of life can be seen in the physical fitness of individuals as well: according to extensive population studies, it has decreased substantially e.g. in Finland. The level of physical activity and general physical fitness of Finns are forecasted to deteriorate also in the future. (Heiskanen et. al. 2011.) This development is considered extremely alarming, as poor physical fitness and low levels of physical activity are connected with many health risks, e.g. cardiovascular diseases and musculoskeletal disorders, which in turn lead to extremely high spending in health care (Borodulin 2006).

Because of its importance from the points of view of both public health and finance, promoting physical activity has become one of the key activities in western societies. By encouraging people to be more physically active, one hopes to prevent or at least diminish the threatening health problems and associated health care costs.

(Post)modern western societies are characterised by the ubiquitous use of technology physical activity being no exception. As well the intentional sport and exercise as everyday physical activities are nowadays quite often accompanied by technology: various monitoring devices (heart rate monitors, activity bracelets, mobile fitness apps…) and digital services connected to them are widely used as a part of the sport experience. By now, prior studies on these exercise tracking technologies have focused either on their use in measuring the level of actual physical activity (mainly for research purposes) or on their motivational role adding individuals' adherence to general guidelines on desired amount of physical activity (cf. e.g. Butte, Ekelund & Westerterp 2012 or Bravata et. al. 2007). This kind of focus is easy to understand considering the afore-mentioned goals of promoting physical activity for health reasons.

Earlier, we have researched the usage intentions and demographic variables explaining the use of exercise tracking devices (Makkonen, Kari, Frank & Moilanen 2012a; Makkonen, Kari, Frank & Moilanen 2012b; Makkonen, Kari, Frank & Moilanen 2012c). However, it is at least equally important to understand the previously uncovered reasons why individuals choose to use – or not to use – exercise tracking systems. To address this gap in research, the aim of this study is to find out, how these technologies are used in the actual contexts of use and what kind of experiences and feelings are connected to their use. It is also important to consider the fact that devices do not alone comprise a technology in use, but it is rather a system. Therefore, we opted for using the concept of *exercise tracking system*, with which we want to emphasise the fact that the physical device being used is only a part of a larger system delivering the benefit the user is seeking. In our view, the physical devices can be seen as distribution mechanisms for the benefits and services as suggested by Vargo and Lusch (2004) in their seminal work on service-dominant logic. Simultaneously they are, however, complicated technological creations with substantial abilities to serve – but also e.g. to irritate – the user.

In this article, we present the results of a study, for which we recruited a group of people to use an exercise tracking system (consisting of a Suunto Ambit 2 wristop computer and a sports community called Movescount (for more information on Movescount, see Malinen & Nurkka (2013)) for a limited period of time. Our aim was to understand the technology use at the level of an individual: what are the factors promoting or preventing the use of such systems? As a theoretical contribution, we extend previous frameworks regarding inhibitors

and enablers of technology use and provide new context-specific knowledge on exercise tracking systems use. For practical implications, our results assist exercise tracking system providers in finding ways to promote their use and to refine them to true persuasive technology tools (cf. Fogg 2003, 32) and in that way to increase the physical activity level of individuals and help them in their quest for better health.

2 Theoretical Background

In our research, we see exercise tracking systems as IT-artefacts – as man-made pieces of technology with some information processing and mediating capabilities (Sjöström & Goldkuhl 2009). The system consisting of the actual physical device, the service available on the web and the computer systems behind all this can also be seen as an information system built in order to satisfy the desires of the system user (the individual engaged in exercise to be tracked), and therefore we decided to refer to the information systems science when considering theoretical background for our study.

There is a long and solid tradition on theorising the adoption and use of technology and information systems, and a vast amount of theories explaining this phenomenon exists. These theories can be divided into two categories according to whether they are based on technological determinism or social constructionism.

In hard technological determinism, technology is seen as an independent actor, which is created autonomously as a consequence of actions of its developers, and it enters a social system from outside. After this entrance, one is no longer interested in its further development within a system. Best-known examples of hard technological determinism are the diffusion of innovations theory by Rogers (1962) and technology acceptance model by Davis (1989). Soft technological determinism recognises the social consequences of introducing technology into a social system, but one believes that they can be controlled by the developer both at technical and at social level (Markus & Robey 1988). In other words, technology is determined by its developers, and technology has an effect on its users (Orlikowski 1992).

Theories based on social constructionism (originally Berger 1967) abandon the basic assumption of technology being the catalytic factor itself. Instead, they see technology and its development, adoption and use being intertwined with the social system. Examples of theories on this field are a model known as SCOT (social construction of technology, Pinch & Bijker 1984) and the model of social shaping of technology (Williams & Edge 1996).

2.1 Inhibitors and enablers

In theories describing information system success, emphasis has been on techno-determinant factors. One of the best-known models of information system success was developed and updated by Delone & McLean (1992, 2003). The latest version of the model (DeLone & McLean 2003) identifies six success factors (system quality, information quality, service quality, use, user satisfaction and net benefits) based on 90 empirical studies examined and the results summarised.

Cenfetelli and Schwarz (2011) point out that just as Delone & McLean's model (1992, 2003), all dominant theories on technology adoption and use are focusing exclusively on the factors affecting positively on the adoption and use decisions. They refer to these factors as *enablers*

and emphasise that to fully understand the phenomenon of the technology use, one has to pay attention to the factors inhibiting technology acceptance as well. These factors are referred to as *inhibitors*.

To test the role of inhibitors, Cenfetelli and Schwarz (2011) interpreted the DeLone & McLean (1992, 2003) model to present six enablers, of which three are connected to system and three to information, and defined the corresponding inhibitors. The enablers connected to system ("user's evaluation of the technical capabilities of the system and its usability") are reliability, flexibility and responsiveness, whereas enablers connected to information ("user's evaluation of the system's conveyance of semantic meaning and/or communication of knowledge) are accuracy, currency and completeness. The inhibitors defined by Cenfetelli & Schwarz (2011) based on a series of empirical studies are system-dependent inhibitors intrusiveness, effort redundancy and process uncertainty. Information-dependent inhibitors are respectively information overload, irrelevant requests for information and deceptiveness. For the definitions of these inhibitors, see Table 1 in section four (Results).

The framework suggested by Cenfetelli and Schwarz (2011) can be considered techno-determinant as it in no way refers to the social aspects of technology or information systems use. We wanted to assess its appropriateness and potentially extend it in the case of exercise tracking systems, which are used in the personal sphere of life normally tightly connected to the context of use and the social world of the user.

3 Methodology

3.1 Approach and methods

Our study can be defined as a diary study based on phenomenographic approach – as Limberg (2000) has put it: we had human experience as our research object. Diary study as a method was selected, because it is able to provide more authentic information on human-technology relationships and technology use *in situ* (e.g. experiences and feelings), as the so-called presentation effects (i.e., participants may act differently because of the presence of the researcher) are diminished (Carter & Mankoff 2005). Since users were free to report the experiences of their choice, it is likely that they have reported experiences and incidents with especially strong meaning from their point of view. This brings our study to the direction of critical incident technique (CIT) originally presented by Flanagan (1954). Our study also presents some of the methodological strengths generally associated with CIT: 1) we believe to have captured issues that might have been missed with other methods as responses were not forced to a predetermined perspective or framework, 2) the users have reported their experiences in their own words without being restricted to any specific model or set of terminology and 3) we have accessed users' actual (though reported) behaviour versus prospective and ideal behaviour (Gremler 2004; Holloway & Beatty 2008; Serenko & Stach 2009).

3.2 Participants and data collection

The voluntary participants (five men and five women with various exercise backgrounds) of our study were given a Suunto Ambit 2 –wristop computer with the instructions and other

material they would have got if they had acquired the product at a shop by themselves. In addition to this, they were instructed 1) to use the device and connected services regularly in real-life situations for at least six weeks and 2) to keep a diary (to take notes) of their feelings, opinions, thoughts and concrete occurrences they experience during the test use. No specific requirements for the reporting (form, length, tone etc.) were set. These written experience diaries form the research data of our study. All participants were also asked for their informed consent for the use of the information provided by them in scientific research.

3.3 Descriptive level analysis

The process of qualitative data analysis was based on the NCT-model (noticing, collecting, thinking) adapted from Seidel (1998, according to Friese 2012, 228-239). In our case, the process was recursive, as we moved back and forth between noticing and collecting. We started our analysis by assessing the user-diaries by close reading them in order to preliminary determine the fit of the selected theoretical framework to be used in the analysis. During this phase, we also defined a code list based on the theoretical framework (categories of codes being enablers and inhibitors) and context-dependent attributes emerging from the data. We discovered that while the selected framework was suitable to be used as the basis for the analysis, the diaries also contained aspects, which seemed hard to be explained with the selected framework. Therefore, we opted for the possibility to use open coding as well. The systematic coding of the diaries was done with ATLAS.ti –software for qualitative data analysis. We used both the predetermined code list and open and in vivo –codes, which were used to capture the aspects not explained by the theoretical framework. Our coding system can be considered as focused coding: we only coded segments connected to adoption and use of technology omitting e.g. users' reflections on sport as such.

3.4 Conceptual level analysis

After the data was coded, we started the second phase of the analysis, in which the data was seen from the perspective of the research task with the help of the selected theoretical framework. This phase can be described as deductive content analysis or theory-guided content analysis (cf. e.g. Krippendorff 2013 or Sandelowski 1995), and it consisted of iterative cycles of analysing the data by exploring the frequencies and co-occurrences of the codes, linking the codes together and analysing these linkages. As often with the deductive content analysis, the analysis framework covered only part of the aspects in the data. Therefore, we also inductively defined two new categories (in addition to enablers and inhibitors), namely *social* and *self.* Finally, we integrated our findings into a whole, which will be presented as the results.

4 Results

As expected, the users had reported especially experiences they regarded as important or critical for their interaction with the exercise tracking system. Not surprisingly, negative experiences prevailed in the diaries. Most of them were connected to the incompatibility of own desires and functions offered by the system. Some of the negative experiences were strongly connected to the perceived usability of system: e.g., the instructions offered by the

developers and manufacturers were regarded as extremely bad: they were ill structured and overwhelming in details.

4.1 Experiences using the system

In the noticing –stage of the descriptive level analysis we identified the experiences on using the system and classified them to negative and positive experience in the spirit of critical incident technique. Many of these experiences were then identified to be either inhibitors or enablers found in the framework, but to give a general impression of the user data, a summary of these experiences is presented below.

The negative experiences can be summarised as follows:

- Features of the system did not correspond to the desires of the user or the user was unable to find the feature corresponding her/his desires. The desires communicated by the users were connected to 1) one's own exercise background, 2) one's self-reflection of oneself as a person engaged in physical activity and 3) one's own experience as a user of technology.
- The use of the system was associated with a substantial usability problem, which prevented the user from performing the task desired. These problems had even aroused strong emotional reactions.
- The system had malfunctioned in ways unexpected by the user. The situations were especially connected to the use in actual exercising contexts, as the system malfunctioned technically or its function did not correspond to the mental schema of the user.

The positive experiences can be summarised as follows:

- The fluent functioning of the systems and corresponding feelings of flow were quite often mentioned as sources of joy. Especially stable and reliable presentation of context specific information (such as heart rate and speed) were experienced extremely positively.
- Quite often, the system managed to take its user by positive surprise with the produced information content or features the user was not expecting.
- The aspects of fun were mentioned especially when describing the experiences with the sports community on the web: it was regarded as some sort of game or play.
- The system was also reported to be able to strengthen users' self-efficacy or motivation in exercise.

4.2 Framework fit – inhibitors and enablers

As we analysed the collected data with the framework adopted from Cenfetelli & Schwarz (2011), we found it to fit to our study only partially: not all of the experiences reported by the users could be explained by the framework. Only one of the inhibitors (irrelevant requests for information) was not to be found in the data, whereas all the enablers could be found in the data.

Illustrative quotes from our data corresponding the components of the selected framework are presented in the Table 1 below.

Inhibitor	**Example**
Intrusiveness (system) *System performs tasks that were not requested or expected creating a task interruption.*	*I was orienteering. For some reason, the tracking stopped although I only wanted to mark a lap. I had to pay extra attention to it during the training.*
Effort redundancy (system) *System requires unnecessary repetition of already performed steps.*	*My boyfriend examines the device and notices that once again I've become a male weighing 75 kg. I had to create my profile again. (User is a woman.)*
Process uncertainty (system) *User is left unsure whether the system processed a request by the user.*	*I started my swim training and pushed the START-button. Everything I saw on the display was the symbol for swimming. I wasn't sure, if the device was tracking my swim or not.*
Information overload (information) *Too much information is provided beyond the user's needs resulting in perceptions of being overwhelmed.*	*Movescount had too many options for showing the data. Besides, I didn't understand many of the physiological variables and they weren't explained anywhere.*
Irrelevant requests for (information) *Requests for information that is irrelevant or of a nature not needed for system transaction.*	-
Deceptiveness (information) *System fails to meet promises or expectations and such failure is perceived as purposeful by the user.*	*I miss 12:32 from the beginning, since the thing is unable to find GPS. I'm really pissed off, although game itself is going fine.*

Enabler	**Example**
Reliability (system)	*The device measures everything you need accurately and reliably.*
Flexibility (system)	*I like the profiles for different sports. They make the device more versatile.*
Responsiveness (system)	*Device starts tracking training really quickly: it finds satellites and HR-belt almost instantly and is ready to go in no time.*

Accuracy (information)	*I never experienced any fluctuations or strange numbers (data) as I was using the device.*
Currency (information)	*The speed display is more stable and accurate than in my other device. It is a great thing in mountain biking.*
Completeness (information)	*It's great to be able to track the time and distance, to see in Movescount where you have been and where you have had the highest heart rates.*

Table 1: Examples of inhibitors (Cenfetelli & Schwarz, 2011, definitions directly from the source) and enablers (DeLone & McLean 1992, 2002) found in the experience diaries of the participants. Enablers are listed according to Cenfetelli & Schwarz (2011) – they are not directly presented in the referenced works. Illustrative quotations heavily shortened and edited for readability and typographic reasons.

4.3 Side winds

Although the explanatory power of the theoretical framework with our data was decent, we also found a remarkable amount of factors influencing the use and adoption of exercise tracking systems, which could not be explained by the factors of the theoretical framework.

Most of these factors were strongly connected either to the reference groups of the user or to the user's self-reflection or self-image. Users reported their context-dependent experience on their teammates, their personal impressions, successes and failures. In the conceptual level analysis it was determined that most of these factors could be categorised either as social factors or as factors strongly connected to the self of the user. Therefore, we decided to create two new categories in addition to inhibitors and enablers. These categories are the category *social,* which includes factors describing the social environment, connections and actions of the user and the category *self,* which represents the self-reflective components of the context-dependent behaviour or technology use. These categories with illustrative quotes from our data are presented in the Table 2.

Social	**Example**
Role of the significant others	*My partner is using a heart rate monitor and (s)he recommended the use also for me.*
Significant social ties to be supported	*My passion is triathlon and I want to be able to share my training data and discuss my training with the triathletes of my choice.*
Own role in the social world of context	*I do not consider myself an athlete – I am only doing exercise for my health and fun and I can't*

	imagine myself going to a gym.

Self	**Example**
Self-reflection in the context of use	*I don't want to be like those pro-runners in their tights, with their recovery drink belts and bleeping sport gadgets.*
Self-efficacy in the context of use	*I've never been good at sports, but I still try to do something to keep myself lively and fit.*
Motives for the activity to be supported	*I always wonder if my exercise is doing any good. I want to stay fit and get fitter, but going for a walk just feels far too easy.*

Table 2: Examples of factors of the categories of *social* and *self* found in the research data. Illustrative quotations heavily shortened and edited for readability and typographic reasons. Please, see note for the new categories in section 5.3.

The categories of *social* and *self* were not as dominantly present in the experiences of the user as inhibitors and enablers. It seems that the techno-deterministic components of adoption and use (in this case inhibitors and enablers) are the most important factors having influence on the decision of an individual. However, the factors of social and self seem to shape the adoption and use decision of the users. In addition to this, they might alter the interpretation of a given feature or context. Therefore, we refer to them as side winds. One can think of an aeroplane: its course and speed are mainly determined by the head- and tailwind (inhibitors and enablers), but the side winds (in our case social and self) have to be taken into account as well when calculating the necessary steering manoeuvres. Fundamentally, both the actual social components and the components connected to self are anchored to the social world the user is acting in. Therefore, they can be both seen as social side winds.

An important factor found in the user diaries was the gender-dependency of technology. The female users quite often perceived the tested system as masculine and especially the physical device was not regarded suitable to be used by women.

Both the original categories of inhibitors and enablers and the new categories of social and self are shown in the Figure 1 (below), which summarises our extended framework to explain the use of exercise tracking systems.

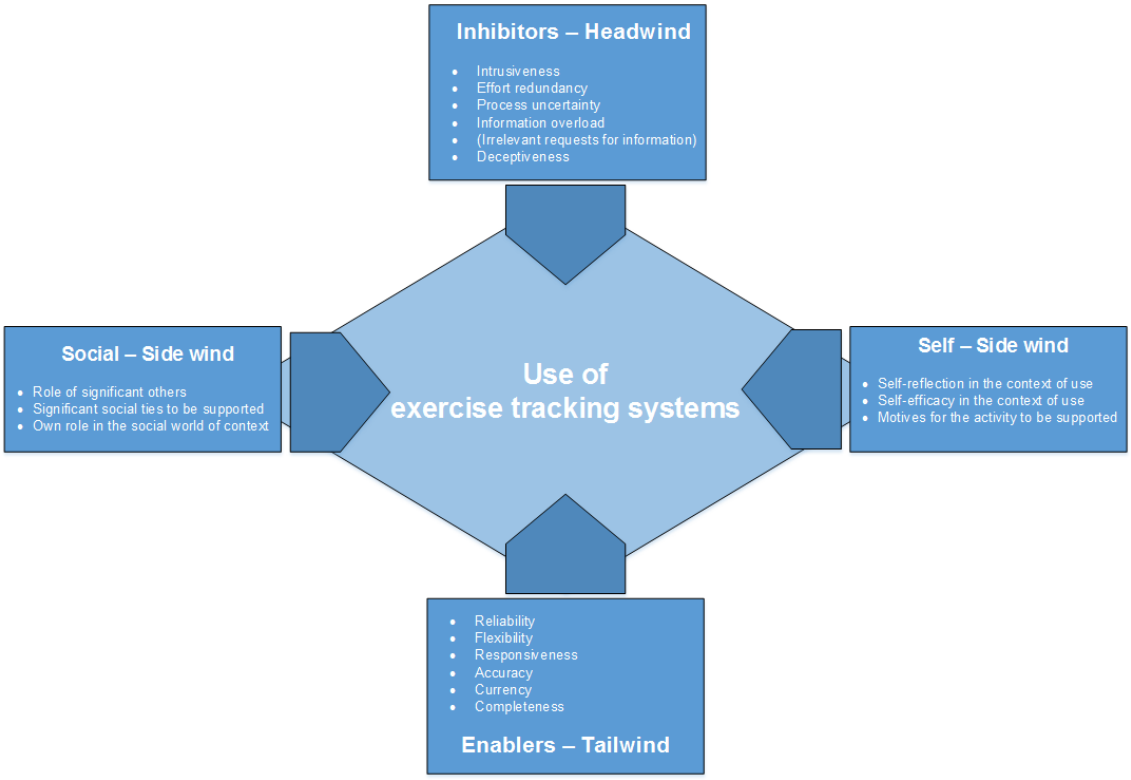


Figure 1: Extended framework to explain the use of exercise tracking systems. Framework is based on *inhibitors* and *enablers* as presented by Cenfetelli & Schwarz (2011) which are supplemented with the categories of *social* and *self* based on the data collected with user diaries.

5 Discussion

The selected techno-deterministic framework was quite adequate in describing the usage data. However, our study showed that in the case of individuals being the users, it is important to realise that enablers and inhibitors of technology use cannot be seen only techno-deterministically in relation to system and information.

First, one should consider the basic motives of using technology. Van der Heijden (2004) has distinguished utilitarian and hedonic information systems, the latter being strongly connected to leisure activities, focusing on the fun-aspect of use and encouraging prolonged rather than productive use. This is normally the case with exercise tracking systems, which are used in the private sphere of live. Techno-deterministic models of technology adoption and use are dominantly developed, used and researched in the context of utilitarian information systems, and the nature of information systems forms an important boundary condition for their applicability.

Second, the social context of the information system use becomes an important factor of technology adoption and use especially in the case of hedonic information systems used by

individuals. Therefore, the social world the users are acting in has to be taken into account as well. Unruh (1980) suggests that we simultaneously live in different social worlds and that our involvement in these worlds has an effect on our concept of our self and on our behaviour in these worlds. Our role in these worlds can vary depending on the level of our commitment to the given social world and we can be strangers, tourists, regulars or insiders – insiders being those in the inner most circles of the social world.

Koski (2008) has refined Unruh's thoughts by bringing them to the world of exercise. He has coined the concept of physical activity relationship (PAR), with which he refers to the relationship describing individuals' social encounters with the world of sport and physical activity not only by exercising but also by following, producing and consuming the meanings of sport and exercise. Consuming meanings may also be interpreted as consuming and using artefacts vital for the involvement in a given social world (Schouten & McAlexander 1995). Hence, an exercise tracking system can be seen as such artefact to be consumed or as a medium acting as a platform enabling producing, transferring and sharing meanings of a social world of exercise.

5.1 Research implications

DeLone and McLean (2002) state that an important reason for their ten-year update of the information system success model was the fact that "the role of IS has changed and progressed during the last decade". This development has not ended – on the contrary, it is now more rapid than ever. Information systems use of today is characterised by factors almost incomprehensible only a decade ago: consumerisation, pervasiveness, convergence and ubiquitousness of information systems are challenging not only the IS-developers but also scholars trying to understand their adoption and use. Therefore, our study attempts to extend the previous theorising on technology enablers and inhibitors by binding them with dimension of social and self.

As technology and information systems are ever more entering into the most private spheres of our lives and into the high-involvement contexts of our selves (such as sport and exercise), it is extremely important to understand, how they are conceived, adopted and used in these settings. To achieve this, one has to do research not only to describe or explain, but also to understand. This intrinsically requires complementing techno-deterministic models and methods with models and methods anchored in the social. These two methodological foundations should not, however, be seen as opponents or extremities, since both of them have explanatory power regardless of the technology, context or social ties. An important future research direction is the interplay of these two - also the factors appearing to be strongly linked to technology *per se* might be influenced by the social in some contexts. This applies to interpretation of inhibitors and enablers in general as well: to certain extent, they are also socially constructed by the users.

5.2 Practical implications

Exercise tracking system providers may utilise our context-specific findings to improve their products and services. In the user diaries, negative experiences were distinctively dominant compared to positive experiences. This is not a surprise, as e.g. prospect theory (Kahneman & Tversky 1979) describes an asymmetry between negative and positive impressions despite

them having a similar magnitude. As a result, negative impressions often overshadow positive impression when an object (in this case, exercise tracking system) is evaluated (Skowronski & Carlston 1987). However, many of the factors now conceived as inhibitors were actually neutral product characteristics or features, and they only became inhibitors just because of inconsiderate design or poorly structured instructions.

The exercise tracking system used in this study represents a state-of-the-art level in its class: the number of features is abundant or for some users, overwhelming – e.g. the user's guide of the physical device is 128 pages long. The system is designed by a company, which is known for its hobbyist product development strategy and for product development teams extremely passionate for sports themselves (Kotro 2005). In other words, the system was developed by people being insiders of a social world of sport and consequently it can be argued (or at least suspected) that it was developed also *for* people being insiders of a social world of sport.

Our study showed that the artefact designed appeared for many users as overly complicated, overwhelmingly capable and strongly linked to professional sports. Considering the market structure and high hopes on the use of exercise tracking systems as an aid to promote physical activity in general, we urge the developers for more active interaction with users in every circle of the physical activity relationship and social world of sport and exercise. In addition to this, the perceived gender-specificity should be taken into account as well: although technology products can never be totally neutral, they should be designed in a way that they are not perceived e.g. overly masculine, if they are intended to be used by both genders.

5.3 Limitations and future research

There are certain limitations for this study. This study was based on the input of ten users. Although saturation was detected on many areas of interest, the amount of data should be considered when assessing the results of the study. The amount of data also has an effect on the definition of the new categories of social and self : at the moment, they (including their names and factors) are quite abstract, but we hope to be able to define them more precisely as we collect more data on this research topic.

The study brought forward also many aspects strongly connected to the physical device or physical conditions of the system use. These aspects, which represented e.g. some aspects of physical usability, were not covered by the framework or by the new categories defined in this study.

In the future, the physical attributes of information systems use should be, however, researched further, as information technology is – as in the case of exercise tracking systems - becoming pervasive and ubiquitous (i.e. information systems are more often used e.g. through mobile devices).

The evolving nature of information technology into the direction of hedonic systems postulates the need for research especially in the areas connected to social and self. In addition to this, personal informatics – a class of tools used by people to collect context-specific personal information for purposes of self-reflection and self-monitoring to gain self-knowledge is an important technological direction and area of future research combining both the importance of physical attributes and relevance of the social understanding.

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Social Media Choice: An Explorative Study on Information Transmission via Social Media

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Abstract

From Facebook (i.e. a social network site) to Twitter (i.e. a microblog), a large variety of social media types and platforms facilitate information exchange among individuals. The information systems literature provides theoretical approaches to understand media choice, especially when multiple electronic media are available. In this empirical study, we seek to understand social media choice in the context of major business events. We explore how individuals make use of different social media types at different times during the communication process subsequent to the announcement of major business events. While controlling for other task-related influencing factors, our analysis provides evidence that the successive choices of social media types determine the task-related communication process.

Keywords: Social Media Types, Media Capabilities, Media Choice, Information Transmission

1 Introduction

Social media in general can be defined as: "a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content" (Kaplan and Haenlein, 2010, p.61). According to a survey of the Pew Research Center (2013), 42% of adults that are using social media, use multiple social media types and platforms. This raises two questions: Why do people use multiple social media types and platforms, and when do they favor one over the other?

Questions of media choice have always been an important topic in the IS literature. A large variety of empirical studies investigated media choice with respect to traditional media (e.g. fax, email or video/telephone conferences) (Daft and Lengel, 1986). Yet, to the best of our knowledge, no empirical study sheds light into the topic of social media choice.

According to the provided definition of social media, the generation of user-generated content (UGC) is a result of the use of social media by individuals on the internet. UGC can be defined as "i) content made publicly available over the internet, ii) which reflects a certain amount of creative effort, and iii) which is created outside of professional routines and practices" (OECD, 2007, p. 4). Therefore, the occurrence of UGC across different social media types related to a certain task can provide insights into the phenomenon of social media choice. In our empirical analysis we aim to explore social media choice by analyzing the communication process following merger announcements, where social media users are incentivized to transmit and process information in order to reduce merger-related uncertainties.

In the next section, we provide a review of the relevant literature and formulation of our research question followed by a description of used datasets and variables. Then we present our methodology and analysis results, followed by a discussion of our findings. We conclude with a summary of our findings, present limitations and describe potential future research directions.

2 Background and Research Question

Social media continue to pervade the life of internet users and are the primary choice of online social interaction and communication (Goh et al., 2013). Social media enables users to share information, to express feelings and opinions, and to build interpersonal relationships among users (Chiu et al., 2006). Burnett (2000) developed a typology of information exchange and classified information behavior of social media users. In addition, with respect to various topic areas (e.g. politics, business and products), social media are considered a reliable information source that supports users in their decision making process (e.g. consumer decisions or investment decisions) (Aggarwal and Singh, 2013; Weiss et al., 2008). Especially in the presence of informational uncertainties, individuals approach social media in order to satisfy their information needs and reduce uncertainties (Lu and Yang, 2011; Weiss et al., 2008). This explains why social media is responsible for the increased frequency of online information exchange and the creation of UGC.

Various types of social media have been identified by the literature. These social media types differ in their nature and functionalities. Social media types are e.g., blogs, microblogs, social network sites, message boards, collaborative projects, virtual social worlds and virtual game worlds. Kaplan and Haenlein (2010) propose a classification of social media types based upon media richness and social presence theory. These social media types are represented by existing social media platforms (e.g. Facebook, Twitter, YouTube or Second Life). Kietzmann et al. (2011) identified functionalities by which social media platforms can be classified: identity, conversations, sharing, presence, relationships, reputation, and groups. In our study we focus on social media types that are responsible for the generation of text-based UGC: blogs, microblogs, social network

sites, and message boards (Boyd and Ellison, 2007; Schmidt, 2007; Stieglitz and Dang-Xuan, 2013; Im and Chee, 2006).

While earlier media theory on media richness (Daft and Lengel, 1986) had a focus on medium's information richness, i.e. its capability to reproduce information, later theory also focuses on other, more functional, media capabilities. Media synchronicity theory (Dennis et. al, 2008) presents different media capabilities, which describe how a medium supports individuals that want to transmit and process information to accomplish a certain task, e.g. to acquire useful information in situations of uncertainty. These media capabilities are transmission velocity, parallelism, symbol sets, rehearsability, and reprocessability. Given these diverse media capabilities, media synchronicity theory suggests that "the 'best medium' for a given situation may be a combination of media" (Dennis et al., 2008, p. 588). Thus, there are repeated choices to use media at certain points in time during task-related communication processes. Each individual media choice and usage will then be affected by the fit of media capabilities and the task-related information needs at a particular time.

In this paper, we aim to explore individuals' combined usage of social media to transmit and process information in the context of situations of uncertainty. We therefore explore the communication process following a major business event (merger announcement) and the subsequent choice and usage of diverse social media types during this process. While existent research has explored the different capabilities and usage of more traditional media during communication processes (e.g. Mohan et al., 2009), to the best of our knowledge, there is no empirical study that explores the combined choice of social media (e.g. microblogs or social network sites) in the context of task-related communication processes.

Given the central hypothesis of media synchronicity theory that "communication performance will be enhanced when different media are used at different times" (Dennis et al., 2008, p. 576), we aim to empirically explore the usage of different social media types during the business-related communication processes following the announcements of major business events. On this basis, using the business context of a merger event we state the following research question:

How do individuals make use of different social media types at different times during the communication process subsequent to the announcement of major business events?

The event of a merger announcement (i.e. a major business event) represents an adequate context to investigate usage of social media in the presence of uncertainties. In the context of merger-acquisition events, Zülch et al. (2014) showed that information quantity in social media is driven by certain event and firm characteristics. In general, a merger announcement represents a situation of information asymmetries for investors and is followed by severe price reactions (Healy and Palepu, 2001; Asquith, 1983). Furthermore, information concerning a merger disseminated into the market is very complex (Loughran and McDonald, 2013). Investors and potential investors have to assess if a combination of two companies will achieve future strategic or synergetic gains (Chakravorty, 2012). Given the descripted circumstances, investors are incentivized to engage in information exchange via social media in order to reduce informational uncertainties (Herrmann, 2007). Several merger-related factors (i.e. event-related factors) represent reasons to exchange information concerning a merger. These

factors concern the strategic fit of the two merging companies (Goergen and Renneborg, 2004), the financial risk of the transaction (Louis and Sun, 2010), or the chosen method of payment (where cash-acquisitions signal confidence in a positive post-merger performance) (Yook, 2003; Goergen and Renneborg, 2004).

In addition, it is reasonable to assume that the extent of information exchange in social media concerning merger events is also affected by the characteristics of merging companies. Some events are more likely to be talked about than others based on the fact that people are more aware about some companies compared to others. Companies that are bigger in size, or receive more media coverage, or sell goods and services to consumers are more visible to social media users (Capriotti, 2009). These firm-related factors create visibility among people which may influence the extent of information exchange in social media that needs to be controlled for.

3 Data

3.1 Sample

Thomson Reuters SDC Platinum database (SDC) was used in our sample selection process. Our sample selection had several objectives. First, we focused on merger attempts of publicly listed companies with a deal value equal or higher $100 million in order to ensure that these transactions quicken interest for individual investors (Kau et al., 2008). Second, we focused on US mergers in order to ensure communication in English language. Third, in order to ensure increased social media coverage we restricted our sample to merger attempts in recent years that have been announced between 2010 and 2011. At last, our study is focused on the online communication in the time period between the announcement of a merger attempt and the announcement of its final outcome. Therefore, we restricted our sample to merger attempts where the final outcome was known (Bates and Lemmon, 2003). These objectives lead us to a sample of 159 merger transactions.

3.2 Data Collection

We used a variety of databases for collecting data. Our data collection of social media data had several objectives. First, our study aims to investigate communication patterns across a large variety of social media types. In contrast to other social media studies, we do not restrict our empirical analysis to a specific social media type (Aggarwal et al., 2012; Bollen et al., 2011; Das and Chen, 2007). Second, we want to ensure that the social media data is publicly available for reproducibility purposes. Therefore, we collected social media data by using Social Intelligence Solutions' SM2 database (SDL-SM2). SDL-SM2 provides several advantages for collecting historical social media data. SDL-SM2's assignment of UGC to a specific social media type is consistent with classification schemes of social media types from the literature (Kaplan and Haenlein, 2010) and all relevant social media types that enable text based information exchange for social media users are identified by SDL-SM2. In addition, SDL-SM2 provides a large variety of query functions. We were able to use specific search terms, limit our search to UGC written in English, and to specify a date range for which UGC was

obtained. An overview on the relevant information available for each identified UGC obtained from SDL-SM2 is provided by table 1.

Data Field	Description
Author Name	Name of the author of UGC
Title	Title of the UGC
Full Content	Content of UGC
URL	URL of UGC
Time Published	Time and date of publication of UGC
Social Media Type	Identified social media types: Message Boards, Microblogs, Blogs, Social Network Sites
Social Media Platform	Identified social media platform (e.g. Twitter or Facebook)

Table 1: Data Description – SDL-SM2

For collecting merger-related data and data related to companies in our sample we made use of databases that are commonly used in financial studies. Thomson Reuters SDC Platinum database (SDC) was used for collecting merger-related data (Bates and Lemmon, 2003). Thomson Reuters Datastream (Datastream) was used for collecting company-related data (Faccio and Masulis, 2005). Finally, we used LexisNexis to collect press articles related to companies in our sample (Wattal et al., 2010).

4 Variables

4.1 Dependent Variable

In order to explore the choice of diverse social media types subsequent to a merger announcement, we measure the occurrence of postings across different social media types by using the following dependent variable:

- **Posting Lag of UGC (PL):** For each merger attempt in our sample, we identified merger-related postings across previously mentioned social media types (see section 2) by applying the following Boolean search string: *"name of the acquiring company" AND "name of the target company"*. For each query, we restricted the date range to the date of announcement of a merger attempt and the date when the final outcome of the merger attempt was known. SDL-SM2 identified a total of 137,668 social media postings that are related to merger attempts in our sample. For each posting that was related to a specific merger attempt, we calculated the difference between the time of announcement of that merger attempt and the related posting time of UGC (time difference was measured in hours).

4.2 Independent Variables

In the following we present a list of variables by which we differentiate social media postings according to their identified social media type:

- **Microblog (MICB):** A dummy variable where the value of one indicates that identified UGC was posted on a microblog.
- **Blog (BG):** A dummy variable where the value of one indicates that identified UGC was posted on a blog.

- **Social Network Site (SNS):** A dummy variable where the value of one indicates that identified UGC was posted on a social network site.
- **Message Board (MB):** A dummy variable where the value of one indicates that identified UGC was posted on an online message board.

4.3 Control Variables

In the following we present a list of variables by which we control for event-related (i.e merger-related) factors that also may influence information exchange in social media:

- **Duration of Merger (D):** Number of days between date of announcement of a merger attempt and the date when the final outcome of the merger attempt is known.
- **Relatedness (R):** We measure merging firm's industry relatedness by using a dummy variable that takes "the value of one if the two merging partners are in the same two-digit SIC code and zero otherwise" (Louis and Sun, 2010, p. 1784).
- **Method of Payment (MP):** A dummy variable where the value of one indicates that cash was chosen as a method of payment for a merger and the value of zero indicates other forms of payment (e.g. stock) (Yook, 2003).
- **Transaction Value (TV):** The transaction value represents the announced amount of consideration that is paid (in million USD) by the acquiring company (Luo, 2005).

In addition, we also control for firm-related factors (determined for the acquiring company (A) and the target company (T)) that may influence information exchange in social media:

- **News Coverage (A-NC, T-NC):** We collected the total number of news articles citing a company's name involved in a merger published in The New York Times and The Wall Street Journal within one year prior to the respective merger attempt (Antweiler and Frank, 2004). A dummy variable was created to further distinguish between companies with a high and a low news presence. We defined companies with a high news presence as companies that are in the top quartile of total number of news citations in our sample (Pfarrer et al., 2010).
- **Business Focus (A-BF, T-BF):** A dummy variable where the value of one indicates that a company in our sample is focused on selling goods and services to consumers and zero otherwise. The classification is based on a company's four-digit SIC code.
- **Firm size (A-E, T-E):** The enterprise value of a company involved in a merger attempt is determined as of the end of the fiscal year prior to a respective merger announcement (Agrawal and Nasser, 2012).

Table 2 provides a list of all variables and their respective data source.

Type of Variable	Factor Category	Variable	Abbreviation	Data Source
Dependent Variable		Posting Lag of UGC	PL	SDL-SM2
Independent Variables	Social Media Types	Microblog	MICB	SDL-SM2
		Blog	BG	SDL-SM2
		Social Network Site	SNS	SDL-SM2
		Message Board	MB	SDL-SM2
Control Variables	Event-related Factors	Duration of Merger	D	SDC
		Relatedness	R	SDC
		Method of Payment	MP	SDC
		Transaction Value	TV	SDC
	Firm-related Factors	News Coverage	A-NC, T-NC	LexisNexis
		Business Focus	A-BF, T-BF	SDC
		Firm Size	A-E, T-E	Datastream

Table 2: List of Variables

5 Empirical Analysis

5.1 Methodology

Our analysis will investigate how individuals make use of different social media types at different times during the communication process subsequent to the announcement of a merger attempt. As we observe information processing by individuals in terms of total posting lags of UGC, we select a hazard function model regression (Greene, 1997). This supports the non-linear behavior of posting lags as well as the strict positive characteristics of the model variables and avoids broken assumptions compared to a linear regression (Greene, 1997). Designed to estimate how long an entity will stay in a certain state, these models have been applied to divorce rates, length of studies and pensions, and mortality expectations in social science (Greene, 1997).

The hazard rate λ is the likelihood at which an event observer (author of UGC) does not change the state to post UGC about an event within a given period. The model estimates the likelihood with given influencing factors and allows to estimate the likelihood of influencing the posting lag. Thus, if the model estimates a positive coefficient then the likelihood of longer posting lags increases in the percentage value of the coefficient and vis-à-vis. We expect that the posting lag is dependent to their influencing factors:

$$PostingLagOfUGC_i\,(t) = PostingLagOfUGC_0\,(t)\,exp(\beta_1 SocialMediaTypes_{i1} + \beta_2 EventRelatedFactors_{i2} + \beta_3 FirmRelatedFactors_{i3})$$

As the incentive to publish UGC decreases over time (longer posting lags are much less likely than shorter ones) we expect a Weibull distribution of posting lags (positive random variables and not normal-distributed) that is also often used in previous research and validate this assumption with the descriptive statistics in the next section (Fréchet, 1927). The significance of all dummy variables is tested by a Chi-squared test for each factor category as well as for the overall model.

5.2 Descriptive Statistics and Results

Our resulting cross-sectional dataset consists of 136,935 valid UGC postings addressing a specific merger including the posting lag, the variables for 4 social media types, 3 event -related factors and 6 firm-related factors. 5,962 observations are discarded due to missing values, so that the final dataset consists of 130,973 complete UGC postings. Posting lags are measured in hours with an average length of 1,479 hours (61 days). The median is 251.35 hours (10.45 days). Half of the UGC is posted within 245 hours, but it needs 3,064 hours (4.2 month) that more than 80% of the postings appeared. It takes 6,711 hours after which 95% of postings can be observed. On the one hand, there exist postings that appeared within the first hour, while on the other hand, the longest posting lag is 12,981 hours (580 days). The total posting lag has a standard deviation of 2,375.7 hours. The difference between average and median indicates a right-skewed distribution.

The histogram depicted in figure 1 indicates a Weibull distribution that approximates the distribution of posting lags best compared to other distributions used in survival analysis.

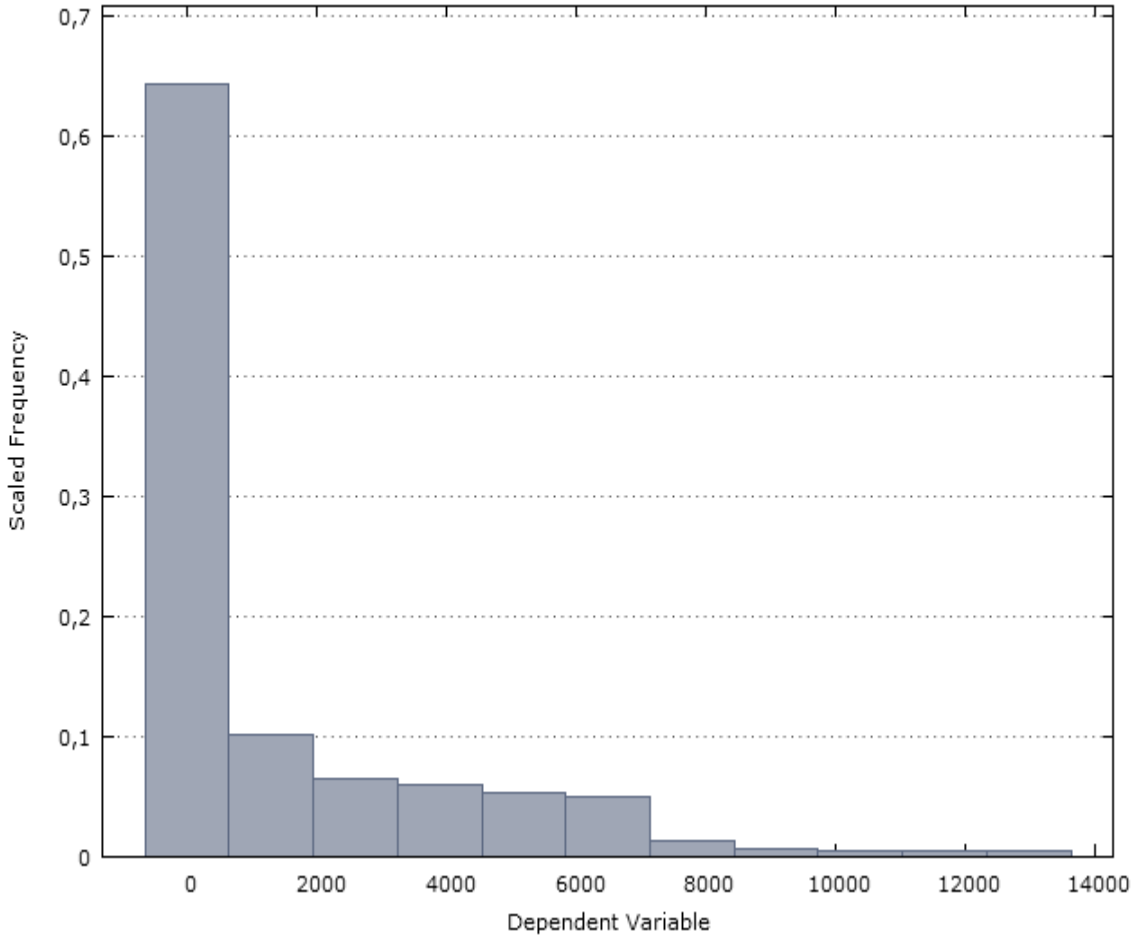


Figure 1: Frequency Distribution of the Dependent Variable - Posting Lag of UGC (measured in hours)

In addition, figure 1 illustrates that the distribution of observations shows declining posting lags and that this time measure is positively, randomly ordinary and not normal-

distributed. Consequently, we treat all 130,973 UGC posting lags as a cross-sectional dataset and investigate the influences using a Weibull-distributed hazard function model. In our final regression we dropped the variable T-E as it shows expectable collinearity with the transaction value. In addition, the microblog variable MICB is removed from the data set due to perfect collinearity with other variables from the social media type category. As a result the remaining coefficients of the social media type category show the likelihood of each social media type having longer posting lags compared to microblogs in percentage. Results of the regression analysis (table 3) explain the influence of each individual entity within the four factor categories to the posting lag.

	Coefficient	Std. Error	z-Value
Const.	4.658590***	0.022	212.437
BG	0.591258***	0.011	52.916
MB	0.551301***	0.011	51.948
SNS	0.499597***	0.026	19.517
D	0.007829***	<0.001	147.615
TV	0.000011***	<0.001	12.232
MP	0.148425***	0.015	10.043
R	-0.159902***	0.014	-11.673
T-NC	0.211914***	0.013	16.387
A-NC	0.415368***	0.014	30.733
A-E	-0.000007***	<0.001	-58.702
T-BF	0.481590***	0.015	31.823
A-BF	-0.241236***	0.015	-16.114
sigma	1.73579***	0.003	501.076
Chi-square (12)	43,414.92***		

*** indicates 1% level of significance

Table 3: Extract of Regression Results for Posting Lag of UGC

5.3 Discussion and Conclusions

A Chi-squared test indicates the overall model validity. Interestingly, all variables are highly significant at the 1% level ($p < 0.01$), providing evidence that all factor categories (i.e. social media types, event-related factors, and firm-related factors) influence the posting lag of UGC (PL).

To recall, coefficients of the social media category show the likelihood of each social media type not having published UGC compared to microblogs in percentage. Social network sites have a 49.96%, message boards a 55.13%, and blogs a 59.13% higher likelihood to be slower in posting UGC than microblogs. This provides several indications with regard to choice and usage of social media types subsequent to a major business event. Our results correlate with the expected length of UGC. While microblogs and SNS are more likely to publish shorter postings, MB and blogs are typical channels to publish longer postings that need a longer time to be written. In addition, our results provide evidence concerning the successive usage of social media types. Microblogs are faster in providing UGC and are responsible for early buzz with

regard to a new announced merger event. Microblogs are followed by SNS and the discussion is then carried on to MB and blogs, where a more in-depth information exchange concerning a merger event can be established. Overall, our results provide evidence that different social media types are used at different times during the business-related communication process following the announcement of a merger.

The variable duration of a merger process (D) indicates an increase of posting lag of UGC. The transaction value (TV) has a minor positive influence and relatedness (R) has a negative influence on the likelihood of not having published merger-related UGC. Higher information needs and thus increased information processing activity by social media users due to the magnitude and the financial risk of the transaction, as well as a lack of strategic fit of merging companies (i.e. no industry relatedness between companies), are responsible for longer posting lags. The signaling effect of transactions not carried out by cash (MP = 0) negatively influences posting lags of UGC, which indicates that uncertainties due to the chosen method of payment are responsible for faster information processing in social media.

Both news coverage variables (A-NC and T-NC) positively influence the likelihood of not having published UGC. It is reasonable to assume that companies that in general receive high media coverage also receive higher levels of media coverage during a merger event. Therefore, information processing activity of social media users is increased by higher levels of news coverage. The processing time of UGC is fast for mergers where acquirers are larger in size (A-E) and that are focused on selling goods and service to consumers (A-BF). This indicates that a higher awareness of a company among users results in a faster information processing in social media. Surprisingly T-BF has a stronger positive influence on the likelihood of having lagged publishing merger-related UGC compared to A-BF. An interpretation of this finding is subject to further inquiries.

Overall, our analysis provides strong evidence that the choice of social media types determines the task-related communication process (i.e. information exchange in order to evaluate a major business event) when controlling for other task-related influencing factors. The observed difference in the usage of social media types may be explained by their specific media capabilities. It is subject to future research to investigate which distinct characteristics of each social media type are responsible for this effect.

Our findings bear important practical implications. Companies that are interested in leveraging the power of monitoring social media activity have to take into account that different social media types are used at different times during the communication process with respect to company-related events and actions.

6 Limitations and Further Research

While our results provide empirical insights into social media choice during a task-related communication process, our research provides motivation for future research directions. The relationship between posting lags of UGC and our binary control variables may be more nuanced and the binary coding may not uncover all the dynamics. In addition, a merger passes through several phases (e.g. shareholder voting or regulatory approval) which we did not account for in this study, except for controlling for the duration of the merger attempt.

Future research should further investigate social media choice by taking into account the distinct capabilities of different social media types and platforms.

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Is Google Making Us Stupid?
The Impact of the Internet on Reading Behaviour

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Abstract

This study explored the impact of the Internet on our reading behaviour. Using an exploratory survey, it examined the online and offline reading behaviour of individuals, and determined the underlying patterns, the differences between online and offline reading, and the impacts of the online environment on individuals' reading behaviour. The findings indicated that there were definite differences between people's online and offline reading behaviours. In general, online reading has had a negative impact on people's cognition. Concentration, comprehension, absorption and recall rates were all much lower while reading online than offline.

Keywords: Online reading, Comprehension, Concentration, Content absorption, Content recall

1 Introduction

When Nicholas Carr published his article "Is Google making us stupid?" in 2008, it evoked a stream of debate in the various media. Although Carr targeted Google, he was using Google as a proxy for the Internet. Carr's motivation to write the article was the increasing difficulty he was experiencing in concentrating on reading a piece of text for a long time, and the decrease in his ability to immerse himself in contemplative reflection of the content. Carr posited that the Internet would have a far-reaching negative effect on our capacity for comprehension and contemplation and thus learning.

It is undeniable that technological advances and the Internet have altered conceptions of certain activities and businesses (Cheong & Park, 2005). Statistics indicate that the number of people accessing the Internet grew by 566% between 2002 and 2012 (Internet World Stats, 2013). The implications would thus be significant if, as Carr (2008) implied, Google was making us stupid.

Reading on the Internet presents many advantages, such as enhanced user experience through media rich content, efficiency, increased reading capacity, flexibility, cost effectiveness, and

comprehension (Fidler, 2004; McPherson, 2005). It also presents disadvantages such as a negative impact on short and long term memory, lack of concentration, and lack of comprehension (Leu & Zawilinski, 2007).

Despite the growing interest in reading online, limited research has been conducted to assess the changes to human reading behaviour in the online environment (Liu, 2005). While some such as Coiro and Dobler (2007) have explored new literacy approaches, these have been targeted at young children learning to read. Others (Siegenthaler et al. 2011) have explored the impact of specific technological aspects such as text display.

The aim of this research was thus to explore both offline and online reading and determine the impact of the online environment on people's reading behaviour. The research objectives were: [i] to explore the online reading behaviour of individuals, and the underlying motivations[ii] to explore offline reading behaviours, and the underlying motivations, [iii] and to determine the differences between online and offline reading, [iv] and the impact of online reading on the relevant cognitive functions.

This paper is structured as follows: a literature review provides the background knowledge and theoretical underpinning as well as an indication of the gap in knowledge. The subsequent section consists of a description of the research methodologies used. The findings are reported next. A discussion section follows and the article concludes with an indication of the major findings of this study, their implications, and possible future research directions.

2 Literature review

According to Transaction Theory, a person interacts with reading content like a river connects with its banks, each working its effects upon the other (Rosenblatt, 1994). Therefore, it can be expected that the online environment would have an effect on the way in which people read, and consequently on their information processing and memory – and, by implication, learning.

A significant advantage of online reading is its relative efficiency in delivering content (Shaikh, 2004). Interactivity, ability to search the content, better information structures and the ability to embed multimedia in reading content are further key benefits of digital media (McPherson, 2005). The amount of accessible information appears unlimited, but hyperlinks provide more control over the way readers access material (Reinking, 1992). This enriches the reading experience by allowing the reader to obtain necessary background information (Fidler, 2004; Moje & Pugh, 2009). Readers also have the flexibility to decide how they will read the text; and the availability of one or more entry points to the same page encourages users to access the same information through different paths at different phases of reading. There is thus the freedom to read in whatever way best suits the reader's purpose, and this results in better comprehension. In addition, comprehension can be increased by means of sound connected to visual formats (Fidler, 2004). The online reading experience is thus more sophisticated than offline reading in many ways, and helps to promote literacy and learning by making reading enjoyable, fostering the use of critical reading skills and promoting reading fluency (McNabb et al., 2002).

Online media also have disadvantages which impact human reading behaviour negatively. Hyperlinks can distract readers (McPherson, 2005), while the fragmentary hypertext threatens sustained reading (Birkerts, 1994). Advertising on web pages can be distracting and even unethical due to uninvited disruption of reading by pop-up adverts. In general, readability on the web is also regarded as poor in comparison with reading on paper (Moje & Pugh, 2009). Despite the apparent increase in online reading, many users print online material to read on paper (Liu & Huang, 2007) and generally it seems that readers prefer to read longer documents, and those that need annotation, on paper (Liu & Huang, 2007) and shorter material online (Shaikh & Chaparro, 2004).

However, reading on the Internet may well have changed readers' behaviour by increasing browsing and scanning, increasing on-time reading (Liu, 2005). People tend not to read online in the traditional sense but rather to skim read, hop from one source to another, and "power browse", thereby exhibiting new forms of reading patterns (University College London, 2008). Many readers scan through search engine generated lists of information in a ruthless and impatient manner (Burke, 2000). Reading online can thus detract from the ability to read deeply, or from prolonged engagement with reading (Liu, 2005; Birkerts, 1994). Some, such as Carr (2008), perceive that it has detrimental effects on cognition, has decreased the ability to concentrate and contemplate, and has altered our reading patterns and memory. In fact, Wolf (2007) believes that the 'reading brain' is endangered. Wolf's notion of the "reading brain" draws on the actual physiological reading mechanism whereby the brain forms new circuits with existing structures in the brain every time something new is learnt.

Studies into online reading, such as that of Liu (2005) are limited in terms of the age group (30-45) sampled and the US context. Coiro and Dobler (2007) focused on school children. Although D'Haens and Jankowski (2004) found no difference in recall between reading online and offline, digital media do differ from offline media, and authors such as Coiro and Dobler (2007) and Carr (2008) have called for greater attention to how readers actually engage with different media, their reasons for choosing one format over another, and their satisfaction with each format in terms of concentration, comprehension and recall.

Two theoretical approaches have informed our research. The theoretical perspective of "new literacies" purports that the nature of literacy is changing rapidly (Lankshear & Knobel, 2003). New skills in comprehension and reading strategies are required (Leu et al., 2004). Although traditional reading skills are necessary as a point of departure, new skills are required for Internet reading. Because of the different presentation of material on the Internet, such as hyperlinks and interactive diagrams, the reader needs to acquire cognitive flexibility in order to transition the difference between offline and online reading (Spiro, 2004).

The Staged Model of Information Processing (Atkinson & Shriffin, 1968) presents a clear explanation for possible low content absorption and recall levels of online readers. The model explains how information gets processed and stored in the human memory. Learning and memory are viewed as discontinuous and multi-staged. The information is processed and stored in three stages: sensory, short term and long term memory. The sensory memory is formed when an initial stimulus is "translated" by the brain into something comprehensible. The process takes only a few seconds. If incomprehensible, the stimulus is usually discarded but if processed, the information moves to the short term, or working, memory. Initially of only a few seconds' duration, the information is rehearsed until, after about ten minutes, it is transferred to the long term memory. There are two major aspects of retaining information in

the short term memory: organization and repetition. If the information is not properly coded and organized, rehearsed or repeated, it gets forgotten. Otherwise it will pass into the long term memory. The long term memory has an unlimited capacity and holds information indefinitely (Huitt, 2003).

There are many techniques to improve information retention. "Chunking" of information is particularly important in transferring information to the long term memory (Huitt, 2003). Most online materials are designed to be read in small chunks to assist the memory processes. However, when readers skim read they tend to skip some of the words, and therefore the content that gets absorbed to the short term memory is not complete. Furthermore, skim reading and speed reading can lead to a surfeit of stimuli so that often vital information is discarded (Miller, 1956).

While some researchers have identified powerful advantages of reading digital media, others have criticised the effect of the Internet on human cognition and reading capabilities. However, only a few studies have examined the fundamental issue of the Internet's impact on broader reading behaviour, and studies such as that of Liu (2005), Coiro and Dobler (2007) and Siegenthaler et al. (2011) are limited in terms of the age group or technical aspect studied. Very few, if any, studies have explored the perceived differences between online and offline reading of adults. This study sought to address that gap and gain a greater understanding of the perceived effect on their memory and, by implication, on their learning.

3 Methodology

The study was exploratory and built on the findings of four focus group interviews. An interpretive research paradigm was adopted, and an online survey with open-ended questions was used to complement the findings of the focus groups. This technique was employed to gain additional insights into the topic (Pickard, 2007).

For the purpose of this study, online material included material that people accessed via the Internet and read whilst connected. Offline material included paper-based material or that which had been downloaded from the Internet but was being read electronically without being connected to the Internet, e.g. with e-readers.

A snowball sampling procedure was employed. The sample consisted of participants who were over 18 years of age and who used the Internet and online materials frequently (read online for an average of >16hrs per week). The survey invitation was initially distributed via e-mail to acquaintances of the researchers and via the social medium, Facebook. The survey was active for 14 days. Out of 500 survey invitations, 281 responses were received. Among the 281 that were received, 79 had incomplete data, so only 202 were included in the analysis.

Respondents hailed from a variety of countries and possessed various levels of education and industry background. The majority (31%) of respondents were between 30-39 years of age, with the rest being evenly dispersed across other ages groups, the highest being 50+. Females made up 65% of respondents.

The rest of the data were analysed according to themes and sub-themes that were guided by the research questions (Pickard, 2007).

4 Findings

By way of introduction, respondents were initially asked why they read. The question allowed for multiple answers, and for respondents to indicate which medium they preferred for each reason. In general, information seeking, commitments whether for work or study, and pleasure were the top three reasons identified. Reading for information or commitments was predominantly online but for pleasure, paper/offline was preferred. The reasons for reading fell into two groups: those pertaining to the individuals' dispositions and those pertaining to attributes of the medium. More common choices for the former group were for inspiration, lifestyle choice, relaxation, escapism, to have personal space, as a personal reward, and to change mood. Attributes of the mediums included accessibility, availability, time saving and extent of choice, and were more relevant for information seeking and meeting commitments.

4.1 Reading Practice

In comparing reading behaviours offline and online, on average most reading time was spent reading books offline (7.23 hrs/wk), with respondents using a mixture of paper-based and e-reader material. The second largest amount of time was spent on reading web pages (6.17 hrs/wk), and then online business documents (4.34 hrs/wk). Generally, most offline reading was done at home whereas most online reading was done at work. Most reading, irrespective of medium, was done in the morning – probably because of work pressures - although a lot of reading on paper was done before bedtime.

Offline, by far most reading was straight through from beginning to end (82% of respondents), whereas by far the most frequent online reading pattern was to scan for interest (87% of respondents). Skim reading was also very popular with online readers (59% of respondents), but less so for offline readers (41% of respondents). Most respondents (72%) printed out the materials they wanted "to read".

4.2 Online Reading Compared With Reading Offline

Given that the most commonly cited online reading behaviour was skim reading, many respondents indicated that they read online primarily for work and to seek information. Therefore, they wanted to get through a lot of content and get to the point within the shortest time possible. Scanning the content was also repeatedly recorded as an online reading behaviour. Some respondents indicated that they felt impatient while reading online. Others indicated that they tended to be browse online rather than getting involved with the content.

The majority of respondents commented that they read much more quickly online and that their speed reading had improved over time. Some implied that this was due to the large amount of information that was available and could be accessed in electronic format. A few respondents indicated that they were more 'selective' when reading online.

Cross referencing occurred a lot when reading online materials. The availability of hyperlinks on some online content encouraged this behaviour. However, the questionable integrity of online content had also been a reason for people to cross reference information. The cross referencing and consequent jumping between pages seemed to have affected the linear reading pattern of many respondents who reported that online reading was more fragmented. Several read in small chunks and did not read long articles online, preferring to print articles

that caught their interest. Using the Search/Find feature of various applications was also reported as a common behaviour while reading online. Many respondents tended to multitask when reading online (i.e. read e-mails, check news, listen to music), and got distracted as a consequence.

In terms of reading offline, the respondents reported that they read more slowly and in greater detail than online. They were also inclined to read every word in a linear fashion. A few respondents highlighted and annotated content when reading on paper. These reading behaviours seemed to contribute to better information retention levels, a phrase that was used repeatedly.

4.3 Changes To Reading Behaviour

One of the research objectives was to identify changes to reading behaviour and to determine the impact of the online environment on people's reading. The most common comment was that respondents read more due to the exponential growth of online materials. The majority of respondents (66%) had increased the amount of their reading due to the availability of online materials. The speed of their reading and their ability to skim read had also improved.

Some respondents noted changes in their patience as readers, and a number acknowledged that they read much more quickly to get through large amounts of content, especially work related material. This indirect pressure might have contributed to the change in patience in readers, which was noted as a negative consequence by some.

Figure 1 presents a comparative consolidated view of the effect of the two reading environments. Respondents reported much higher levels of comprehension, concentration, content absorption, content recall, and relaxation while reading paper materials as opposed to reading online.

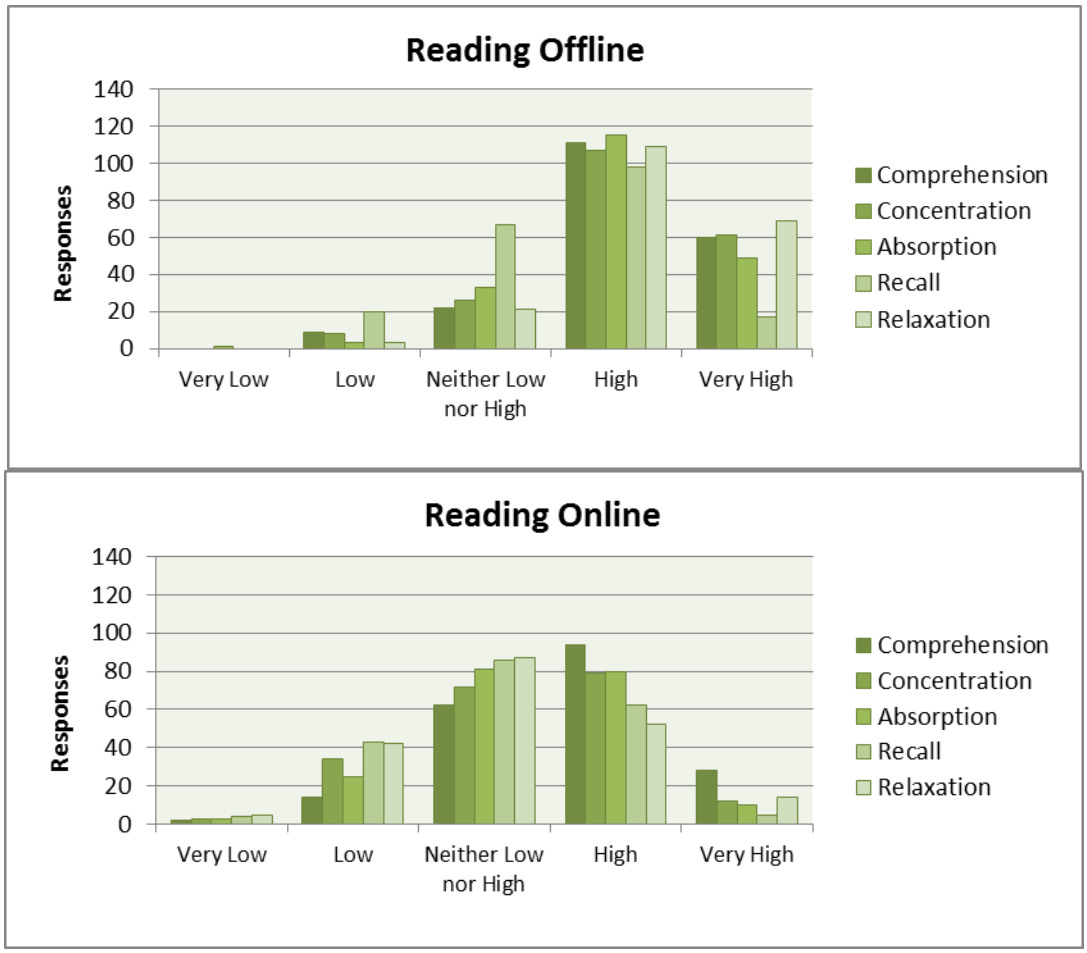


Figure 1: Impact of reading offline compared to reading online

Short attention span emerged frequently in respondents' comments. Many admitted to low levels of concentration and shifting focus, thereby missing out on many words during reading. This could lead to missing crucial information in important documents such as work related documents. A few respondents described this as 'less engrossed' and 'less careful' reading behaviour.

As a result of low concentration levels, some respondents noted that they did not seem to absorb content as they used to. A few argued that this change was due to the vast amount of information they dealt with daily. The lack of concentration and the fragmented nature of online reading thus had a negative impact on some readers. In particular, their ability to recall information they had read was severely decreased. Reading a book generally requires discipline to focus on the material. The continuous skimming and fragmented nature of online reading affected the discipline of reading. However, some respondents indicated signs of adaptation to the new medium – becoming more accustomed to the online medium which they preferred over traditional paper materials.

Nevertheless, most respondents indicated that they did not enjoy reading online as much as on paper. Only 10% preferred the online medium, while the remaining 44% had no preference.

One respondent concluded that he/she had started appreciating reading on paper as opposed to reading on screen.

Overall, the survey data provided a comprehensive comparative overview of people's reading behaviour in the online and offline environments.

5 Discussion

The findings indicated that various benefits provided by the online environment were unquestionable. Aspects noted largely reflected the literature such as: much more information being available and accessible (Liu, 2005). Such demands resulted in an increase in reading speed, and more selective and more discerning reading (Flavian & Gurrea, 2007). However, the demands also resulted in skim reading, scanning, browsing, and hopping hither and thither between different sites and even on the same site. The consequence was shorter attention span, shifting focus, low levels of concentration, and overlooking important words or text. This accorded with the views of Zhang (2006, p.71). As Miall and Dobson (2006) had found, less careful reading and reduced absorption in the content resulted, as well as lower recall of content increased impatience, as well as eyestrain, which reflected the findings and views of Liu (2005) and Carr (2008).

The internal requirements refer to the subjective desires of the individual without any obligation other than to satisfy their own personal needs. These motivations were reflected in statements referring to relaxation, and rewarding oneself, personal space and escapism.

The distinction between the two types of reading motivation seemed to be linked to the time of day when the reading occurred. Most reading for relaxation was done before bedtime. Coupled with the fact that most reading for relaxation was done offline, there is a consequent connection with reading on paper/offline appearing to be more personal than reading online. Such a concept has much deeper roots in the reading history of the individuals sampled. The traditional concept of a parent reading a bedtime story to their child conjures up images of love, caring, bonding, mutual involvement, pleasure, peace, dreamland.

Furthermore, the reference to printing out material that was intended for "reading" implied both aspects of interaction and ownership. People liked to be able to annotate documents, in other words personalizing them, co-creating the memorable content, and placing one's stamp of ownership on the documents (O'Hara & Sellen, 1997). Akin to the notion of co-creation, typically the online environment provides many more illustrations and animations, whereas offline reading material is often less so, allowing the reader to imagine much more. This form of co-creation between the author's words and the reader's images facilitate the memory of such material.

While there was acknowledgement of the benefits of online reading among, the respondents in this study seemed to harbour a definite preference for paper-based/offline reading, identifying many of the benefits to their attention span, concentration, comprehension, and recall abilities.

The findings provide strong support for the Staged Model of Information Processing (Atkinson & Shriffin, 1968). Clearly the respondents perceived their online reading load as being too large to allow for the deep reading experienced offline. However, it might also have

been due to a lack of techniques to deal with this relatively new information environment, an environment which the majority of them entered with their traditional offline reading techniques. They thus skim read online, scanned, hopped from place to place and, in general, noticed a reduction in their attention span. This reflects the sensory stage of the model and seems to indicate that less information is being passed through to the short term memory - or that what is passed through, has been carefully selected. However, when the information passes through to the short term memory, the abundance of information and the time pressures to process information quickly seem to result in reduced concentration, and a reduction in the capacity for the absorption of that information into the long term memory. This might possibly be for the reasons noted above. Needless to say, optimal organization and rehearsal of the information does not take place in the short term memory before it is passed through to the long term memory. Even when it is passes to the long term memory, if neither the organization nor the repetition has been optimal, then low levels of recall result.

However, the findings reflect the experiences of those who had been trained in the traditional models of reading and learning. As Wolf (2010) noted, reading is not a genetically inherited ability. It has to be learnt. More recently researchers have found that online reading involves different reading mechanisms to traditional offline reading. It has been noted that users picture online documents as networks of nodes and links (McEneaney, 2006), which means that readers define text structure by choosing links, which are based on their internal knowledge structure rather than on an author-defined text structure (McEneaney, 2003, 2006). However, the majority of the respondents would have learnt to read in the traditional, linear manner. There were, nevertheless, those who appeared to have mastered online reading techniques and preferred reading on the Internet in comparison with reading offline. As Coiro and Dobler (2007) and Spiro (2004) indicated, they had mastered the flexibility required to transition from traditional offline reading strategies to different online reading strategies. Notwithstanding, most adults learnt to read in the traditional linear manner. They can be regarded as a transition group who will need to acquire different reading skills for the online environment in order to avoid a possible negative impact on their reading and relevant cognitive skills.

6 Conclusion

This study addressed an under-researched area: the impact of the Internet on our reading behaviour. It explored the online and offline reading behaviour of individuals, determined the underlying patterns, examined the differences between online and offline reading, and assessed the impacts of the online environment on individuals' reading behaviour.

The findings indicated that there were substantial differences between people's online and offline reading behaviours with more online reading being done during the day – often at work – while offline reading was usually done more in the evening and at home. The underlying motivations were particularly important, with external motivations driving online reading more and internal motivations driving offline reading more. Definite differences between on-and offline reading behaviour emerged – often prompted by the underlying motivation. In general, online reading has had a negative impact on people's cognition. Concentration, comprehension, absorption and recall rates were all much lower online than offline. That is not to say that certain benefits of online reading were not experienced.

This research has benefitted academics in that it has applied the Staged Model of Information Processing to the online environment and found that, without adaptation to readers' paper-based learning styles, the progress through the various learning stages will be impeded, with a negative effect on attention, concentration, comprehension, and recall. As a result, educators, compilers of online material and suppliers of relevant technology would benefit from an awareness of this impact and devise methods of addressing the potential negative impact of online reading and facilitate the benefits that can be derived from reading online. Individuals, too, will benefit from an awareness of the possible effect on the reading, concentration, information absorption and recall, and be more conscious of the need to endeavour to overcome any negative impact of online reading, and acquire the necessary online reading skills.

In addition, given that most of the respondents in this research were nouveau digital natives, further research should explore the reading behaviours of the younger generation who were raised in the digital age. Their online reading behaviour might well provide pointers of how to overcome the negative influences of the online environment on our reading. Alternatively, it might indicate a need to address the reading habits of this generation as well. There is scope for future research to confirm the findings of this exploratory survey. However, there is also opportunity to explore other aspects of this research such as the motivational aspects of our reading, and the psychological influences of other desires such as those of ownership of content.

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How Companies Can Modify R&D for Integrating Social Media Activities into the New Products Development

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Abstract

Through past decade open innovation achieved enormous amount of attention from scholars and practitioners as well. We took one part of open innovation – customer innovation through social media, and looked into companies' practices to more efficiently integrate information from social media into New Product Development (NPD). We used mechanism of coordination method to explore how moving from traditional product development to open one, affects changes in R&D. We found three types of changes, that affects product development related processes, and four important factors to which companies are paying attention while integrating social media into NPD process: (1) frequent interaction with customers, (2) open information flow, (3) building a unit for coordinating activities, and (4) dividing R&D into units for tackling with ideation, concept development, and actual product building separately.

Keywords: Social media, R&D, New Product Development, co-creation, open innovation

1 Introduction

For a long time vertical integrated model of R&D was the most commonly used model for developing the products. Products and services were developed inside the company, and customers were treated as passive users. But with the emergence of open innovation phenomenon, which describes usage of inflow and outflow knowledge to accelerate innovation (Chesbrough et al., 2006), customers started to be included into new product development process (NPD), and treated as value co-creators with the company.

In the past decade open innovation became a hot topic among management scholars. Vrande et al., (2010) presented different areas of open innovation research, which include open innovation in SMEs, open innovation and competition patterns the role of individuals in open

innovation the relationship between open innovation and entrepreneurship in determining the innovation performance, and how firms can profit from large-scale form of open innovation.

One part of open innovation area is customer innovation. Even that this phenomenon, which is called co-creation, is known for more than 15 years, companies only recently started to adopt co-creation procedures widely in new product development (NPD) process. With advent of social media platforms, like Facebook, Twitter, blogs, or virtual forums, companies got an opportunity to reach their customer in online environment, aiming at increasing a pace of the product development through this form of customers collaboration.

By the virtue of collaboration with customers, the open innovation approach can be considered as an antithesis to the traditional, vertical integrated model of R&D where products are developed internally (Schroll & Mild, 2011). Thus, with the increased usage of open innovation activities, some scholars even went as far as to question the role of the internal R&D (Schroll & Mild, 2011).

Even that open innovation and co-creation attracted lot of attention from the scholars, however it's not yet clear how R&D is adjusted to deal with open innovation, and especially with customer innovation. This leads us to the research question:

How companies are adjusting their internal NPD activities in order to handle collaboration with their customers through social media?

- *How R&D department structure is affected?*
- *What new processes are integrated within NPD process?*

To tackle these questions we adopted mechanism of coordination method to focus on and explain the structural changes in R&D department processes. This research is based on qualitative data collected through interviews with product developers, managers and social media experts from different market leading companies in India.

2 Literature Review

The nature of global economic growth has been changed by the speed of innovation, which has been made possible by rapidly evolving technology, shorter product lifecycles and a higher rate of new product development. The complexity of innovation has been increased by growth in the amount of knowledge available to organizations (Plessis, 2007). Despite the role of knowledge as a key component for continuous innovation, the practice of dedicated knowledge management to support innovation has not yet become universally established in all companies (Chapman & Magnusson, 2006), due to the difficulty of integrating knowledge management process into the innovation process (Xu, Houssin, Caillaud, & Gardoni, 2010). Open innovation requires even more sophisticated approach to knowledge management, as knowledge can come from different sources including customers, government, third parties, or even competitors.

Despite the growing interest in open innovation there are still many unanswered questions. One of the most pressing for academics and practitioners alike relates to how open innovation can be implemented (Gassmann, 2006; Mortara & Minshall, 2011)

Some studies already tackled open innovation implementation inside of organization issue from different perspectives. Herzog & Leker (2010) looked into organizational culture and distinguished that there are different innovation cultures needed for closed and open innovation. Kuschel (2008) investigated ecosystem of company's products and found information infrastructure's importance in contextualizing the ecosystem and thus supporting open innovation. Wincent et al., (2009) researched how the boards should be organized to

help improve the innovative status of network participants. Bergman et al., (2009) introduced group decision support systems as complementary to development process and support knowledge creation in Open innovation.

Although the aforementioned studies addressed a number of important issues, unanswered questions remain with regard to implementation of open innovation activities into companies. Chesbrough & Appleyard (2007) argue that the biggest challenge firms are facing is getting over the determinants of traditional business strategy. They need to embrace strategic approaches that address both the inside in and the outside out processes of open innovation (Giannopoulou et al., 2010). Hence, open innovation requires a different mindset and the need for a more expanded set of capabilities within companies (Vrande et al., 2010). More empirical research is needed on strategy, organizational culture and structure, and human factors in order to effectively execute open innovation (Vrande et al., 2010).

In order to tackle this gap, and to answer our research question we address one aspect of open innovation – customers innovation taking place in social media – and look into organizational changes, and especially changes in R&D department, which happen after integrating social media into the innovation process.

2.1 Social media

The term social media denotes highly interactive platforms via which individuals and communities share, co-create, discuss, and modify user-generated content (Piller et al., 2012). Examples of social media include social networks like Facebook and Twitter, various blogs, and virtual forums. The companies in social media platforms track individuals' shared ideas for the new products, problems with existing ones, or just asking for customers' feedback.

Approaches to harvesting the product-related knowledge form social media can also be more sophisticated than a simple gathering of customers' feedback. E.g., customers can be equipped with design tools and be asked to implement their ideas. In any case, for successful collaboration with customers, (social media and/or design tools') users have to be motivated, data gathered from the users needs to be managed, social media platforms have to be tracked. All of these activities require special approaches within R&D department, and might require special changes within its structure. In other words, if managers decide to adopt a certain "open" strategy, they need to establish the necessary organizational structures and processes and develop the relevant capabilities that will help in the pursuance of this strategy (Giannopoulou et al., 2010).

Companies typically set up separate functions, teams or individual roles specifically for the 'inside-out' process (Mortara & Minshall, 2011). Martinez & Jarillo (1989) found that the mechanisms of coordination used by multinational organizations vary from the most 'formal and structural' to the most 'informal and subtle' ones.

In order to understand structural changes in an R&D department, which is using knowledge acquired from social media, we will look into R&D through *mechanism of coordination* lenses.

2.2 Mechanisms of Coordination

A mechanism of coordination is any administrative method for achieving integration among different units within an organization (Martinez & Jarillo, 1989). Mechanism of coordination is needed as any organization has different (administrative/functional) units, running of which requires some sort of coordination effort across them (Martinez & Jarillo, 1989).

There are 8 mechanisms of coordination divided into two groups – structural or formal, and more informal, namely: (1) departmentalization, (2) centralization, (3) formalization, (4) planning, and (5) output control belongs to the first group, while (6) cross-departmental

relations, (7) informal communication, and (8) socialization belong to the second group (Martinez & Jarillo, 1989).

3 Methodology

As our research questions seek to explain rather to confirm the phenomena, we chose qualitative exploratory research method, namely multiple case study, to conduct this research. This is in line with other studies on open innovation (Vrande et al., 2010).

Semi-structured questionnaire was prepared with the questions related to social media usage and changes in product development within the companies. In order to draw more insights, various social media experts, product development experts, and several different companies' representatives were interviewed. Social media experts were chosen to capture main patterns that are happening in the market. Product development specialists – capture product development specific companies activities. Most of the companies were service providers and were chosen to capture service development related view with regards to social media. All participants were from, or working with firms, that are one of the market leaders in India in particular area, and are using social media activities.

Overall ten people were interviewed. 6 of them were from 5 different social media consultancy organizations, 2 of them were from different insurance companies, and another 2 were product design specialist, one working as a freelancer for different kitchenware projects, and another working in one organization. Please look in Table 1 for detailed description.

Position	**Organization**	**Type of business**
Senior social media consultant	"Social world"*	Social media consultancy
Social media consultant	"Social world"*	Social media consultancy
Social Media manager	"Media for all"*	Social media consultancy
Social Media technical and functional consultant	"Breakthrough"*	Social media consultancy, and tool development
Social media expert	"Other side"*	Social media consultancy
Social Media Expert	"We know the answers"*	Social media consultancy
Product designer	Freelancer	Kitchenware products
Product designer	"Groundbreaking house"*	Home appliances
Regional area manager	"Safe"*	Non-life Insurance
Insurance product manager	"Security for you"*	Health and Life insurance

Table 1: Interviewees

**Organization names are changed*

Social media experts revealed their observation regarding various companies that showed successful cases for using social media in NDP process. Both product design specialists, and one insurance service based company have implemented social media processes in the organization as well. While another, insurance service based company, planned activities with the customers through social media in the near future, and started to implement changes in

order to handle more efficiently the co-creation process. All participants express willingness not to publicly reveal their organizations identity, thus all companies names are changed, however are known to the authors.

Interviews took on average half an hour. All interviews were recorded, transcribed, and coded. As the analysis method we used theory driven qualitative content analysis. Qualitative content analysis is suitable for the purpose of classifying large amount of text into an efficient number of categories that represent similar meanings (Weber, 1990). Existing theory is helping to determine the initial coding scheme (Hsieh & Shannon, 2005), which we build on coordination mechanisms. Coordination mechanisms were taken into account for understanding the changes in R&D structure and processes related to NPD. Transcripts were briefly read, afterwards reviewed carefully highlighting parts related to changes in NPD related processes, and lastly highlighted text was coded with predetermined categories.

There were three mechanisms found – (1) departmentalization, (2) centralization, and (3) cross-departmental relations (see table 2 for examples).

During the next step interviews were analyzed with regards to the found mechanisms values, in other words, how exactly it happens. In the data labeled as pertaining to *departmentalization* category structural changes were analyzed. In the data labeled *centralization* - departments layout involved in social media was analyzed. In the data labeled *cross-department relations* - information flow within departments was analyzed.

Type	*Departmentalization*	*Centralization*	*Cross-department relations*
Quotes	"it fits under NPD as part of at very beginning stage for collecting insights."	"it is controlled by one team, like a corporate marketing or corporate communication"	"There has to be free flow of information between each department"

Table 2: Initial coding categories and examples

4 Results

In this section we examine the role of social media in the company's NPD in general, and R&D restructuring in. We start by explaining why social media became an important part in product development, then – how social media affected departmentalization, centralization, cross-department relations, and lastly we explore the reasons preventing companies from integration of social media into their NPD and/or R&D processes.

4.1 Reasons for social media starting to play an important role

Collaboration with the customers through social media didn't come unnoticed. There was a huge need for that. Traditional market research methods were not able to represent target market. Moreover, customers' presence online made a possibility for creating communication tools, and starting to interact with them.

"*There are two angles to it. Number one decision made in a cycle, and it became much faster in a social world. 10 years before I hardly used to share 10 things in a week, as the only thing I could do to go to telephone boot and call someone, but now as I have device and plenty of different application that facilitate communication I am sharing maybe 22 updates per day. Number second is question of complete authenticity of traditional companies brand. Traditional marketing research it is done in a very small data sample.*

How 1.1 billion people could be represented by lets say 7000 people? Now Facebook can give me data of 91 million people in India. You can listen to that real time and you can get 20000 feedbacks everyday" – "Breakthrough" consultant

The idea for the new products needs to come first. In many cases the idea, whether its radical or incremental innovation comes from the unsatisfied market needs, in the form of complaints, suggestions, or already prepared concepts.

"*The need for the new product comes from some kind of market feedback. It's not that we sit in office and think up something.*" – "Safe" manager

Online communities created by social media users', and their willingness to give feedback by itself increased companies' participation in social media activities. Communication with the customers through social media platforms didn't stop after the first stage – getting the idea. Companies interact whenever they have possibility to reach customers for their feedback.

"You take different sketches and you upload to different design websites. There are users' design specific websites like "behance", also specific to India there is forum called "design in India". Getting comments, getting feedback from consumers. And "Design community in India" is a very closely related community, you can get insights or you can get feedback, form that site. So that is the first intervention in social media, during the concept generation. After concept is generated then again you are going for online interaction. After marketing and sales approves concept, then we build the CAD, and then we build something we just call the product renders. When these renders are done they circulate through internal regional managers, and then regional managers circulate feedbacks to us. After this we also do survey of colors. Our products are distributed all over the India, so we developed India specific colors." – freelance product designer

When time to market is crucial, as for technology products, concept is going straight to the sales, however the interaction with the customers is not terminated at this stage. Customers are used as testers and through achieved feedback from them companies improve products to fully functioning solutions.

"*We follow AGILE model of product development. We quickly build something and putting online. And we keep on doing alpha testing, beta testing, everything while it is still online. We start selling and we keep making it better. And that is how most of the technology products are today built. Marketing pace is so fast, you can never make it good enough to go*." – "Breakthrough" consultant

4.2 Changes in NPD related activities

Centralization

For dealing with activities related to social media either a new organizational unit is created or already established unit becomes responsible for such activities.

"*Mostly it's lead by one team. In some cases there is a corporate marketing team, which collects that information and passes to the brand team and customer service and all those teams. In some cases there is social media team and there are also some companies coming up with chief social media officer. But the best model what we have seen is, that there is one central social media team, which has different people working for the different departments, and which is loosely connected to all these departments. It can be that some departments do not have a representative for social media, but department is connected to the social media team. Social media team act as a moderator*." – "Breakthrough" consultant

Maturity of the brand plays important role in deciding social media team's structure, if the team is gathered from external media experts. Size of the company and the knowledge accumulated through the years affect the type of interaction. Bigger companies, have more rigid structure, where departments have clear responsibilities.

> "*Which departments will interact with social media agency depends on maturity of the brand. If it is not a mature brand there would be entire chain, and all departments involved. A slightly more mature brand - the marketing team will be talking to this social media agency. Even more matured brand – PR team and the marketing team will be talking to. The most mature brand will create their own agency, develop tools, and will have the interaction with all of the departments*." – "Media for all" manager

Cross-department relations

The more structured organization, the more time is needed to have a decision and take some actions. However, in a more competitive environment with fast product development cycles, time is crucial resource.

> "*If its very flexible organization then almost every department will be involved on some extent in social media. If it is very structured organization with the closed doors, then the one department, information will flow from one to another. That also involves lot of time. If the department is very closely related, all the piece of information customer support interaction, all that data is used and analyzed, conclusions drawn and then it is passed to other departments. There has to be free flow of information between each department, and that there is no redundancy. The more departments there are connected to social media, the stronger the online space becomes, and there should be information flow among all of them*" – "Other side" expert

Experts for social media that are employed within different departments form "social team" which ensures knowledge flow among social media team and particular department.

> "*Each department has a social media champion who is a part of this team and managing social media project. So this is the guy who takes initiatives and talks about them in the team. This guy is involved in social media activities, but works within some other department."* – "Media for all" manager

Whole company becomes more open, user centric and willing to share the information.

> "*Senior management also brings lot of insights into the product, for example international flavors. My CEO travels a lot, as he has family based all over the world. What happens, is that e.g. when new mixer was launched, CEO sent a link to look up, and after he commented that this kind of things need to be incorporated. This entire interaction happens on a Facebook page. I am able to see, and marketing guys as well*." – freelance product designer

Departmentalization

The ideas for the product design and/or features are coming from the market but not R&D department itself, in which afterwards the idea is converted to concept and product is developed. Due to this companies are trying to separate departments into units in such a way, that there are units researching the market and developing the product idea, and different units developing the real product based on the generated idea.

> *"Part of the ideation happens first. Then till recently we had the technical departments, which used to design the product. Now, we have separate R&D. One department will design the product, and then refer to the particular technical departments. The technical department will develop the actual product, because they have already the technical knowledge, legacy knowledge, which cuts a lot of time. Then you can start your publicity, tell the market about this new product you've got and start selling it*." – "Safe" manager

One more unit for tracking customers' satisfaction with co-creation procedure is becoming important part in product development.

> "*There should be one more very important tool for identifying the grievances. There are clients who satisfied with your explanation, but the grievance might not get over. They felt that could be one in a particular manner. For example we have a policy conditions that state what are the limits for compensation available for a particular instance – disease. A customer will understand that this is all he is going to get because he signed the policy, but he might be not happy with it. He may have a grievance still, he may publish it through the social media and social media will also probably generate a discussion on this issue. The complaint is not over, the file is not closed at that point of time*." – "Safe" manager

4.3 Issues preventing from usage of social media more frequently

There are also concerns, which don't allow to fully rely on social media when developing the product. One of them is intellectual property.

> "*Intellectual property is getting leaked out which is one of the reasons, why no conception is circulated very frequently. But we can generate the ideas and concepts a little bit differently. We can make idea, get a feedback about kitchen equipment, without its body embedded completely inside in the kitchen platform. You form a concept very rough from rough sketched and you put it on the web, and then you get a feedback after*." – freelance product designer

Some types of products need to be observed in reality, in order to receive proper feedback, as material, texture is important parts of product usage.

> "*We go to the shop, demonstrate our product get the feedback, as consumer likes the product, he wants to touch it, feel it, operate it, see how it works.*" *– freelance product designer*

Target users are not yet online, and observing only consumers that are in social media, might not get right results.

> "*Our target consumer for kitchen appliances is mostly housewives, and they are not very 'online proactive'*." – freelance product designer

Customers by themselves are not willing to interact in all phases of NPD.

> "*When the product reaches somewhere the middle of product development that particular for example product, it's a very niche kind of period when you cannot interact with the consumers. Interaction with consumers in all phases would give us an advantage in making less mistakes in improving the product and making new product that is exactly designed for the consumer*" – freelance product designer

Limited resources that company has need to be allocated wisely.

> "*Before you launch you are no one. You are absolutely no one, no one is talking about you, no one is giving you a feedback or giving you anything. But you can keep close track of competition before you even entering that space. However, you need to take a decision whether you want to spend a lot of time looking at the competition before you launch or just concentrate on building the product, as we have limited resources. But once the product is on the market, you can't take away your eye from the competition at all*." – "Breakthrough" consultant

5 Discussion and Conclusion

Open innovation and especially co-creation became an important topic both for scholars and for practitioners. More and more companies are trying to implement such paradigm into their processes. However, to this day, no clear practices have emerged on how to efficiently utilize the open innovation in NPD. Due to this reason, we explore various companies' practices to cope with social media integration into NPD. We focus our research on structural changes of companies' R&D. We aim at providing insights rather than generalizing to any extent.

After analyzing interviews, outcomes can be generalized to three possible structural changes that affected departments related to NPD after adopting social media.

First one - social media doesn't cause structural changes. Companies treating social media as additional communication tool reach the customers and collect their grievances. It can be also explained by Willcocks et al. (2013) findings, which relates to the beginning phases of technology adoption, where new technology is used to replace old one, however the processes around the technology in order to capitalize its potential, not changing.

Second change relates to adding one more department, which is responsible for the social media, and coordinating, or distributing information to separate departments (please see figure 1). Even though collaboration among departments was encouraged, there was still a clear division of responsibilities between different units. However, there were cross-department relations, which were achieved by having with combine efforts formed social media unit. Departments were having a representative within a formed unit for managing social media activities. The same representative was coordinating other departments and in this way there was forming the centralization mechanism of coordination. Such integration, in turn, was helping establish information flow within the company, and higher interest to social media related activities.

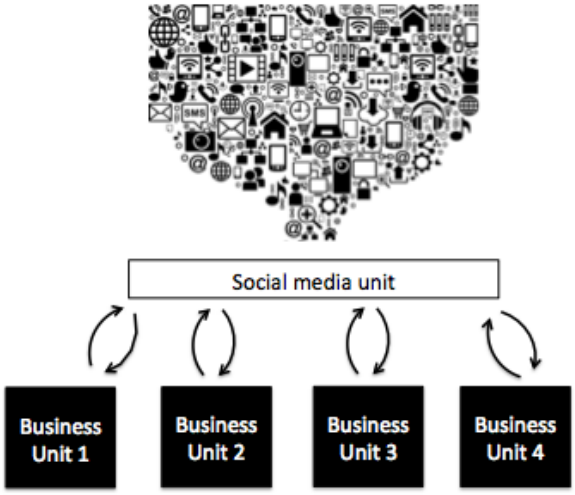


Figure 1: establishment of social media coordinating unit

Third type relates to completely new product or service development, where structure is changing in order to bring ideas from the users (please see figure 2). We found that companies in order to better use resources separated their R&D into more than one unit. Different units are used for each of these activities - gathering market needs, forming concept, and implementing the concept into the real product. Moreover, we found that companies after leaving their traditional product development model and engaging in cooperation with their customers in social media started more frequent interaction with customers through social

media. Some of the observed companies are trying to get customers feedback on each product development stage.

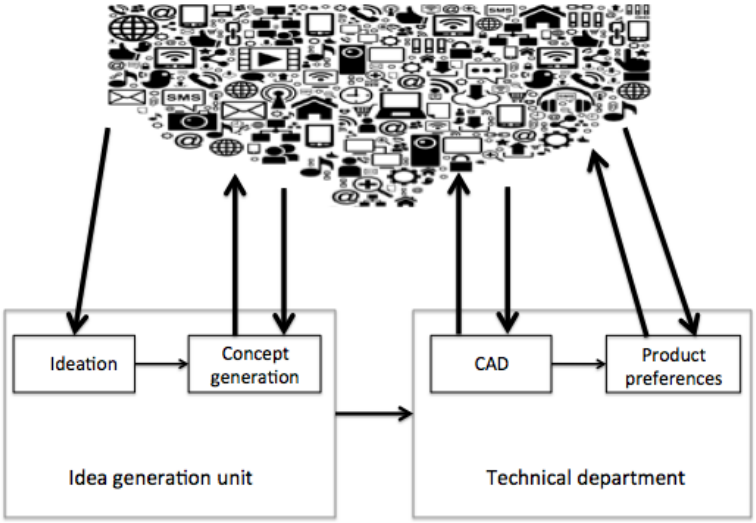


Figure 2: separation of product development and intense interaction

Additionally in this paper we revealed some barriers to tighter integration of social media in NPD. Schroll & Mild (2011) proved that open innovation complements the existing vertical R&D processes. In this paper we elaborate that the culture of the customers with regard to the use of social media determines the R&D practices of the firm - specifically, the company's decision to stay away from social media. Moreover, Huizingh (2011) notices that success of open innovation depends on internal and external environment. Internal context characteristics relate to company's demographics and strategies. Demographics were mainly studied with regard to the company size: large versus small. We would like to enrich this discussion with our findings, which reveal that success of innovation can be affected by maturity of the brand, and structure of social media management unit. The less matured brand the less departments interact with social media unit. The flexibility of the organization plays the same role. The more flexible organization the more departments involved in a communication with the social media unit.

Finally, we noticed users behavior related pattern. On general traditional product development has around 5 phases varying from ideation to go to market (Nambisan, 2002). In this study we found that users are willing to participate in the firsts and the lasts stages, however they are now burning with intention to contribute in the middle processes of the product development.

As a practical contribution, we reveal some insights, which can be useful for companies, which are willing to adjust their internal processes to deal with social media more efficiently. We argue that dividing the R&D into separate units for different purposes, where one unit responsible for gathering and evaluating ideas from social media, while another, implementing them in practice, allows the firm to gradually integrate social media into NPD. Moreover, developing a unit responsible for social media, which is communicating with and coordinating different departments with regards to information, which can be harvested from social media, helps foster information flow within the company – a factor that appeared to be important for NPD.

This paper has some limitations, which could be addressed in future research. Firstly, all companies in which interviews were conducted are based in India, and studies of innovation and social media related practices in different countries might produce different insights.

Secondly, we addressed only limited amount of products and services, thus future research could look into different industries. Thirdly, we picked the practices of the companies regarding how they are dealing with social media, however there weren't any measurements to prove that those practices lead to successful NPD strategies through social media, thus future research could develop and test hypothesis.

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On the Search for New Revenue Models: An Empirical Investigation of Personalized News Aggregators

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Abstract

News consumption is evolving from offline newspapers to online news. Nevertheless, no profitable business model exists for online news, and publishers are still reporting drops in revenue. Personalized news aggregators (PNAs), which rely on new information and communication technologies, provide a new way to aggregate content that might provide the basis for a revenue model in order to design a business model. Nonetheless, there is very little research about user willingness to pay (WTP) for a PNA service, in part because WTP strongly depends on the ideal configuration of a PNA. Based on an adaptive conjoint analysis (ACA) with 146 participants, this study explores the importance of different attributes in a user's estimation of total utility and a user's WTP for changing attribute levels. We show that price, contract duration, and revenue model are the most important attributes. €2.50 per month would be acceptable in combination with an advertising-based revenue model. Changing the contract duration from 12 months to one month shows the highest WTP. However, even if the importance of personalization functionalities is high, there is limited WTP for it.

Keywords: Personalized news aggregator, PNA, business model, willingness to pay

1 Introduction

For some time, publishing houses have provided news with the main business model of selling the newspaper as well as selling advertising in the paper. Owing to digitization, the amount of online news and the possibility to consume it complimentary have increased. Publishers therefore have two primary problems: On the one hand, newspaper sales are decreasing, resulting in a strong revenue decline. On the other hand, people still believe that online content in any form should be free, and consumers generally show low willingness to pay (WTP) for online content (Dou, 2004). Scholars argue that this low profitability results from the absence of an appropriate business

model (e.g. Cawley, 2008; Chyi, 2005). Publishers thus need to find new business models in order to monetize news and to counteract strong revenue declines. According to Veit et al. (2014), this type of question is a crucial and persistent issue in information systems (IS) research.

Traditionally, newspaper articles have been selected and bundled manually (e.g. by journalists). With the advent of new information and communication technologies, the bundling process has been changed dramatically, and automatic content aggregation has become possible. A prominent example is Google News, which automatically aggregates content from different sources. However, this research area has seen much attention from different scholars (e.g. Schroeder & Kralemann, 2005). In the meantime, technologies have evolved, and automated content aggregation and personalization according to a user's preferences has become possible. This is already being used in new service types: personalized news aggregators (PNAs), which provide content in an optically unified interface, automatically adjusted and personalized to a user's personal preferences, as well as mostly optimized for mobile devices. Flipboard is a well-known approach of this type of service.

There is a correlation between online news, personalization, and new business models (Saeaeksjaervi, Wagner, & Santonen, 2003). However, PNAs and the impact of this new form of content aggregation has not yet been explored, and should be scientifically researched. Information about the configuration of a profitable revenue model is at the center of attention as it is a primary part of business models. Since WTP strongly depends on the configuration of this new service type, it is necessary to obtain more information about the ideal configuration of a PNA from a user's perspective. Based on this information, it is possible to deduce information about how to increase a user's WTP. To address this research gap, we examine the importance of different attributes and PNAs' preferred attribute levels from the perspective of users. We also show the WTP for changing attributes levels.

This paper is structured as follows: In Section 2, we present related literature. In Section 3, we present the research framework, including our deducing of the research attributes. In Section 4, we continue with the research methodology and analysis for the adaptive conjoint analysis (ACA) and the WTP. Section 5 contains our empirical results. In Section 6, we discuss our results, highlight implications, and present study limitations.

2 Related Literature

2.1 Social Recommender Systems and News Aggregators

In the first years recommender systems were used only to provide well-structured information in searching, sorting, or filtering content. The Tapestry system of Goldberg et al. (1992) was one of the first recommender systems. With the development of the internet and the increasing availability of content, recommender systems were first used in e-commerce. As the technologies were developed, classic recommender systems can now also be used for digital products (e.g. music or news). Thus, the most widely used systems are content-based filtering, collaborative filtering, and hybrid filtering (Adomavicius & Tuzhilin, 2005).

With the rise of user-generated content and Web 2.0, the amount of available content has drastically increased, leading to the intensification of information overload. Also,

social networks have become well known, and personal information about users and the relationships between them have become available (Carmagnola, Vernero, & Grillo, 2009). By using interpersonal information about a user and their friends, social recommender systems can recommend content accordingly. These systems might have the potential to improve the selection and weighting of content, and can increase the overall recommendation accuracy (Arazy, Kumar, & Shapira, 2010). As a result, IT-enabled personalization mechanisms such as recommender systems have been integrated into aggregation applications. Madnick and Siegel (2001), as one of the first, predicted increasing usage of aggregation applications, owing to a faster bundling of content and a minimization of costs. Webster et al. (2006) analyzed news aggregators to provide a filtering mechanism in order to reduce the information overload of RSS feeds. Isbell (2010) classified existing news aggregators in four categories (feed aggregators, specialty aggregators, user-curated aggregators, and blog aggregators). Nanas, Vavalis, and Houstis (2010) as well as Paliouras et al. (2008) were among the first to concentrate on news aggregation applications, showing higher interest from potential users. Nanas et al. (2010) developed a news aggregator concept that analyzes usage behavior and provides content accordingly. The mechanism presented by Paliouras et al. (2008) aggregates content automatically, sorting it into different categories and presenting it in an adaptively personalized interface.

2.2 Business Models for Online News

Digitization is the primary reason why publishers have begun to move from printing newspapers to online news. Publishers are experimenting with business models, especially with new revenue models for online news. According to Chyi (2005), the most popular revenue models are the subscription model, the advertising model, the transactional model, and the bundled model. While research shows that the advertising model has become the primary revenue source for online news, it is not a guarantee for a sustainable revenue stream (Chyi, 2005; Herbert & Thurman, 2007). Therefore, in the future, new revenue models such as *freemium* might have the potential for a new strategy (Wagner, Benlian, & Hess, 2013).

Research has been done on WTP for online news (Chyi, 2005; Dou, 2004) as well as for digital content such as music (Breidert & Hahsler, 2007; Regner & Barria, 2009) or video on demand (Mann et al., 2008). Using quantitative surveys, Dou (2004) as well as Chyi (2005) confirmed the general belief that online content should be accessible for free. They state that if a website is going to charge for its content and services, users will immediately switch to free alternatives. Wang et al. (2005) showed different results and stated that additional functionalities such as a higher service quality do influence the WTP for a subscription-based online news service. Frijters and Velamuri (2010) also confirm these results and acknowledge that users show a greater WTP for content with a specific purpose. One example is specific business news offered by the *Wall Street Journal*. Gentzkow (2006) measured the WTP to access washingtonpost.com and found that the average person would pay $0.30 per day.

Chellappa and Shivendu (2010) analyzed different personalization strategies and their monetization possibilities. In these authors' view, companies should collect information about their customers to enhance the personalization of their content. Li and Unger (2012) suggest that news websites can charge for personalization efforts, especially if the providers show added value in comparison to competitors. To determine the price

sensitivity of highly personalized newspapers, Schoder et al. (2006) performed a conjoint analysis, and found that some users are willing to pay for a personalized newspaper – for instance, well-educated people. Saeaeksjaervi et al. (2003) also analyzed business models for personalized online newspapers and showed that content personalization could provide additional earnings.

3 Research Framework: Attributes of User Value

To provide a research framework, we explore attributes that affect the user value of PNAs. User value is thus our dependent variable, as has been the case in similar cases (e.g. Zeithaml, 1982).

The derivation of different attributes is based on several steps that seem appropriate (e.g. Papies, Eggers, & Wlömert, 2010). First, we conducted a content analysis of current PNAs. Second, we conducted a literature analysis to derive existing attributes for our case. Previous research about the customer value of digital goods included the price, revenue model, platform support, and offline access (Breidert & Hahsler, 2007; Doerr et al., 2010; Papies et al., 2010). Price, personalization, content integration, and social networks have also been used in previous studies to determine the behavioral intention to use a PNA (Oechslein & Hess, 2013). Third, a qualitative study confirmed these attributes and explored further attributes. This was conducted in mid-2012 with more than 30 semi-structured interviews with technology experts and bloggers. Nine attributes were identified for the research framework: *revenue model*, *price*, *contract duration*, *classic personalization*, *social personalization*, *content integration*, *social networks*, *platform support,* and *offline access*.

The *revenue model* (free with advertising vs. charged without advertising) was integrated, since some online services use only an advertising-based model (Papies et al., 2010). *Price* (€0, €0.50, €2, €7, €10) describes the monetary cost for a monthly usage of a PNA that includes all functionalities. We need to include this attribute in our research model, since it is necessary for the calculations of the WTP. €0 is necessary for the possibility of a free revenue model. A price range of €0.50 to €7 was adopted from a study that investigated overall WTP for news aggregation applications (Oechslein & Hess, 2013). Since our reference product is available for €10 per month, we integrated this price. We followed Doerr et al. (2010) concerning *contract duration* (1, 6, or 12 months), describing the minimum time before the user can terminate the contract. *Classic personalization* (explicit vs. implicit personalization) is the functionality of a PNA to provide personalized and adjusted content for a user. It can be either implicit by automatically analyzing a user's clicking and reading behavior, or explicit by the user stating his or her interests directly (e.g. Gauch et al., 2007). *Social personalization* (by social networks, by profile information, by reading behavior in social networks, or by none) is also a primary functionality of PNAs (Oechslein, Fleischmann, & Hess, 2014). Social personalization is the integration of interpersonal data in a PNA to provide personalized content, by means of recommendations by information from a user's social network (e.g. Facebook) as well as information from a user's profile. A user's reading behavior in a social network can also be used. However, it is also possible that there is no social personalization functionality. *Content integration* (yes vs. no) is the possibility of integrating individual content from other sources, such as a certain blog or website. *Social networks* (yes vs. no) allow one to simultaneously integrate social networks (e.g. a Twitter news stream) in a PNA and share content in a social network. *Platform*

support (browser vs. app) describes the way to use a PNA (in a browser or as an app for a tablet or smartphone). Finally, *offline access* (yes vs. no) is the possibility of using a PNA without an active internet connection.

WTP is modeled as a direct correlated construct with the user value. We discuss the measurement of WTP from utility data later (see Figure 1).

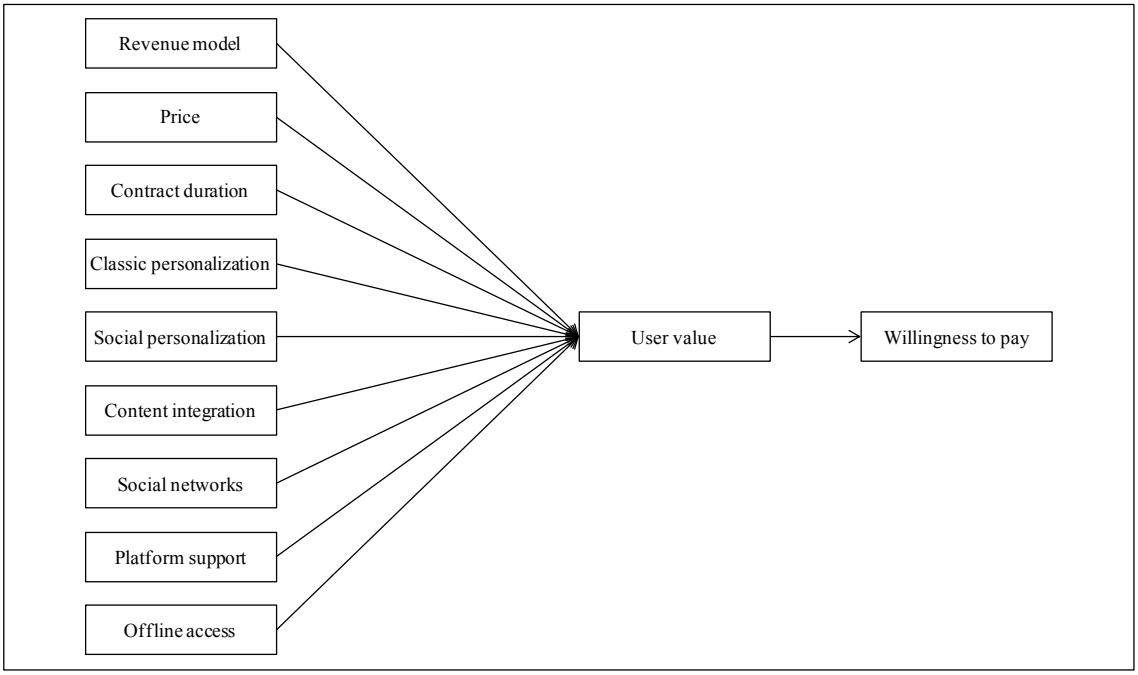


Figure 1: Research framework: Attributes that determine the user value

Based on our research framework, we formulated three research questions. This study's overall aim and goal is to analyze the revenue model as part of a future business model of PNAs. To determine a proper WTP for PNA, we must address PNA attributes, their importance, and preferences for them. Adding a single component can determine the future success of PNAs (also referred to as PNA service).

Research question 1 addresses the relative importance of each attribute in a user's estimation of total utility.

RQ1: How important is each attribute in a user's estimation of total utility of a PNA service?

Research question 2 addresses the specification of each attribute. It is possible to analyze the preferred specification of the attributes from a user's perspective and its influence on the buying decision.

RQ2: Which attribute levels are preferred and how do they influence the buying decision?

Research question 3 concerns the WTP for each attribute. Since it is possible to calculate a user's WTP for each PNA attribute, we can calculate the WTP with changing attribute levels by means of a sensitivity analysis.

RQ3: How much would a user's WTP for a PNA service rise or fall with changing attribute levels?

4 Research Methodology and Analysis

4.1 The Method of Adaptive Conjoint Analysis

Conjoint analysis is a method to analyze the user value of multi-attribute objectives. Therefore, a user's preferred combination of these objectives can be evaluated by offering alternative product configurations (Green & Srinivasan, 1990). Here, ACA was used, being validated by several scholars (e.g. Breidert & Hahsler, 2007). The questions will be adjusted to the users while the questionnaire is being answered, to find out each attribute's maximum. Furthermore, the questionnaire's length will be reduced without losing expressiveness, which also significantly reduces complexity as well as dropouts (Johnson, 1987).

The ACA is based on four general assumptions (Johnson, 1987). First, it is stated that products are a bundle of different attributes. In this case, a PNA consists of a certain bundle of attributes that increase user value and in turn increase a user's WTP for the service. These attributes have a number of specified levels (also referred to as specification). An individual's total utility for a PNA is equal to the sum of the utilities he or she receives from each attribute having a specification. This can be expressed formally as:

$$(1)\ u_{it} = u_i(a_1) + u_i(a_2) + u_i(a_3) + u_i(a_4) + u_i(a_5) + u_i(a_6) + u_i(a_7) + u_i(a_8) + u_i(a_9)$$

u_{it} is the totally utility for an individual i for the product configuration t. These attributes are compensatory, and we therefore follow a simple addition approach. The total utility is a function of $u_i(k_t)$ with the individual i's part-worth utility for each specification of the attribute k in the product configuration t. In our case, we use the attributes with its specifications as follows: a_1 *revenue model* (free with advertising vs. charged without advertising), a_2 *price* (€0, €0.50, €2, €7, €10), a_3 *contract duration* (1, 6, or 12 months), a_4 *classic personalization* (explicit vs. implicit personalization), a_5 *social personalization* (by social networks, by profile information, by reading behavior in social networks, or by none), a_6 *content integration* (yes vs. no), a_7 *social networks* (yes vs. no), a_8 *platform support* (browser vs. app) and a_9 *offline access* (yes vs. no).

Second, we assume that each attribute level has a certain value for the participant that in turn describes his or her preference for a product. These individual preferences are described by the part-worth utilities. Third, we assume that a product's total utility is the sum of the part-worth utilities of the attributes. It is now possible to predict the preferred product. Fourth, the third assumption can also be applied the other way round. Instead of adding the part-worth utilities, it is possible to deduce underlying utility values from a complete product concept (Johnson, 1987).

The conduct of an ACA is divided in four steps. First, in the *preferences for levels* module, the preferences of the participants for each attribute will be prompted (see Figure 2).

Please evaluate how important is contract duration for you?							
	Not important at all						Very important
1-month contract duration	○	○	○	○	○	○	○
6-month contract duration	○	○	○	○	○	○	○
12-month contract duration	○	○	○	○	○	○	○

Figure 2: Example: Preferences for levels

Second, the attribute importance module compares the relative importance of each attribute with the highest and the lowest rating (see Figure 3). Both modules were measured on 7-point Likert scales (where 1 = the lowest score and 7 = the highest score).

All others being equal, how important would the following difference be for you?							
	Not important at all						Very important
Browser use vs. app use	○	○	○	○	○	○	○

Figure 3: Example: Attribute importance

Third, the paired-comparison trade-off questions follow. In this module (using a semantic differential), two different product configurations are compared prompting the conjoint trade-offs. Also, only two to three different attributes will be considered in this module (see Figure 4).

Which of these PNA services would you prefer?								
6-month contract duration No social network integration Browser use	Not important at all						Very important	**1-month contract duration Social network integration App use**
	○	○	○	○	○	○	○	

Figure 4: Example: Paired-comparison trade-off

The ACA's fourth module consolidates all previous steps. The calibrating concept shows the participant a product configuration with five different attributes, in order to evaluate his usage probability (see Figure 5). Here, the participant must indicate a value between 0 and 100, where a higher value refers to a higher probability of using the service.

If the following PNA service were offered to you, how likely would you be to use it? *Please estimate in values between 0 (would definitely not use it) and 100 (would definitely use it)*	
Browser use Offline access Social network integration 1-month contract duration Charged without advertising	**%**

Figure 5: Example: Calibrating concept

4.2 Measuring Willingness to Pay from Conjoint Data

We follow the approach by Kohli and Mahajan (1991), to derive a user's WTP for the attributes. This procedure has been validated before (e.g. Mann et al., 2008; Strube, Pohl, & Buxmann, 2008). This approach compares a certain product configuration's total utility to a reference product's total utility. The user will choose the proposed new

product configuration when its total utility (u_{it}) is higher than or equal to the total utility of the reference product (u_{iRP}). This can be stated as follows:

(2) $u_{it} \geq u_{iRP}$

The WTP equals the price when the product configuration's total utility is not lower than reference product's total utility. We use a status quo product as reference product. We use the PNA Niiu, which has been around Germany since the beginning of 2013. It has a charged without advertising revenue model, charges €10 per month, and has a 1-month minimum contract duration. The technology is based on explicit recommendation and uses no social personalization. It is possible to integrate content information and social network information. It uses an app and provides offline accessibility. To calculate the WTP, we state:

(3) $u_{it|-p} + u_i(p_t) \geq u_{iRP|-p} + u_i(p_{RP})$

$u_{it|-p}$ is the individuals i total utility of the product t without the price and $u_i(p_t)$ is the individual i's part-worth utility of the price of product t. $u_{iRP|-p}$ is the individual's total utility of the reference product RP without the price. $u_i(p_{RP})$ is the part-worth utility of the price of the reference product RP. In this case, the new product configuration's utility must be higher than or equal to that of the reference product (Strube et al., 2008).

By using conjoint analysis, we can only include a limited number of attributes for the price: €0, €0.50, €2, €7, and €10. However, by means of a linear interpolation, we can also calculate the utility values $u_i(p)$ for other prices. This can be stated in the following formula:

$$(4)\ u_i(p) = u_i(p_1) + \frac{(p - p_1)\left(u_i(p_2) - u_i(p_1)\right)}{(p_2 - p_1)}$$

To estimate the individual's WTP for different product configurations, we use two price points' p_1 and p_2. For instance, if we want to calculate the utility value for the price of €4, we use p_1 with €2 and p_2 with €7. To calculate the WTP, we started with a price p = 0 for each product and raised it in steps of €0.25 until the equation (3) is no longer valid (Strube et al., 2008). Following Kohli and Mahajan (1991), we assume that the price point prior to the violation of equation (3) equals the user's WTP for product t.

4.3 Data Collection

The data for this empirical study was developed with the software Sawtooth Version 8 and collected in July 2013, using a standardized online survey. Data collection and analysis was part of the thesis of Verena Lindinger (B.Sc.), supervised by the Institute for Information Systems and New Media at the Ludwig-Maximilians-Universität, Munich. A pretest was conducted. All participants were invited via an invitation link per email to 4,224 students. We followed the regular approach of asking a student sample in this early research (e.g. Chyi, 2005; Fuchs & Sarstedt, 2010).

The questionnaire had seven parts. First, we showed a short video explaining the core functionalities of a generic PNA. Second, we explained all attributes and presented the status quo product used as the reference product in the derivation of the WTP from data. All ACA modules followed. Finally, we considered questions about media usage behavior and general demographic questions. Items were adopted from Teo, Limb, and

Lai (1999). The analysis of the exported data was done with the software Sawtooth Version 8 (Hierarchical-Bayes model).

5 Results

5.1 Sample Description

We collected 149 valid datasets. The average participant age was 25 years, the youngest being 18 and the oldest 63; 66 participants were male and 83 were female. At least 97% had a high school degree or equivalent. More than 40% are online for more than three hours per day. Most use the internet as primary information source and to consume news. Approximately 79% of the participants own a smartphone. The most popular PNA is Flipboard, known to more than 45% of the participants.

5.2 Part-Worth Utilities of the Attribute Levels

To describe a user's preference structure, we first address the relative importance of the attributes and then the part-worth utilities for the different attribute levels. It must be noted that relative importance is determined by the ratio between the utility of one attribute in comparison to the utility of all attributes. Table 1 provides an overview of the results.

Revenue model (11%)	Utility mean	Std. dev.	**Price (25%)**	Utility mean	Std. dev.
			€0.00	106.41	47.45
Free with advertising	17.23	53.50			
			€0.50	61.75	31.40
			€2.00	8.59	17.73
Charged without advertising	-17.23	53.50			
			€7.00	-61.32	28.13
			€10.00	-115.38	43.57
Contract duration (13%)	Utility mean	Std. dev.	**Social personalization (10%)**	Utility mean	Std. dev.
1-month	50.99	36.84	None	13.58	57.97
6-month	2.67	14.17	Reading behavior in social network	0.01	36.22
12-month	-53.65	29.01	Profile information	-2.53	25.38
			Social network	-11.07	22.19
Classic personalization (8%)	Utility mean	Std. dev.	**Content integration (8%)**	Utility mean	Std. dev.
Explicit	17.30	37.74	Yes	33.46	26.50
Implicit	-17.30	37.74	No	-33.46	26.50

Social networks (7%)	Utility mean	Std. dev.	**Platform support (8%)**	Utility mean	Std. dev.
Yes	16.19	32.09	Browser	-21.22	33.48
No	-16.19	32.09	App	21.22	33.48
Offline access (10%)	Utility mean	Std. dev.			
Yes	42.30	24.63			
No	-42.30	24.63			

Table 1: Importance of the attributes and part-worth utilities of the attribute levels

To answer RQ1, the importance weights are calculated by the mean of all individual importance weights. The price (25%) of a PNA service shows the highest relative importance, followed by contract duration (13%), revenue model (11%), social personalization (10%), and offline access (10%). The least important attributes were classic personalization (8%), content integration (8%), platform support (8%), and social networks (7%).

By analyzing the part-worth utilities, we can answer RQ2 and can get an idea of what is important for a user. We can also provide a preferred product configuration. Nevertheless, when we consider the part-worth utilities, we bear in mind that this is interval-scaled data and not ratio-scaled data. By using zero-centered utility values, all preference utility values add up to 0. By transforming the data and shifting the utilities by a constant, so that the worst attribute level is equal to 0, no information will be changed (Orme, 2010). However, it is possible that differences of part-worth utilities of one attribute can be compared to other attributes' utilities. The results for price are ranked as expected, and are distributed equally. Also, there is a strong preference for shorter contract durations, since there is a higher utility for a 6-month or even a 1-month duration. Concerning social personalization, the user prefers either no social personalization or profile-based personalization. Furthermore, offline access increases the utility value the most, as well as a possible content integration and app-based platform support. In comparison, it seems that other functionalities – for instance, the existence of social network integration – shows the least utility.

5.3 Willingness to Pay for Changing Attributes Levels

To calculate the WTP for changing attribute levels, we followed the approach of Kohli and Mahajan (1991) and compared the prices with the reference product – Niiu. To answer RQ3, we performed a calculation for every single case and only changed one attribute at a time. Thus, we could determine the WTP for the individual attributes, as summarized in Table 2.

Attribute	**Changing attribute level**	**WTP for changing the attribute level**
Contract duration	12-month to 1-month	Δ €6.50 per month
Contract duration	6-month to 1-month	Δ €2.75 per month
Classic personalization	Implicit to explicit	Δ €2.00 per month

Social personalization	Reading to none	Δ €0.75 per month
Social personalization	Profile information to none	Δ €1.00 per month
Social personalization	Social network to none	Δ €1.25 per month
Content integration	No to yes	Δ €4.00 per month
Social network	No to yes	Δ €1.75 per month
Platform support	Browser to app	Δ €2.25 per month
Offline access	No to yes	Δ €5.25 per month

Table 2: Willingness to pay for changing attribute levels per € and per month

The results show that users are willing to pay an additional amount if the product configuration is changed at attribute level. The highest WTP is for shorter contract duration. For instance, users were willing to pay €6.50 more per month for a 1-month contract duration in comparison to a 12-month one. However, there is less than half the WTP for the change from a 6-month contract to 1-month one. Our results also show that offline access (€5.25), content integration (€4.00), and usage with an app (€2.25) increase the price most. Users were willing to pay €2.00 per month to use explicit personalization rather implicit functionality. The social personalization results show that the provider should even lower the price if it adds social personalization into a PNA. Also, additional functionality for adding social networking information shows one of the lowest WTPs – at €1.75.

6 Conclusion, Implications, and Limitations

This study's primary goal was to investigate the configuration of a revenue model for PNA's, as a new form of content aggregation. In particular, since the WTP depends on a PNA service's configuration, we wanted to shed light on the importance of usage attributes from a user's perspective. By using an ACA with 149 participants, we could analyze the importance of different attributes and part-worth utilities of their attribute levels. Also, by using the method of Kohli and Mahajan (1991), we could calculate the WTP for different product attributes.

First, our study results show that the attributes price, contract duration, and revenue model are the most important ones (49% in total), relating to the configuration of the underlying business model. Personalization is also an important attribute for PNAs. Social personalization shows little more importance than classic personalization, followed by the attributes of content integration and social network integration. The PNA's platform support and the integration of social networks show the least importance from a user's perspective.

Second, concerning the attributes' part-worth utilities, it seems logical that lower pricing increases the user's total utility. For instance, a decrease of the contract duration by 6 months shows about the same increase of utility if the price is lowered by €3. Also, the provider could keep the price the same and could lower the contract duration, and this would have the same utility for a user. Offline access functionality shows especially high user values. This addresses the fact that people still worry about poor or inconsistent internet access. While classic personalization as an attribute still has a lower value, explicit functionalities show a higher value than implicit ones. This result is in line with social personalization results, since using social networking information or reading behavior show very low values.

Third, WTP results are in line with the tendencies of the utility values. Attributes with the highest difference in the part-worth utilities show the highest WTP. These are – for instance – a change in the contract duration from 12 months to one month and to the availability of offline access. Users were willing to pay approximately €6.50 more per month if they can choose a 1-month contract duration. Also, for offline access, users were willing to pay €5.25 more per month. In contrast, different forms of social personalization do not increase WTP at all. Additionally, the revenue model results must be interpreted differently. It is not possible that users were willing to pay €2 per month to have a free revenue model. It is rather useful to interpret these results to show the overall importance of a free version for a user.

Concerning our results, a clear and consistent PNA configuration can be identified. Price is the most important attribute, according to this attribute's importance and the high difference in the results of the part-worth utilities for higher pricing. Contract duration also shows very high importance, as well as the highest WTP for a shorter contract commitment. While offline accessibility is less important, it is an important attribute, owing to a very high WTP. Revenue model is also an important attribute. Finally, while content integration has a lower attribute importance, there is a very high WTP for it. The main functionality of a PNA with different personalization types provides mixed results. Social personalization is somewhat more important than classic personalization. However, results show the highest WTP for classic personalization. Finally, the platform support and the integration of social networks in PNAs are not important; these attributes show both low importance and low WTP. To sum up, the following attribute combination shows the ideal PNA configuration: 1-month contract duration, explicit personalization, and no social personalization. The possibilities of adding content sources, social networks, usage as an app, and offline accessibility should be present. The revenue model should be free with advertising. However, we propose a price of €2.50 per month, based on the WTP results. Advertising in addition to a low pricing model could provide the basis for a profitable business model.

This study has some limitations. First, our sample consists mostly of people between 20 and 30 years old and might not be representative for future PNA users. Nevertheless, our study participants are highly internet literate, and therefore tend to use PNAs more easily. However, this sample might provide a lower WTP and might bias our results. Future studies should use a representative sample and should repeat our study in order to interpret the results for the entire PNA market. Second, we only considered a limited amount of attributes, owing to limitations of the ACA method. Future studies should also explore other attributes in order to help provide a more complete picture of a PNA configuration and utility values. Third, in the future, the development of mobile technologies should be considered in the exploration of PNAs. Also, the (dis)continuance of PNAs should be explored.

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Enhancing Student Engagement Through Social Media
A School of Business Case Study

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Abstract

While many universities have been deploying both electronic learning (eLearning) and social media applications for academic purposes, there is currently little research on the impact on their use on students' overall learning experiences and associated learning possibilities. This paper elaborates on several online academic activities, such as Facebook, Twitter and quizzes for one classroom taught school of business undergraduate (UG) module. The similarities and differences discovered across all aspects of this paper's research findings are examined against Chickering & Gamson's (1987) seven principles of good practice teaching and Astin's (1984) five tenets of engagement. Online activities were tracked over a period of one academic semester (fifteen weeks) and results insinuate that innovative and sustainable social media can indeed be utilised in higher education to enhance student learning and engagement.

Keywords: eLearning, Student Engagement, Social Media, Facebook, Twitter, Online Activity Tracking

1 Introduction

Like it or not, Facebook is everywhere. Rather than sigh as yet another student seems more concerned with their status than your class, why not use SNS to increase their engagement with module material? This paper examines a way to do just that by exploring the use of eLearning and social media applications in higher education, with a particular focus on student learning and engagement. A research gap exists for studies which incorporate both qualitative and quantitative analysis of student engagement. To contribute to this area, a selected UG School of Business student cohort's interaction with MIS20040's social media was conducted over fifteen weeks. The findings were then examined against Chickering & Gamson's seven principles of good practice teaching and Astin's five tenets of engagement. For personal observations and the literature review, the authors formulated and tested the following hypotheses in context of this research:

- H1: The use of social media as part of a module's structure will improve communication and level of engagement between students and academics
- H2: Using SNS & eLearning applications will improve students' overall learning experience as it allows for deeper learning
- H3: Simply adding SNS and/or eLearning applications to a module will not improve student's overall learning experience in higher education

2 Literature Review

2.1 Student Engagement

Influential research conducted by Chickering & Gamson (1987) list seven principles of good practice in UG education (Bangert 2004, Junco *et al* 2012, Kuh 2003). These are:

1. Encouraging student-faculty contact
2. Encouraging cooperation among students
3. Encouraging active learning
4. Giving prompt feedback
5. Emphasising time on task
6. Communicating high expectations
7. Respecting diverse talents and ways of learning

Student engagement has become a focus of many authors with one of the greatest influences on students' learning and personal developing being the amount of time a student will allocate to educationally beneficial activities (Carini & Kuh 2003). A student's level of engagement with a topic has been proven to have behavioural and cognitive impacts on their learning (McCarthy & Kuh 2006). Their engagement level will influence how a student feels about their peers, their school environment and their overall satisfaction (Kuh 2003, McCarthy & Kuh 2006). Astin (1984) developed five tenets of engagement. These are:

1. *Engagement refers to the investment of physical and psychological energy.*
2. *It occurs along a continuum (some students are more engaged than others and individual students are engaged in different activities at differing levels).*
3. *It has both quantitative and qualitative features.*

4. *The amount of student learning and development associated with an educational program is directly related to the quality and quantity of student engagement in that program.*
5. *The effectiveness of any educational practice is directly related to the ability of that practice to increase student engagement.*

(Cited Junco, 2011, pp. 164)

These are beginning to be applied to student engagement via SNS. Junco (2011), Glowatz & O'Brien (2013) and McEwan (2011) agree that SNS can lead to greater instances of student engagement in some areas. While it is debatable that Astin's five tenets can be applied to all learning theories, it best fits into social constructivist learning. Bangert (2004) explains that social constructivism supports all seven of the good practice principles in virtual environments. Constructivist models allow learners to actively develop their own understanding of knowledge and draw meaning from their personal experiences (Bangert 2004, Anderson & Dron 2011, Dalsgaard 2006). The teacher's role is that of a guide rather than an instructor, who will help lead students to come to their own understandings (Anderson & Dron 2011). Subramanian (2012) notes that students who learn in a social constructivist environment obtain more '*diversified knowledge'* than students who are taught using the traditional learning theories. This is due to peers contributing their thoughts and relating their individual experiences to the topic of discussion as well as the teacher (Dalsgaard 2006, Glowatz & O'Brien 2013, Subramanian 2012).

2.2 Social Media

The popularity of social media amongst students is a global trend and its potential educational purposes has become of interest to many academics (Selwyn 2007, Bangert 2004, Siemens 2004, McEwan 2011, Glowatz & O'Brien 2013, Mazer *et al* 2007, Junco *et al* 2012).

Facebook is the most popular social networking site (SNS) reaching over 1.3 billion monthly active users worldwide (Social Bakers 2013), an increase of 21% year-over-year (Facebook 2013). Twitter has over 241 million monthly active users (Twitter 2014). There have been several case studies exploring the various beneficial applications of Twitter in higher education (Ford *et al* 2011, Kowalik, 2011, Grosseck & Holotescu 2008, Junco *et al* 2012). With regards to overall social media usage, McEwan (2011) concludes that "*Facebook use appears to be nearly ubiquitous on college campuses*". The '*anytime, anywhere*' nature of SNS, not to mention the increase in mobile data usage, facilitates greater communication possibilities. SNS provide new channels of communication between a student, their peers and their teachers, both inside and outside of the classroom (McEwan 2011, Griffiths & Wall 2011, Selwyn 2007).

The informal nature of SNS like Facebook and Twitter (McEwan 2011) allow a different learning environment to be created for students - a hybrid learning experience of formal and informal learning. Andergassen *et al* (2011) explains that informal learning is something that is "*not institutional, not planned and, not structured*". Many authors report that the informal tone of SNS environments will increase student engagement with module content (Mazer *et al* 2007, Selwyn 2007, Bosch 2009, Selwyn 2007, Subramanian 2012).

Reasons for this are that students prefer to use digital communication compared to face-to-face methods (McEwan 2011, Ford *et al* 2011), students enjoy using SNS as part

of their learning experience as it contributes to course satisfaction (Griffiths & Wall 2011, Subramanian 2012), the nature of SNS environments facilitate the development of online academic communities (Booth & Esposito 2011, Siemans 2004), the majority of students are already active on FB (Muñoz & Towner 2009) and students prefer to use SNS over a University's Virtual Learning Environment (VLE) such as Blackboard (Mazer *et al* 2007, Selwyn 2007, Bosch 2009, Glowatz & O'Brien 2013, Griffiths & Wall 2011, Ford *et al* 2011). The use of SNS for educational purposes allows students the opportunity to gain deeper knowledge on a module's content as they are likely to discuss topics with peers and receive information from a variety of different mediums (Subramanian 2012, Selwyn 2007, Glowatz & O'Brien 2013). Schouten (2011) lists the various different educational uses SNS provide such as: news feeds, conducting classwork, holding meetings with geographically scattered colleagues, sharing information and building a sustainable community both digitally and in real life.

There is a need for staff within the academic community to familiarise themselves with SNS (Junco 2011, Glowatz & O'Brien 2013, Schouten 2011, Muñoz & Towner 2009,McEwan 2011, Griffiths & Wall 2011). Selwyn (2007) and Griffiths & Wall (2011) explain that a disconnect between staff and students exists, which creates frustration. Subramanian (2012) and Bosch (2009) claim that Gen Y students desire more than the traditional lecture-based-teaching approach offers, feeling this approach is not fitting for this day and age. Many authors point out that students do not engage with a university's VLE beyond passively downloading information (Griffiths & Wall 2011, Glowatz & O'Brien 2013, Ford *et al* 2011, Selwyn 2007). Booth & Esposito (2011) commented that in their experience, using SNS did not add to their workload and at times reduced it.

While there have been a lot of positive consequences shown from mixing academia and SNS, there are also some concerning issues. The lines between professional and social can become blurred if students and teachers connect on these sites. This can lead to privacy issues and anxiety for students (Muñoz & Towner 2009). While some studies have shown that students are comfortable connecting with staff on SNS (Muñoz & Towner 2009), others find that some students prefer not to interact with staff online (McEwan 2011). Another concern is that using SNS will have a negative impact on students' ability to communicate in the real world (McEwan 2011). Students who spend a lot of time may have a high level of digital literacy but consequently, may have skill deficiencies in more formal communication, critical reading and analysing (McEwan 2011, Bosch 2009). Other studies have found that using FB can be detrimental to students' grades as they will spend too much time on line when they would otherwise be studying (Junco 2011, Glowatz & O'Brien 2013). Regarding Astin's (1984) tenets of engagement, many authors (Junco *et al* 2012, Griffiths & Wall 2011, Glowatz & O'Brien) agree that learning occurs along a continuum; some students will always be more engaged than others and different students will be engaged by different things. Moule (2011) raises the issue of computer literacy; some students may not have the skills or technology available to them to use SNS or eLearning applications.

A gap in the literature on eLearning and the use of SNS exists regarding the application of SNS to the structure of classroom-taught university modules. Currently there are relatively few case studies exploring the use of social media in this type of academic setting (Bosch 2009, Junco *et al* 2012, Mazer *et al* 2007). Even fewer provide extensive quantitative data as to how students interact with academic content and eLearning applications over SNS (Munzo & Towner 2009, Junco *et al* 2012, Selwyn 2007). Also, the

impact of assigning participation marks for student engagement with a classroom-taught module's SNS (Junco 2011, Bofin 2013). When researching this area, it is important to consider Jung *et al*'s (2002, cited Ford *et al* 2011, pp. 122) discussion on participation. Jung *et al* (2002) explain that students can engage with a module by "*reading others' messages [...] posting one's own messages [...] responding to others' opinions*". Ford *et al* (2011) mention it was immeasurable for them track the number of messages read by their students via SNS. This can be a large problem in gauging the success of student engagement with a module's SNS, however just because it cannot be counted does not mean it does not add educational value.

The extensive literature review resulted in the following three hypotheses to be formulated and tested as part of this research:

- H1: The use of social media as part of a module's structure will improve communication and level of engagement between students and academics
- H2: Using SNS & eLearning applications will improve students' overall learning experience as it allows for deeper learning
- H3: Simply adding SNS and/or eLearning applications to a module will not improve student's overall learning experience in higher education

3 Case Study

This case study focusses on an "eMarketing & Social Networking" module (MIS20040) offered to UG students at University College Dublin's (UCD) School of Business. MIS20040 is an elective module and had 210 student enrolled during the 2012/2013 academic year. The module's descriptor, available to students prior to making respective module elective choices, states that:

"This module discusses the concepts and specific skills related to electronic Marketing (eMarketing), Social Networking & Web2.0. We will evaluate eMarketing opportunities and investigate implications of Social Networking on different industry sectors. This practical oriental module also requires students to design and implement an online marketing strategy for an organisation as part of the International Google Online Marketing Challenge (GOMC)." (UCD 2013).

MIS20040's dedidacted Facebook fan page and Twitter account were set up during the first week of term and enrolled students were informed about those initiatives both in class and through eMail. It was not mandatory to engage with either initiative as no grades were awarded for student contributions on these platforms. 43 students '*followed'* the Twitter account and 190 students '*liked'* the Facebook fan page in total.

Student engagement with MIS20040's Facebook fan page was recorded using Facebook Insights. This provided staff with analytical tools. The majority of links posted on MIS20040's SNS were shortened using Ow.ly link shortener. This allowed click tracking to be used for all applications. This data exported to Excel 2010 workbooks.

The module coordinator and workshop tutor incorporated innovative eLearning tools and social media initiatives when making announcements about assignments, posting supplementary articles relating to the module's topics and posting weekly online

quizzes. The supplementary articles were all from non-academic sources and covered a wide range of eMarketing topics. It was made clear to students that they could contact staff through social media as well as traditional methods, namely electronic mail (eMail) and face-to-face meetings. The tone of all staff posts via SNS was informal.

Weekly online quizzes were published via FreeOnlineSurveys.com to MIS20040's SNS after each lecture. There were no participation marks assigned to these quizzes; they were purely supplementary content for students. Figure 1 outlines a sample quiz.

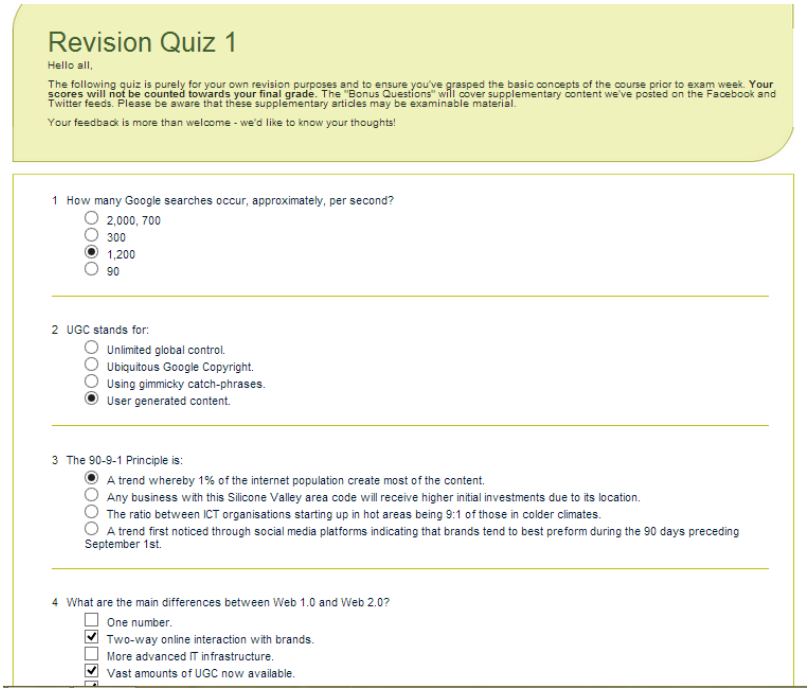


Figure 1 Sample online quiz made available to students

Scores were displayed on screen after completion. This allowed students to monitor the progress of their own learning and understanding of module content. The tutor reviewed the overall scores and addressed any 'problem areas' in the next tutorial.

This module has been included as one of UCD's overall Teaching & Learning show cases and more information can be found at the following link: http://bit.ly/1lB3Uvt

4 Method

In addition to collecting Facebook and Twitter analytics with Facebook Insights and Owly, the authors used FreeOnlineSurveys.com to design and administrate an online questionnaire for this study's primary data collection (Bofin 2013). The questionnaire consisted of 25 questions grouped into four sections relating to this study's objective. The Section 1 covered demographic information. Section 2 enquired about students' general online behaviour. Section 3 focussed on MIS20040's social media and Section 4 requested for improvements/recommendations on using SNS in higher education. The survey used various types of questions, including open-ended, closed-ended and Likert-type scales.

The survey was administered to 210 students by email on 22nd April 2013 and was open for two weeks. Participants responded to the survey anonymously. Seventy-six (n=76) students completed it by 5th May 2013.

5 Data Analysis and Discussion

5.1 Social Analytics Data

The authors tracked students' interaction and engagement with MIS20040's SNS over a fifteen-week period. This included a two-week mid-term break and a study week prior to the final exam. The types of content posted to the SNS included general module announcements, supplementary articles, links to the weekly quizzes.

Throughout the data selection period, MIS20040's Facebook fan page received 60 comments, 55 private messages, 215 '*likes*' and two '*shares*' from students. Staff posted content to the Facebook page an average of six times per week, while only posting content twice-a-week on Twitter. The MIS20040 Twitter account only received three direct tweets from students and one retweet.

Facebook Insights monitored the amount of daily page views and MIS20040's '*consumptions*'. Figure 2 shows the number of daily unique visitors and number of daily page views for MIS20040's dedicated FB page. The dates shown on the X-axis correspond to the date of weekly lectures. While there is a spike on these dates in most cases, there is still a reasonable level of unique users visiting the fan page and engaging with its content throughout the week.

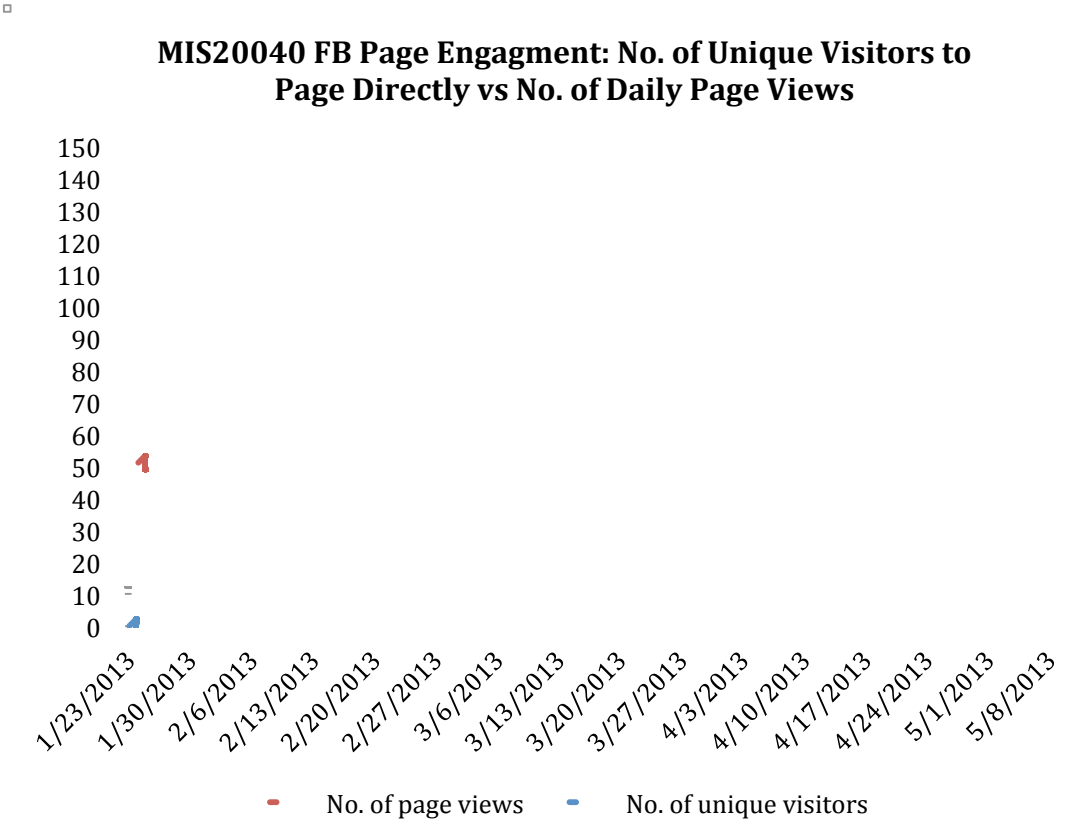


Figure 2: No. of unique visitors to MIS20040's Facebook page compared to total page view

Data collected via Hootsuite and Ow.ly focusses specifically on students' engagement with the supplementary articles and quizzes. Ow.ly links track the number of daily clicks by unique users. However, it does not count the total amount of daily clicks nor does it exclude users who have clicked on a link in the past, provided it was not done so on the same day. Users who click on the same link, on the same day – whether it is posted on Facebook or on Twitter – will only be counted once. Figure 3 shows the total number of unique user clicks on any supplementary article throughout the semester.

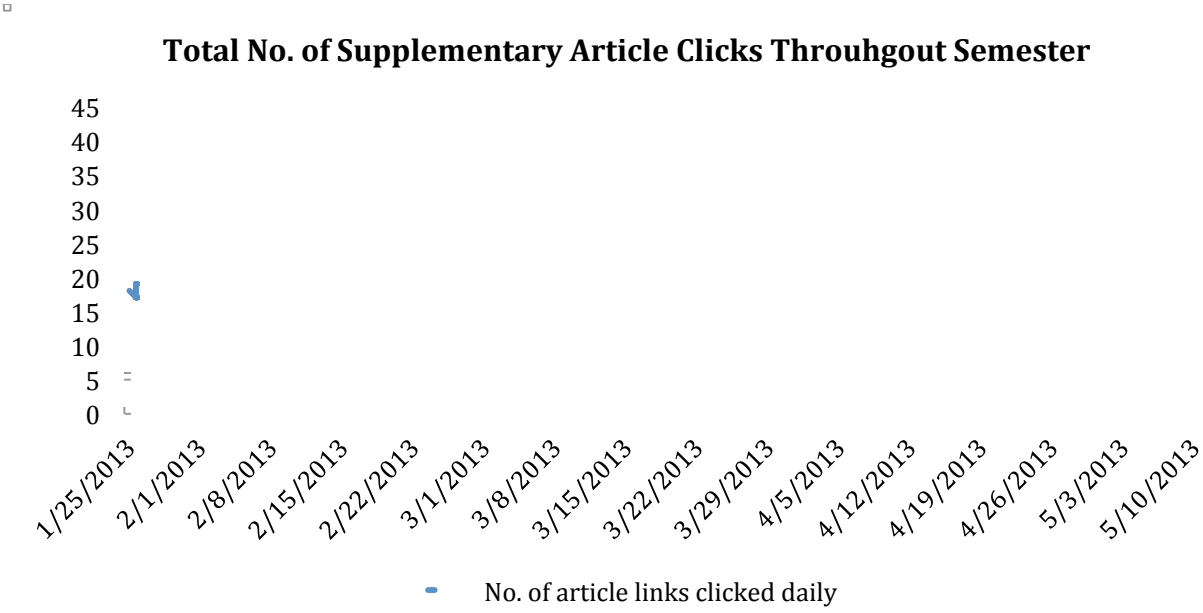


Figure 3 Total daily unique clicks completed throughout the semester

Figure 4 outlines the compiled daily clicks on any quiz links compared to the compiled number of completed quizzes.

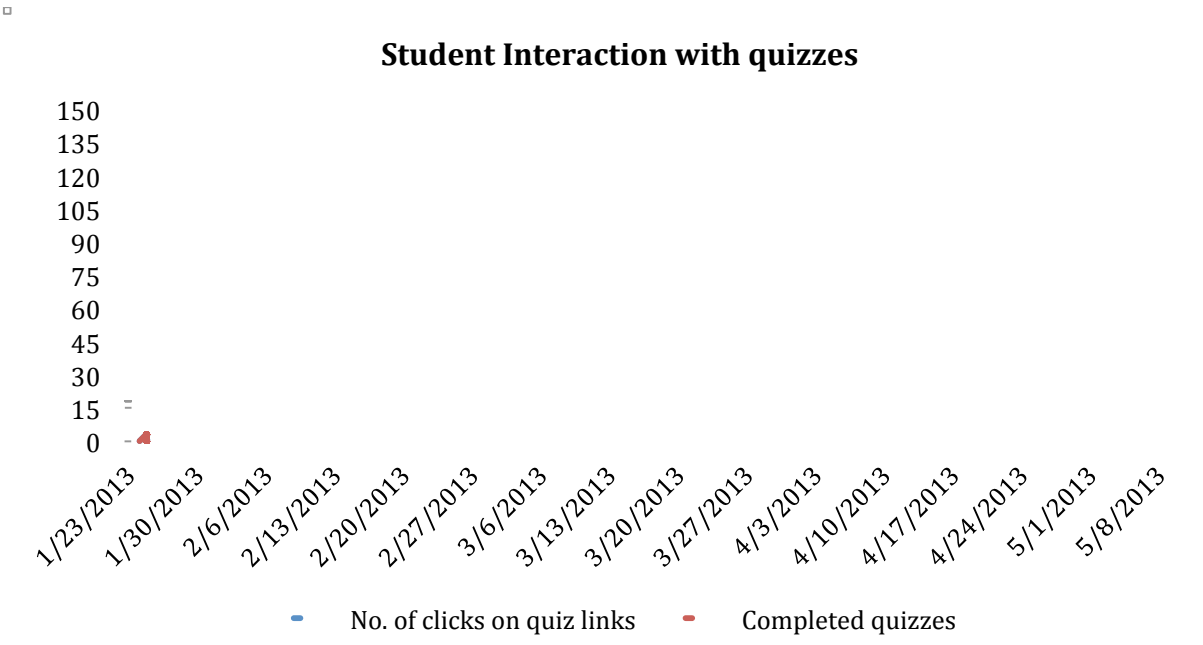


Figure 4 Total number of quizzes completed throughout the semester

The sharp activity drop as shown in above figures (06/03/2013 – 20/03/2013) is due to the two week mid-term break and the spikes in the week 01/05/2013 - 08/05/2013 is due to the final exam schedule. Figures 3 and 4 can be used to prove there was regular student engagement with MIS20040's supplementary content between lectures and tutorials. Despite the aforementioned spikes and drops, there is a relatively stable pattern of engagement with the additional

content. Initially, there was a higher click-through-rate with the supplementary articles but this soon sharply declines, resulting in intermittent activity. However, the rate of engagement with the quizzes and FB page remains at a reasonable level, with the exception of the huge spike on the days leading up to and including the day of the final exam. There was a four-week gap between the Week 7 and Week 9 quizzes' publications due to the mid-term break and students needing to focus on their GOMC projects. 661 quizzes were completed over the semester.

5.2 Questionnaire Data

The majority of the respondents (n=76) were Irish (n=59). 89% of respondents were permanent UCD students with 11% exchange students from different partner universities.

A surprising behaviour emerged while analysing the UG data set. Although, the majority of students spend a subtantial amount of time on any social media platform, they revert back to traditional eLearning platforms, such as Blackboard, to avail of general module-related information before referring back to social media applications (Figure 5). This supports H3.

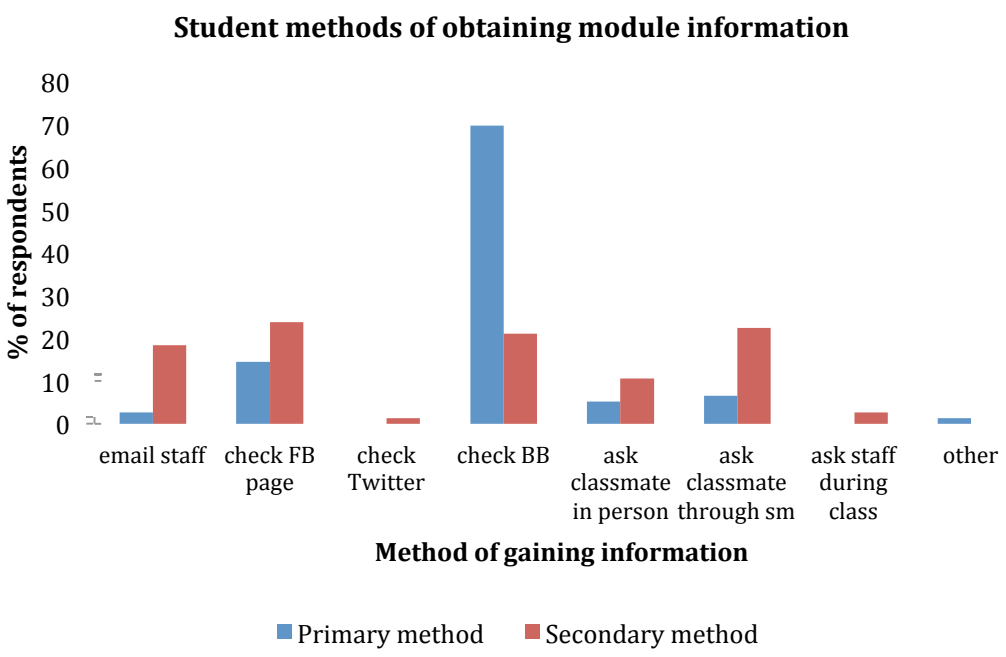


Figure 5 Student's preferred way of obtaining module information

When asked "*What do you see the functionality of course's social media sites as?*" (n=67) students provided the following information (Figure 6).

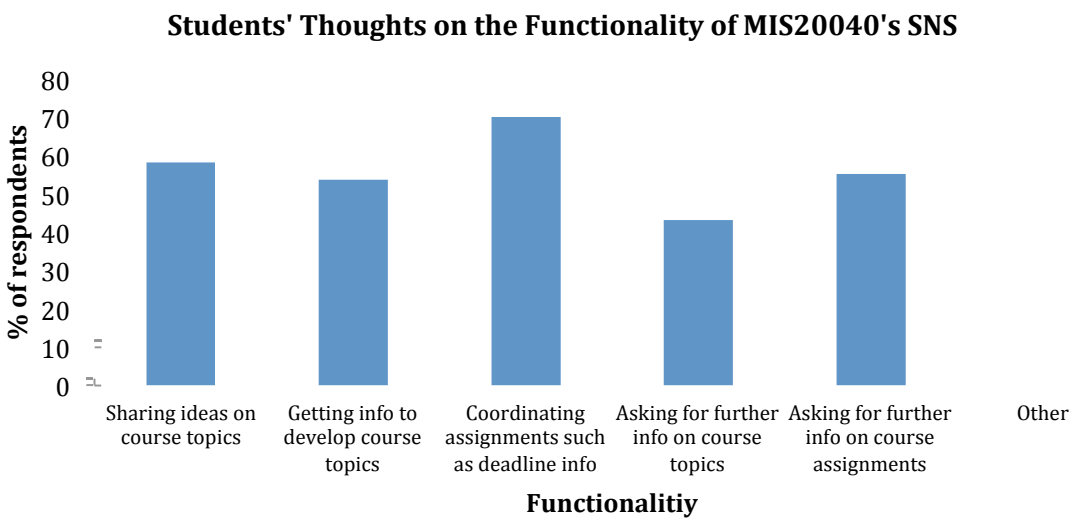


Figure 6 Students' thoughts on the functionality of MIS20040's SNS

When asked "*Do you find the course's use of the social media sites effective?*" 100% said "*yes*" (n = 66). A sample of students' feedback from this question is as follows:

- ***"Accessible lecturers and information in a quick and informal fashion"***
- ***"It always had information on when assignments were due and also had many sources throughout the semester to help us, like articles etc"***
- ***"It delivers a more modern and realistic medium to staff/student communication"***

Students were asked to rate statements about MIS20040's use of SNS and its impact on learning based on how true or untrue they felt them to be. Figure 7 shows their responses (n = 66).

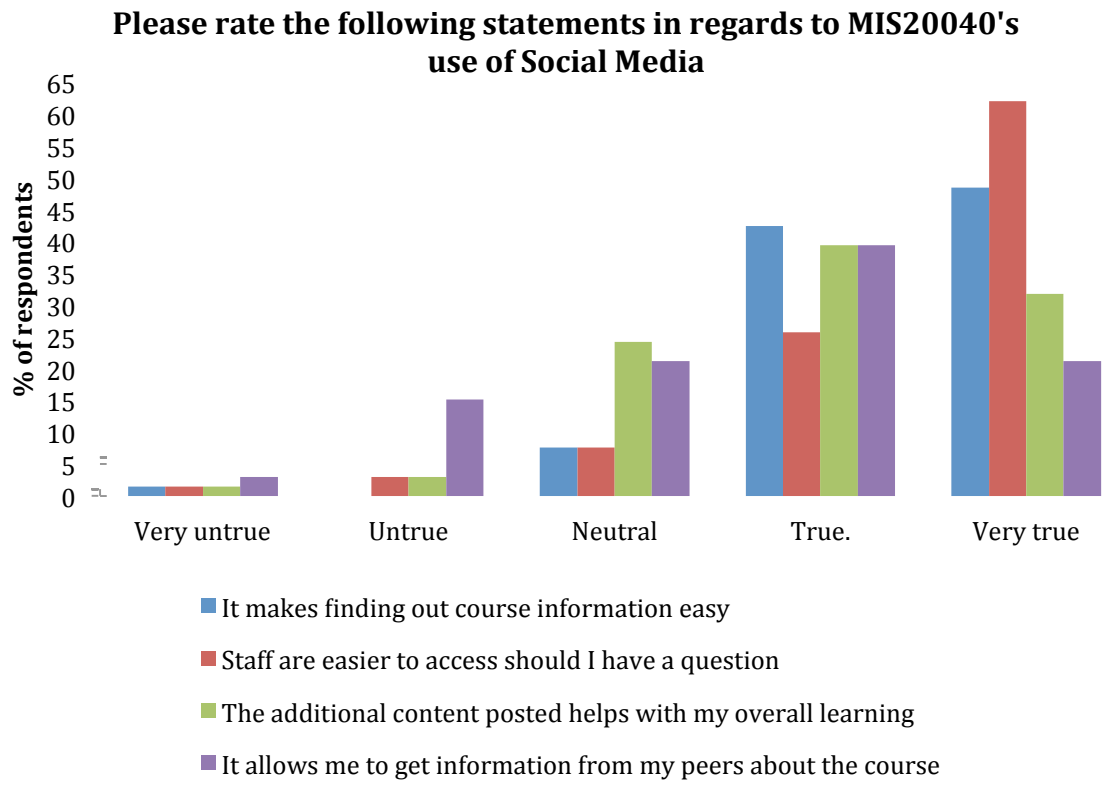


Figure 7 Students' thoughts on MIS20040's use SNS and its impact on learning

When asked *"Do you find the supplementary articles helpful with your overall learning experience?"* (n = 64), an overwhelming 91% of respondents stated "*yes*".

Furthermore, 95% of respondents (n = 64) said "*yes*" to the question "*Do you find the weekly quizzes have helped with your learning?"*

The findings show that MIS20040's use of SNS, particularly Facebook, was very well received by students. It placed information in a virtual space which students frequently occupy outside of lecture time. The students believed that the module's communication was improved. Its informal tone was an important factor in this, suggesting it may not have been as successful if a more formal approach were taken. Those findings support both H1 and H2.

Bofin's (2013) study shows students are highly active on social media in their day-to-day lives and appreciated the module's presence on less academic platforms. One student commented "*Yes, it was a good way of keeping in touch with the subject beyond the once a week lectures and tutorial. It was also somewhat less intimidating and informal than emailing a lecturer"*. This goes on to support H1 as MIS20040's SNS has encouraged students to engage with it throughout each week. Data from Facebook Insights and Hootsuite also support this hypothesis. They reveal that a large number of students interacted with the module's SNS throughout the week, rather than just on lecture- or tutorial-days. The data also showed that students either actively sought out module information by visiting the fan page directly or

passively received information by seeing it in their Facebook newsfeed. Figure 5 shows that Facebook was the most popular 'secondary method' of obtaining module information.

6 Discussion

The majority of students agreed that these initiatives had a positive impact on their exam preparedness and overall learning. The analytics data showing regular interaction with the weekly quizzes and supplementary articles supports this. This reflects Chickering & Gamson's principle of active learning, emphasising time on the task and communicating high expectations as students were asked to dedicate non-gradable efforts outside of class. It also fulfils Astin's tenets that "*the amount of student learning and development associated with an educational program is directly related to the quality and quantity of student engagement in that program"* and that engagement *"has quantitative and qualitative features".* Given that not all students engaged with MIS20040's SNS each week, it justifies the tenant that engagement "*occurs along a continuum."* This supports H2: *Using SNS & eLearning applications will improve students' overall learning experience as it allows for deeper learning*

Throughout the questionnaire, the theme of improved communication occurred. The topics of formality and speed arose repeatedly around this. Students expressed that by using social media, the staff removed a barrier to communication while also encouraging engagement with course content outside of the lectures and tutorials. This shows that informal SNS learning environments facilitate easier interaction between all parties, allowing for online discussions to occur. This finding supports the arguments covered in the literary review on how informal learning environments can improve students' experiences. It aligns with Astin's tenet that *"engagement refers to the investment of physical and psychological energy".* This supports H1: *The use of social media as part of a module's structure will improve communication and level of engagement between students and academics.*

The data has shown that being present in a digital which is currently occupied by most students, makes them more likely to interact with module content than if it remains solely on universities' VLEs such as Blackboard. Students indicated that the Facebook page made it easier for them to find out information because they did not have to sign into Blackboard (Bofin 2013). They are also more active on Facebook thus receiving module announcements sooner than if they just relied on checking Blackboard or college emails. Despite students' strong favouring of Facebook for the MIS20040's SNS, the majority check Blackboard for information first. This suggests that SNS can act as good support for VLEs however students still rely on a formal virtualised educational platform. While this also supports H1, it proves H3: *Simply adding SNS and/or eLearning applications to a module will not improve student's overall learning experience in higher education*.

Staff made it clear that students were allowed to contact them via SNS. Staff-student interactions happened consistently throughout the semester as well as some student-student interactions. These findings meet three of Chickering & Gamson's principles: encouraging student-faculty contact, encouraging cooperation among students, giving prompt feedback. Qualitative data from MIS20040's students revealed that many students enjoyed learning from each other (Bofin 2013). Given the positive feedback and consistent engagement throughout the semester, MIS20040's initiatives appear to adhere to Astin's tenant that "*the effectiveness of any educational practice is directly related to the ability of that practice to increase student engagement".*

7 Conclusion and Future Research

This study has shown that the integration of innovative social media initiatives into higher education meets all of Chickering & Gamson's (1987) and Austin's (1884) criteria for good UG teaching practices and student engagement. However, as this research focusses on a narrow cohort of UG full-time students, we recommend that further research should be undertaken to overcome any limitations in our study:

- Conduct similar research for other cohorts in the higher education sector
- Conduct similar research analysing social media-driven student engagement for non MIS modules
- Compare findings with similar studies completed in other business schools

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Does culture matter?
A qualitative and comparative study on eLearning in Germany and China

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Abstract

eLearning offers the exciting opportunity to acquire new material at any time and any place. It is also a means to teach a large number of people simultaneously, which is an important aspect when thinking about challenges in fast growing countries like China. We suggest that the successful usage of eLearning requires the consideration of didactic

socialization. While prior research has primarily focused on the overall success factors of eLearning, there is little understanding about how a specific learning culture context influences its usefulness. This study intends by a use of a proxy approach to investigate culture-sensitive success factors of eLearning measures regarding overall satisfaction and learning success. The results of the comparison of the German and East Asian learning context show that there are culturally specific requirements of eLearning success that cater to the specific didactic socialization.

Keywords: eLearning, eLearning success factors, culture, self-directed learning, China, user interface, Design principles

1 Introduction

Motivated by its continuously high economic growth, China is undergoing a transformation into a knowledge society, which is why knowledge becomes a central factor in the production process. This does not only alter labor market needs but also requires more flexible and modern education. The enthusiasm for information and communication technology in China provides the necessary innovation potential and can sustainably support economic growth. However, the education system is considered a critical factor concerning the realization of a knowledge society. The education sector suffers from insufficient financial support and investments, mainly in rural and poor areas. Quality and efficiency of education are not yet sufficient for the aspired international competitiveness. Besides the urgent need for qualified workers, tertiary education is insufficiently prevalent. Furthermore, education is not targeting the needs of a knowledge society (iMOVE, 2013). It is recognized that the available offerings are highly heterogeneous and find themselves under an enormous pressure for adaptation and change. Realistic solutions to this problem might well be important for global stability (iMOVE, 2013).

Export of - for instance - German eLearning offers that are considered high quality in China, constitute a possibility to face these challenges. eLearning is a means of allowing cost advantages in education export (Fraunhofer MOEZ, 2012) and can help to efficiently close the qualification gap (Zhang, 2004). It comprises more than a mere communication of knowledge via the Internet. According to Volery and Lord (2000), eLearning is based upon a cross-linking of learners, institutions, trainers, technical and administrative staff, as well as learning aids using the Internet and other technologies. However, exporting these services gives rise to significant problems. The providers face the challenge that eLearning concepts that have proven to be successful in Europe cannot simply be exported to China due to culture-specific differences (Borchert, 2009). A simple translation of content results in a poor learning success.

Therefore, a deep understanding of the culture of the target country is an important prerequisite for successful adaptation of contents (Fraunhofer MOEZ, 2012). Culture, here defined as a common set of values of a group of individuals (Straub, Loch, Evaristo, Karahanna, & Srite, 2002), is a construct which can explain global differences in learning and teaching concepts (Fischer & Kopp, 2007). Evidence from comparative

learning culture research (Hall & Hall, 1990; Hofstede, Hofstede, & Minkov, 2010) led to the conclusion that the consideration of learning conditions as well as cultural experiences of course participants offers great potential for a significant improvement of learning success.

But are there culture-specific requirements of eLearning? And what are these requirements? Information system research has paid attention to the factor of culture for quite some time now but the majority of contributions focus on the design of upstream and downstream development and implementation processes of eLearning applications in the respective country or culture area. There is a lack of reliable evidence regarding the necessity to respect cultural differences in the requirements for an export of the respective services (Krcmar, Böhmann, & Sarkar, 2010). So far, the didactic and information-technological design of learning content has only been taken into account in a few studies, in spite of it comprising the central success factors for eLearning. Recognized principles for IT-supported learning have been developed for western culture but they need to be benchmarked with regard to their suitability for other culture areas. Therefore, the aim of this contribution is to address the question whether there are culture-specific requirements of eLearning. The following research questions (RQ) will be addressed:

RQ1: In how far can standardized eLearning concepts be transferred to foreign culture areas?

RQ2: What are the requirements of culture-specific eLearning?

The theoretical significance of the present paper lies in the consideration of culture theory for the analysis of requirements for an eLearning application. On the practical side, it provides success criteria for the culture-sensitive design and application of eLearning.

First, theoretical basics regarding eLearning, culture, and culture-sensitive eLearning will be presented. Hereafter, and using China as an East Asia example and Germany as an Europe example, the respective requirements will be demonstrated and analyzed on the basis of a qualitative study. The results of this study will be discussed. The paper concludes with the discussion of limitations and the next research steps.

2 Overview of the theoretical principles

2.1 eLearning

eLearning, also known as IT-supported learning or technology-mediated learning (Gupta & Bostrom, 2013), provides job-related learning for many individuals simultaneously and also allows for an exchange of experiences beyond spatial and temporal borders (Hofmann & Jarosch, 2011). It is further specified as an environment in which the interaction of learners with learning material, co-learners, and trainers is supported by technology (Alavi & Leidner, 2001; Volery & Lord, 2000). eLearning comprises web and computer based trainings, webinars, virtual classrooms, video based tutorials, and serious games, amongst others (Seel & Ifenthaler, 2009). Since this paper

does not focus on one specific method, these will be subsumed in the following under the terms ‘eLearning’, or ‘eLearning application’.

To ensure efficiency and effectiveness of an eLearning application, learning success and satisfaction need to be studied closely. A wealth of articles covering this topic is available. Factors that turned out to be significant parameters in these studies are: the learner, the trainer, the course, the technology, the design, the learning environment and the possibility of personalization (table 1). The models developed in these studies help to define the determinants for learning success and satisfaction of learners (Benson Soong, Chuan Chan, Chai Chua, & Fong Loh, 2001; Ozkan & Koseler, 2009; Shee & Wang, 2008; Sun, Tsai, Finger, Chen, & Yeh, 2008; Volery & Lord, 2000).

Success Factors of eLearning	References
Learner dimension	(Benson Soong et al., 2001; Ozkan & Koseler, 2009; Selim, 2007; Shee & Wang, 2008; Sun et al., 2008; Volery & Lord, 2000)
Instructor dimension	(Benson Soong et al., 2001; Ozkan & Koseler, 2009; Selim, 2007; Sun et al., 2008; Volery & Lord, 2000)
Course dimension	(Ozkan & Koseler, 2009; Shee & Wang, 2008; Sun et al., 2008)
Technology and support dimension	(Benson Soong et al., 2001; Ozkan & Koseler, 2009; Selim, 2007; Sun et al., 2008; Volery & Lord, 2000)
Design dimension	(Sun et al., 2008)
Environmental and collaborative dimension	(Benson Soong et al., 2001; Ozkan & Koseler, 2009; Shee & Wang, 2008; Sun et al., 2008)
Personalization	(Shee & Wang, 2008)

Table 1: Success Factors of eLearning

In summary, these success factors have been shown to be strongly dependent on a consideration of requirements of learners and trainers, a high quality of learning content, a user-friendly system, and the consideration of technological aspects, such as usability of administrative tools and interfaces. Thurmond and Wambach (2004) complement this last aspect with a discussion about an appealing arrangement of the interaction between learners, tutors, content, and the learning system. Obviously, the quality of the learning content in eLearning applications is of utmost importance (Papp, 2000). Shee and Wang (2008) showed that learners attach particular importance to content that is well organized, presented effectively and interactively, and conveyed clearly. In addition, the content should be of appropriate extent (time and depth), as well as useful and customizable (Ozkan & Koseler, 2009).

Learning and memory experts define a successful learning process as the encoding of learning content in the memory – the transmission from working to long-term memory. This can be achieved through an appropriate processing (Köhler, Moscovitch, Winocur, & McIntosh, 2000; Morris, C. Donald, Bransford, & Franks, 1977) and processing depth (Bransford & Johnson, 1972; Craik, Fergus I. M. & Tulving, 1975; Davachi, Mitchell, & Wagner, 2003). Learning contents can for example be presented not only visually, but in addition audibly. However, learning style research emphasizes that the usefulness of such approaches cannot be generally implied on all learners. It has been shown that there are individual preferences for specific types of reception, processing, and reproduction of novel information (Felder, 1993; Kolb & Hay, 1999; van Zwanenberg, Wilkinson, & Anderson, 2000). However, preferences for certain learning

types can change over the course of life, and can be influenced by acquired knowledge, experiences, and situations. This is in line with research showing differences in learning between the young and the elderly (Piolino, Desgranges, Benali, & Eustache, 2002), between genders (Barnfield, Anne M. C., 1999), and in different environments (Hebb, 1947; Peisner-Feinberg et al., 2001). These data support a possible socio-cultural influence on learning and eLearning.

2.2 Culture

The term culture is used in literature in different ways and in different contexts. Herbig (1998) identified 450 different definitions of culture. Nevertheless, a common feature of many definitions is the entirety of shared values and norms. The present work takes this as basis for research. Culture research deals with diversities and commonalities of humans from different cultural backgrounds (Straub et al., 2002). Its goal is to understand influences of culture on social, political, and economic activity spheres. Three approaches dominate the field, focusing on the national, organizational, or group-focused levels. Group-focused approaches strongly refer to models of social identity and deal with questions of consequences of group adherence. On the organizational level, one or several enterprises often serve as reference objects for the investigation of individual and organizational behavior in different cultural contexts (Kummer, Leimeister, & Bick, 2012). A wealth of studies (e.g., Sackmann, 1992; Schein, 1990) investigates the anchoring of values and norms in business context. The present work focuses on the investigation of cultural differences on a national level since it is intended to compare countries. National culture research primarily identifies dimensions that can be used to classify and compare cultures of individual countries (Kummer et al., 2012). One of the most popular contributions in the area of national culture research is the one by Geert Hofstede, who identified in the first instance four cultural dimensions in a large empiric study comprising 53 countries (Hofstede, 2001). These dimensions are: power distance, uncertainty avoidance, individualism versus collectivism, and masculinity versus femininity. In 1991, he added long-term orientation as a fifth factor and in 2010 a sixth factor, called indulgence versus restraint. Besides Hofstede, also other researchers are focusing on national cultures having discovered highly similar value dimensions (e.g., House, Hanges, Javidan, Dorfman, & Gupta, 2004; Lytle, Brett, Barsness, Tinsley, & Janssens, 1995).

2.3 Culture-sensitive eLearning

In order to elucidate whether or not eLearning applications must meet culture-specific requirements, the learning behavior of individuals from different cultural backgrounds has to be investigated and compared. In keeping with Hofstede, cultural differences in learning practices, methods, and strategies – also referred to as didactic socialization (Haller, 1997) - can be explained in the light of the above mentioned six dimensions (Hofstede, 1986; Hofstede et al., 2010). Hence, an evolution of similar cognitive learning behaviors within a cultural area can be hypothesized. This notion is supported inter alia by cultural differences in the evaluation and understanding of the role of teachers, necessity of learning, and application of learning material. However, is it

obvious that a consideration of cultural learning preferences in the design and application of eLearning results in optimized performance?

Several studies (Choi, Lee, Kim, & Jeon, 2005; Ishii, 2004; Singh & Pereira, 2005) showed that design preferences of websites and knowledge platforms are different in Asia, compared to the western world. The consideration of culture-specific preferences regarding color schemes, choice of pictures, aesthetics, symbols, site partitioning, and navigation positively affects click and ecommerce behavior. Inspired by Hofstede's dimensions, this led to the development of a guideline for the design of culture-specific websites (Singh & Pereira, 2005). Results of other studies help defining guidelines for achieving a successful eLearning adoption in different cultures (Anakwe, Kessler, & Christensen, 1999; Chen, Mashhadi, Ang, & Harkrider, 1999; Harfoushi, Obiedat, & Khasawneh, 2010). Those studies focus on the introduction process of eLearning, and have identified the readiness and possible resistance of an innovative technology, the preference for a specific kind of distance learning or communication techniques, and the motivation for use of eLearning, as culture-dependent factors. Studies on culture-dependent user preferences of eLearning application demonstrated that the design of graphical user interfaces should be informed by culture-specific values (Hall, 2010; Mushtaha & Troyer, 2007; Swierczek & Bechter, 2010). The respective education system contributes to individual learning styles and thus also influences acceptance and effectiveness of the learning software. For example, an eLearning application for the East Asian culture area would differ strongly from a European one with respect to the presentation of academic references, formalities of interaction with the learner, formulation of instructions and assessment of exercise solutions, as well as patterns of reasoning (Kamentz & Mandl, 2003).

Taking all this into consideration, the results are wide-ranging, and the models used are discussed at various abstraction levels. It is likely that success factors of eLearning, in this context hitherto not investigated, such as learner, instructor, course, technology, design, and environment also underlie the culture effect (Gallivan & Srite, 2005; Leidner & Kayworth, 2006).

3 Research framework and methods

Lenartowicz and Roth (1999) described four ways of identifying valid cultural effects: Ethnological description; Use of Proxies-Regional Affiliation; Direct Values for Inference and Indirect Values Inference. In the present work cultural effects are analyzed by the use of nationality proxies (Hofstede, 1991; Steenkamp, 2001). It is not intended to explain the roots of cultural differences but merely to identify and contrast them for practical usage (culture-sensitive eLearning applications).

To identify the culture-specific requirements for eLearning, a qualitative and comparative study was performed in the form of interviews. These were conducted orally, and based on the model of (Sun et al., 2008), which was chosen due to its superior explanatory power (67% of the variance). In addition, this model provides a more detailed characterization of dimensions in comparison to other success factor models of eLearning using six dimensions and in total 13 factors (Sun et al., 2008).

3.1 Data collection

Interview questions targeted the factors that are essential for successful eLearning according to the interviewees. Data collection and analysis techniques were informed by the principle of Appreciative-Inquiry (AI) (Schultze & Avital, 2011). In a first step, design proposals for culture-sensitive eLearning were derived from interviewees' statements and collected in the form of a requirement catalog. During the course of the interviews, currently used and successfully implemented qualification approaches in the Chinese culture area were explored. Together with the interviewees, a picture of the future of eLearning applications was then outlined.

4 Results

Out of 97 contacted personnel development, eLearning, and East Asia experts, 32 participated in the interviews, each lasting for one to two hours (table 2).

Measure and items	Frequency	Percentage (%)
Gender		
Male	24	75
Female	8	25
Age		
30-40	6	19
41-50	14	43
>51	12	38
Nationality		
German	24	75
Chinese	5	16
Other	3	9
Chinese experiences (years)		
0	2	6
1-2	8	25
3-4	8	25
5-6	0	0
>6	14	44
Experiences in Chinese personnel development processes (years)		
0	4	12,5
1-2	8	25
3-4	8	25
5-6	4	12,5
>6	8	25
Experiences in eLearning (years)		
0	2	6
1-2	15	47
3-4	4	12,5
5-6	5	15,5
>6	6	19

Table 2: Subject demographics (n=32)

4.1 Learner dimension

The ability of the learner to efficiently use eLearning for the acquisition of knowledge strongly depends on his familiarity with computers, the penetration of technology into his private and professional world, and if the learner feels confident about computers' potential to assist in the development of competencies. Interview questions covered the following aspects:

- What are the main differences between a German and a Chinese eLearning participant?
- Which observations did you make regarding the handling and use of computers in Germany versus China?
- Which positive aspects of computers, tablets, or smartphones do Germans and Chinese take most pleasure in?

According to the interviewees, Chinese show a pronounced play instinct, satisfied in competitions, and paired with a high affinity towards technology.

> *A smartphone is a prestigious object and a 'must have' – no matter the cost. [Program Manager of eLearning]*

More than 80% of the interviewees reported that accompanying measures for the introduction of eLearning are rarely utilized due to the strong experience in the handling of computers. One third even suggest that support offers such as manuals are not necessary.

4.2 Instructor dimension

eLearning applications are usually completed by oneself, and learning place as well as time can be chosen freely. The question arises whether or not a tutor should be available in case of queries concerning contents. In theory, this offer can strongly contribute to learning success and satisfaction. 28 of 32 interviewees agree that this is more important for Chinese than for Germans. They take the view that whereas in Germany it is not mandatory, it is of utmost importance to implement it in the Chinese culture area. Two aspects were emphasized: a fear of 'losing face', and a strong focus on the teacher. In contrast to Germany, where queries during class are welcome and promoted, Chinese often fear being suspected of not knowing something, which might be considered embarrassing. In addition, they worry that the question might disgrace the teacher if he or she does not know the answer. The anonymity of eLearning could increase the willingness to ask questions, at best even anonymously, and at the same time improve learning success.

50% of the interviewees reported that learning in China mainly happens under the guidance of a teacher.

> *Group work, open interactions between learners and teachers, open treatment of criticism, and exchange of experiences in small groups are only fringe phenomena. [Exchange teacher at Chinese vocational training college]*

Interviewees also phrased a request to complement the online tutor with a virtual coach guiding students through the learning course. For the German culture area, they support the idea of a strongly self-directed learning approach with the completion of goals in a self-defined order.

4.3 eLearning course dimension

With regard to the assessment of flexibility of eLearning applications, no culture-specific tendencies could be identified in the framework of the interviews. However, a

large diversity of perspectives was obtained. 15 of 32 interviewees stated that a demand for 'boundlessness' is a typical German phenomenon, and that structural rigidities might result in a perception of external control and negatively affect learning motivation and satisfaction in German students. 11 of the 32 interviewees suggested that in a time of great change, as currently happening in China, knowledge inventories are altered and require a rapid and self-directed acquisition of this knowledge, not least to decrease dissatisfaction due to ignorance. Six of the interview group agreed that general statements cannot be made.

> *eLearning and the associated flexibility are only applicable to target groups that are able to learn self-motivated and self-directed. [Trainer working in China]*

Course quality is dependent on how eLearning is applied to develop and improve competences. The interviewees' statements (more than 70%) led to the conclusion that interactive, clickable, and multimedia elements are important success factors in Germany as well as in China.

4.4 Technology and support dimension

As a consequence that eLearning should contain multimedia and interactive elements, specific technological requirements need to be considered. Long loading times or interruptions due to connection or compatibility issues can result in frustration. This is considered merely a hygiene factor for Germany according to 60% of the interviewees, relevant only in case of very poor quality, and considering the currently high standards with respect to Internet connection and browser availability.

> *In China, however, the availability and quality of Internet and Intranet connections at work or in school are considered a central success criterion. [East Asia expert]*

4.5 Design dimension

Besides a graphical processing of learning content, design considerations also include the perceived user friendliness and added value for the learner overall. Analysis of the interviews revealed three important factors for the Chinese culture area: aesthetics, the world of images and symbols, and navigation. Bright and striking colors, a centered alignment of text and graphics, emotional charging of learning contents with nice scenarios, nature-related pictures, as well as a guided navigation with big buttons were considered important design aspects in order to increase user friendliness by the majority (> 60%) of interviewees.

> *For Germany, you need a cleaned up, clearly structured design with simple pastel colors. [eLearning Designer of a German eLearning company]*

No culture-specific particularities could be identified regarding perceived usefulness.

4.6 Environmental and collaborative dimension

Tests for determination of the current learning status and offers of communicative exchange can optimize learning processes and increase success and satisfaction. [Chinese vocational teacher]

Status controls, anonymously compared with the results of fellow students, were considered important especially for China. According to the East Asia experts, competition and measuring oneself against others enjoy great popularity. The offer to interact with other students, however, was estimated to be more relevant for Germany, where a collective understanding and passing of exams is paramount. Despite a collectivist social image, learners in China rely mainly on themselves, pursuing the goal of scoring better than competitors and standing out from the masses.

5 Discussion

In this section, we want to discuss the findings we derived through our qualitative approach and point out theoretical as well as practical implications for the transfer of standardized eLearning concepts to foreign culture areas, as defined in research question one. We have shown that today there are major cultural requirement differences in the eLearning application and design in Europe versus East Asian areas. As addressed in the second research question, we will discuss the requirements in accordance with the previously used eLearning success dimensions.

Success of eLearning is defined as interplay of satisfaction with the application and knowledge growth by both German and East Asian experts (cf. Bitzer & Janson, 2014 for an extensive review of learning success and satisfaction of eLearning). This is consistent with existing study results (Benson Soong et al., 2001; Ozkan & Koseler, 2009; Shee & Wang, 2008; Sun et al., 2008; Volery & Lord, 2000). However, from this it cannot be stated that a one-fits-all eLearning application is in general not expedient because influencing variables for successful eLearning are differentially prioritized and characterized. With the exception of the eLearning course dimension, the dimensions were described differently depending on the cultural area, which is due to the context of the learner dimension. If an eLearning application is targeting an East Asian audience, the context of the action situation does not only encompass individual prior knowledge or learners' interests and preferences, but also the different aspects of cultural background, which influence the learning process (Kamentz & Mandl, 2003). The roles of trainers and learners as well as the use of learning material are differently assessed and understood due to didactic socialization. This confirms results on culture-dependent learning methods by Fischer and Kopp (2007) as well as Hofstede et al. (2010). To allow conclusive and final statements regarding mechanisms of action, further analyses are required.

Requirements of culture-specific eLearning could be specified in the present study on the basis of the dimensions defined by Sun et al. (2008). Based on the interview results, practical implications for the design and use of eLearning in the cultural context of Germany and China are identified (table 3).

Regarding learner dimensions, the results are surprising. Previous research considering dimensions of national culture and IS research suggests that countries displaying high

uncertainty avoidance usually need guidance with respect to the user interface (Kamentz & Mandl, 2003). In contrast, our results, based on expert interviews, suggest eLearning solutions for China that do not provide extensive support and guidance. Vice versa, this is considered more necessary for Germany.

Dimension	Germany	China
Learner dimension	- Support for take-up measures and pilot actions in order to increase the acceptance of the eLearning application among learner - Motivational elements (e.g. praise upon successful completion of a chapter) - Help button, invoking context-sensitive support in case of handling errors - Telephone support and optional remote support	- Device-independent user-interface - Statistics of processed topics and chapters - No need of support or instruction manual, at most short video-based instruction tutorials
Instructor dimension	- Forum for open discussion of questions from the lectures - User-controlled processing of the eLearning contents	- questions anonymously directed to online tutor - Virtual coach, guiding the learners through the eLearning application
eLearning course dimension	- Temporal and spatial flexibility for processing of the learning content - Short units of learning (learning time maximum of 10 minutes) - Interactive, multimedia components	
Technology and support dimension	- browser-independent	- Offline availability of the eLearning application (download option or CD-ROM/DVD version) - Particular attention to data protection and data security
Design dimension	- Clear structure of user-interface - Non-linear, free navigation through the application - Simple pastel colors	- Bright and striking colors - Centered alignment of text and graphics - Emotional charging of learning contents with nice scenarios, nature-related pictures - Guided navigation with big buttons and pictures - Linear navigation with ramifications to basic learning topics and further information (instant access to the next chapter is only possible after completion of the prior chapter)
Environmental and collaborative dimension	- Saving of individual learning pathways - Exchange of information and lecture materials among learners (e.g. alongside lecture forums and chats) - Individual 'lessons learned' exercises (repetition of the exercise or guided solution in case of failing)	- Charts for orientation between the chapters - Game-based 'lessons learned' exercises (anonymously and in comparison to other learners) - Button providing the solution in case of failure

Table 3: Requirements of an eLearning application in Germany and China

A possible explanation is that cultural development considering IT and eLearning in China has outpaced western countries such as Germany. As a consequence, device-independent eLearning solutions might be helpful in China in order to support ubiquitous learning possibilities that might not be feasible in western countries at this time (Fischer & Kopp, 2007). Previously reported propositions were confirmed by our experts for the instructor dimension. China still has a teacher-centric learning culture,

whereas Germany displays a low power distance and a high degree of self-regulated learning (Fischer & Kopp, 2007; Swierczek & Bechter, 2010). Thus, a culture-sensitive eLearning application should take these differences into account. Possible design implications include an avatar-based guidance for the eLearning application as well as guidance through the learning process. Sun et al. (2008) emphasize the possibility of contacting an online tutor as a major contributor to learning satisfaction and success. One reason for such guidance is that learning does not need to be interrupted, thus improving the 'handling' of eLearning (Arbaugh, 2002). A formative assessment of learning success would be appropriate to demonstrate progress to the learner and also the target-oriented appropriation of the eLearning application (Gupta & Bostrom, 2013). Anonymous requests to the teacher in order to prevent a possible loss of face of both teacher and student should also be allowed (Lehmann & Söllner, 2014).

Considering the course dimension of eLearning, there are requirements that are suitable for both cultural backgrounds, including the general potentials of eLearning such as independence of place and time to learn, the possibility of short learning units and new interactive multimedia elements that convey complex learning content and a strong individual adaptation (Ozkan & Koseler, 2009), which is also in common with study results of learning styles (Felder, 1993; van Zwanenberg et al., 2000). Whereas Sun et al. (2008) show a strongly significant effect of this dimension, more recent replication studies assigned this effect to the organizational context, differing in relation to the organizational structure. In the context of companies, flexibility of eLearning is more important than in the context of higher education (Wegener, Krause, Flohr, & Leimeister, 2012). The technology dimension did not reveal any major differences between both countries. However, since many vocational education centers do not provide Internet access in China, a major requirement is that the eLearning applications are also available offline. Hence, software-as-a-service solutions and connected business models are not implementable, or it is at least more difficult to do so. Our results regarding the design dimension strongly confirm results from IS research, especially in the area of user interface research (Hall, 2010; Mushtaha & Troyer, 2007; Swierczek & Bechter, 2010). Germans typically prefer a plain and simple user interface with a clear navigational structure. In contrast, Chinese prefer the traditional colors, a high image to text ratio and a clear-guided navigation with a lot of signals to indicate proper use of the eLearning application. At first glance, these results are not surprising. However, we reviewed several eLearning tools in China in the course of our analysis that did not fulfill these criteria. They were often very similar to western tools regarding design, possibly due to an acculturation process and cultural imperialism (Leidner, 2010). Hence, it might be interesting for research and practice to actually employ such culturally adapted eLearning applications for distance learning purposes, and to assess how the learning outcomes are actually influenced by such user interface design decisions. Finally, it is worth discussing the environmental dimension. Contradictory to cultural theory, Germans display a collectivistic learning culture including the possibility to share learning materials and to strongly interact with other learners, for example using discussion forums or chats (Anakwe et al., 1999). In contrast, our interview results suggest that China needs more anonymous eLearning tools that take this collaboration of work into consideration. Nevertheless, considering China as a performance and long-term oriented country, students seek the challenge with other

learners. Therefore, a possible design implication is the use of pseudonyms and the opportunity to compare learning success, for example with game-based solutions.

6 Limitations and Future Research

Our study of course has limitations but it nevertheless offer opportunities for further research in the learning culture context. To investigate whether success factors of eLearning differ between cultures, we chose a comparative qualitative approach. 32 experts from Germany and China participated in the interviews. Broader quantitative analyses are now required to provide empirical support for our results, including a bigger sample and further countries. As has been shown before, cultural theory requires deep insight, especially when investigating complex cultures like the Chinese (Lenartowicz & Roth, 1999; Steenkamp, 2001). Nationality proxies are suitable for first analysis but this approach is a mere classification method that lacks measures to test hypothesized relationships regarding the influence of culture on dependent variables. Therefore, they should be enriched with mixed methods like ethnological description, direct values for inference, or indirect values for inference, to provide explanatory power.

In addition, our research paper comes with several threats to validity. First of all, characteristics of our sample could threaten the external validity, since we did not randomly choose the interviewees in the study. Also, we do not claim that our results can be universally generalized, because we only focused on our specific example of Germany and China. However, future research should acknowledge this gap by investigating how our insights can be transferred to other contexts and thus foster an implementation of a cultural sensitive eLearning.

7 Conclusion

The present study highlights that there are practical implications for eLearning due to cultural differences on the learner, instructor, technology, design, and environment levels. Taking all this into consideration can improve learning success and satisfaction with the eLearning application. While an operationalization of culture remains challenging, our nationality proxy approach constitutes a contribution towards capturing this difficult and hard-to-define concept. The implications of this paper for further research relate to culture-sensitive success factors of eLearning measures regarding overall satisfaction and learning success. Beyond culture-specific requirements of eLearning success (Gallivan & Srite, 2005; Leidner & Kayworth, 2006), they also provide a correlation between learning context and eLearning usefulness as evidenced by the comparison of European versus East Asian learning context. Further research should examine this correlation by including additional countries and research contexts beyond the studies by Swierczek and Bechter (2010), Fischer and Kopp (2007) and Zhang (2004), and progress to a quantitative approach. Finally, our results strongly support the need for increased localization instead of standardization. The overlap between culture-specific and purely individual characteristics of the learner is still an open question. The developments of methods which enable a differentiation of such

characteristics constitute a suitable starting point for sustained investigations (Janson, Peters, & Leimeister, 2014; Kamentz & Mandl, 2003; Leimeister, 2012).

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Performance Measures for Social CRM: *A Literature Review*

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Abstract

Social CRM deals with the integration of Web 2.0 and Social Media into Customer Relationship Management (CRM). Social CRM is a business strategy supported by technology platforms to provide mutually beneficial value for companies and their target groups. In practice, one factor impeding Social CRM implementation is the lack of performance measures, which assess Social CRM activities and monitor their success. Little research has been conducted investigating performance measures in order to develop a Social CRM performance measurement model. To address this gap, this article presents the qualitative part of a two-stage multi-method approach. It comprises a systematic and rigorous literature review as well as a sorting procedure. In this effort, 16 Social CRM performance measures and four categories of a performance measurement system are identified. The sorting procedure validates the corresponding classification and ensures a high degree of external validity. In a subsequent study, formative survey instruments are developed from the respective findings and are tested by applying a confirmatory factor analysis.

Keywords: Social CRM, Social Media, performance measures, Social CRM performance

1 Introduction

Social Customer Relationship Management (Social CRM) deals with the integration of Web 2.0 and Social Media into CRM (Lehmkuhl and Jung 2013). According to Askool & Nakata (2011) Social CRM is a new paradigm and defined by Greenberg (2010) as "[…] a philosophy and a business strategy, supported by a technology platform, business rules, processes and social characteristics, designed to engage the customer in a collaborative conversation in order to provide mutually beneficial value in a trusted and transparent business environment". Additionally, Social CRM describes the creation of "[…] a two-way interaction between the customer and the firm. It is a CRM strategy that uses Web 2.0 services to encourage active customer engagement and involvement" (Faase, Helms, and Spruit 2011).

The implementation of Social CRM "requires transformational efforts among all organizational parts" (Lehmkuhl & Jung, 2013) and has the potential to provide mutually beneficial value for the company and their customers. A prerequisite to start the transformational process is the identification of Social CRM objectives and corresponding performance criteria, i.e. performance measures (Neely, Gregory, and Platts 1995; Payne and Frow 2005). A performance measure is a metric, which "can be expressed either in terms of the actual efficiency and/or effectiveness of an action, or in terms of the end result of that action" (Neely, Gregory, and Platts 1995)[1]. By aligning on Neely's et al. (1995) proposed procedure to develop a performance measurement system design the article follows the two steps being (1) the identification of performance measures, and (2) the classification within a performance measurement system.

The development of Social CRM performance measures is a practical and an academic challenge and the focus of the article. From a practical perspective, identifying and establishing Social CRM performance measures (e.g., metrics, key performance indicators, etc.) are essential for companies to conduct a comprehensive Social CRM strategy (Baird and Parasnis 2011). A corresponding measurement model enables the assessment of Social CRM activities and the monitoring of their success (Sarner and Sussin 2012; Sarner et al. 2011). From an academic perspective, there is a lack of clearly defined performance measures and measurement models based on an empirical foundation (Küpper 2014). Given the lack of empirical research in this regard, there is a literature review performed in order to identify conceptual Social CRM performance measures (aforementioned defined as a metric) as well as to classify them into a Social CRM performance measurement system. Therefore, the corresponding research questions are as follows:

RQ1: What are performance measures for Social CRM?

RQ2: What are corresponding categories that classify the identified Social CRM performance measures?

[1] The development of key performance indicators, as the operationalization of a metric, are not the focus in the article, whereas it is a part of further research activities and considered in the research agenda.

To answer the research questions, the article is structured as follows: Firstly, the literature review, according to vom Brocke's framework, is described (vom Brocke et al. 2009). Secondly, the literature analysis and synthesis is given containing the identification of the Social CRM performance measures and their classification within a performance measurement system. Subsequently, a research agenda is derived with regard to the overall research project. Finally, a short conclusion and limitations are presented.

2 Literature Review

A literature review provides a solid theoretical and conceptual foundation (Levy and Ellis 2006). Figure 1 depicts a framework for reviewing scholarly literature, according to vom Brocke et al. (2009). It comprises five steps being definition of review scope (section 2.1), conceptualization of topic (section 2.2), literature search, literature analysis and synthesis (section 3), and the derivation of a research agenda (section 4). The authors describe the research method in the following subsections according to the argumentation of (Küpper 2014).

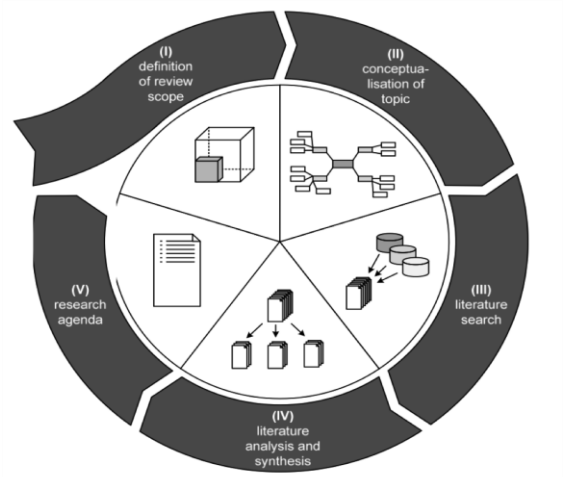


Figure 1: Literature Review Framework (vom Brocke et al., 2009)

2.1 Definition of the Review Scope

Categories	Characteristics			
Focus	research outcomes	research methods	theories	applications
Goal	integration	criticism	central issues	
Organization	historical	conceptual	methodological	
Perspective	neutral representation	espousal position		
Audience	specialized scholars	general scholars	practitioners	general public
Coverage	exhaustive	exhaustive and selective	representative	central / pivotal

Table 1: Taxonomy of literature reviews based on Cooper (1988)

The scope of a literature review can be characterized using the taxonomy of Cooper (1988), which differentiates six categories each having a different number of characteristics. The grey shades in Table 1 indicate the literature review characteristics. The *focus* is on the identification of the research outcomes (e.g., different performance measures like "social network monitoring"). Considering the research question, the *goal* is to identify central issues. The *organization* of this literature review is related to a

conceptual foundation. The *perspective* has a neutral representation. The specific research topic constitutes specialized scholars as the target *audience*. Due to the restrict number of articles in the research field the coverage of the literature search is *exhaustive and selective.*

2.2 Conceptualization of the Topic

A literature review has to "provide a working definition of key variable" (Webster and Watson 2002). Table 2 presents an overview of the key variables and their definitions, which are conducted in the literature search.

Key Variables	Definition	Author(s)
Web 2.0	"Web 2.0 is a **set of economic, social, and technology** trends that collectively form the basis for the next generation of the Internet - a more mature, distinctive medium characterized by user participation, openness, and network effects."	Musser and O'Reilly 2006
Social Media	"(…) a group of **Internet-based applications** that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user generated content."	Kaplan & Haenlein (2010)
CRM	"CRM is a **strategic approach** that is concerned with creating improved shareholder value […] with customers and customer segments. CRM unites the potential of relationship marketing strategies and IT to create profitable, long-term relationships with customers and other stakeholders."	Payne & Frow (2005)
Social CRM	"(…) a **philosophy and a business strategy, supported by a technology platform**, business rules, processes and social characteristics, designed to engage the customer in a collaborative conversation in order to provide mutually beneficial value in a trusted and transparent business environment."	Greenberg (2010)
Performance Measure	A performance measure is defined as a metric, which "can be expressed either in terms **of the actual efficiency and/or effectiveness** of an action, or in terms **of the end result** of that action."	Neely et al. (1995)
Effectiveness	"Effectiveness refers to the extent to which **customer requirements are met** (…)."	Neely et al. (1995)
Efficiency	"(…) efficiency is a measure of how economically the **firm's resources are utilized** when providing a given level of customer satisfaction."	Neely et al. (1995)

Table 2: Overview of the definitions for Social CRM performance measures

2.3 Literature Search

A rigorous literature search follows the sub-process proposed by vom Brocke et al. (2009) including (1) a journal search, followed by (2) a database search, and (3) a keyword search, and finally (4) a forward and backward search.

The relevant journals for the (1) journal search are derived from the multidisciplinary research areas, namely Information Systems (IS) and Marketing (Lehmkuhl and Jung 2013). A selection of the top-tier IS journals are: Information Systems Research, MISQ and Journal of Information Technology. High ranked Marketing journals are, among others, Journal of Marketing, Journal of Marketing Research, Journal of the Academy of Marketing Science, as well as the Journal of Interactive Marketing. The selection of renowned, double blinded IS conference proceedings include the International Conference on Information Systems (ICIS) and the European Conference on Information Systems (ECIS). The selected high ranked Marketing conferences are the

American Marketing Association (AMA) and the European Marketing Academy (EMAC).

The (2) database search assures the investigation of the previously identified journals. Consequently, the following scholarly databases cover the aforementioned disciplines and are primarily queried and investigated: EBSCOhost, ProQuest, ScienceDirect, Emerald, Web of Knowledge and AISeL.

The (3) keyword search, is the core of the literature search. The keywords and related abbreviations are derived from the key variables in Table 2. The combination of keywords, abbreviations and similarities are hereafter defined as search phrases, which are queried in the databases at hand[2]. The results of the keyword search are given in Table 3. The number in brackets (hits) represents the number of articles found in the respective database using the specific search phrase. Applying a backward reference search later on mitigates the inherent risk of omitting articles. The articles have been further evaluated by manually analyzing (reading) title, abstract and introduction and eliminating duplets. The numbers marked bold represent the net hits after the analysis. The total net hits for the keyword search yields to 18 articles.

The last sub-process step (4) aligns according to Levy & Ellis (2006) backward references search and forward references search. A first-level backward references search focuses solely on the references of the net hit's articles from the keyword search (Levy and Ellis 2006). In sum, this search yields 9 additional articles. The forward references search focuses on articles that contain a reference to one of the net hits articles. Therefore, each of the 18 net hits was analyzed using Google Scholar and the six databases (X. Chen 2010). The forward references search yields 10 additional net hits (see Table 3). This leads to a total of 37 relevant articles that are used for further literature analysis and synthesis.

Database	Keyword Search				Forward Search		Backward Search
	Search Phrases			Net Hits	Hits	Net Hits	Net Hits
	(a)	(b)	(c)				
EBSCOhost	**2** (11)	**0** (22)	**6** (194)	**8**	**196**	**1**	-
Emerald	**0** (0)	**0** (0)	**0** (7)	**0**	**0**	**0**	
ProQuest	**2** (43)	**2** (67)	**3** (250)	**7**	**87**	**0**	
Science Direct	**1** (3)	**0** (0)	**2** (26)	**3**	**0**	**0**	
Web of Knowledge	**0** (0)	**0** (0)	**0** (25)	**0**	**97**	**2**	
Google Scholar	-			**-**	**592**	**7**	
Sum	-			**18**	**-**	**10**	**9**
Total Net Hits	**37**						

Table 3: Results of the literature search

[2] The search phrases are: (a) ("social crm" OR "social customer relationship management") AND ("success" OR "performance" OR "effectiveness" OR „efficiency"); (b) ("crm" OR "customer relationship management") AND ("web 2.0" OR "social media") AND ("success" OR "performance" OR "effectiveness" OR „efficiency"); (c) ("crm" OR "customer relationship management") AND ("success" OR "performance" OR "effectiveness" OR "net benefits" OR „efficiency").

3 Literature Analysis and Synthesis

The core of a literature review is to analyze and synthesize the relevant articles in order to identify elements for the research topic under investigation (Webster and Watson 2002).

3.1 Findings on Social CRM Performance Measures

	Social CRM performance measures	Description
Performance measures with CRM background	Customer Insights	Companies analyze data obtained from Social Media to detect patterns in customer behaviors, and match the results with the existing customer data (master data) in order to obtain a 360-degree view of the customer.
	Customer Orientation	As part of the Social CRM strategy, a company can align organizational processes along customers' needs and devise every touch-point more customer-oriented.
	Market and Customer Segmentation	Social CRM enables a more efficient and effective segmentation.
	Customer Interaction	Through Social CRM, companies interact more effectively with customers (i.e. more intensive and customer-oriented).
	Customer-Based Relationship Performance	Customers perceive an enhanced relationship quality in the context of Social CRM implying that the confidence increases and overall satisfaction rate rises.
	Customer Loyalty	Web-users developed an emotional attachment to the company and are interested in a long-term relationship. It increases the customer willingness to attach with products or services of the company.
	New Product Performance	Social CRM increases the success of newly introduced or developed products and services.
	Organizational Process Optimization	Social CRM enables the enhancement of efficiency and effectiveness through the entire value chain of the company.
	Brand Awareness	Social CRM increases the brand awareness and brand recognition, e.g., by means of customers recommendations.
	Customer Lifetime Value	Social CRM has a positive effect on the profitability of a customer's value over his relationship lifetime. From the company's perspective, the net present value increases with respect to customer's maintenance.
	Financial Benefits	Social CRM increases the potential of cost reduction, particularly, in the area of CRM, as well as the potential of increasing sales.
	Competitive Advantage	By implementing Social CRM, the company encompasses itself from competitors and gained a sustainable competitive advantage.
Exclusive Social CRM	Social Media Monitoring	Capturing information from Social Media about characteristics, needs, behavior and relationships enables further analytical approaches.
	Customer Co-Creation	Social CRM activities support the involvement of customers as co-creators, e.g., in the innovation process.
	Peer-to-Peer-Communication	Customers get the opportunity to interact and collaborate with each other on social media.
	Online Brand Communities	Companies provide a brand community to interact with customers e.g., about service or product related content.

Table 4: Definitions of Social CRM performance measures

The content analysis of the 37 articles is structured in two phases. Firstly, single performance measures are selected from each article leading to a total number of 16 measures. Secondly, each article is re-examined in order to falsify and validate the

results. Concerning the first research question (*RQ1: What are performance measures for Social CRM?*), table 4 presents the findings and corresponding definitions[3].

Four out of 16 performance measures ("Social Network Monitoring", "Customer Co-Creation, "Peer-to-Peer Communication", and "Online Brand Communities") are dedicated to a Social CRM context. The remaining stem from a traditional CRM context and have to be re-described and operationalized in Social CRM. This is due to the fact that the measurement process in Social CRM is significantly different compared to a traditional CRM setting (Neely, Gregory, and Platts 1995). The performance measures "Customer-Based Relationship Performance" and "Customer Lifetime Value" are two examples of that reasoning (see Table 5).

	CRM	Social CRM
Customer-Based Relationship Performance	A satisfied customer ratio (%) can be calculated with a ratio of "complaints resolved on 1st call (%)" (H.-S. Kim and Kim 2009).	A satisfied customer ratio contains, e.g., the ratio of resolved customer problems after the first initial posts (in %) on the company's social media profile.
Customer Lifetime Value	Borle, Singh, & Jain (2008) estimate the customer lifetime value with the following model: $\mu_{ih} = \ldots + \mu_{1h}X + \ldots$ X = independent variable μ_{1h} = average expended amount by customer h on purchase occasion i. μ_{ih} = "the impact of lagged dollars spent on future amounts expended."	Due to the assumption that Social CRM has a positive effect on the profitability of a customer's value over his relationship lifetime, a hypothesis is derived: $H_0: \mu_{1h} > \mu_{1h*}$ μ_{1h*} = new impact of lagged dollars spent on future amounts expended. The non-rejection of this hypothesis leads to an increase customer lifetime value as follows: $\uparrow\uparrow \mu_{ih} = \ldots + \uparrow\uparrow \mu_{1h}X + \ldots$

Table 5: Differences in operative performance measures: CRM vs. Social CRM

3.2 Classification into a Social CRM Performance Measurement System

To answer the second research question (*RQ2: What are corresponding categories that classify the identified Social CRM performance measures?*), a two-step approach is conducted by firstly, adopting a performance measurement system from current literature and secondly, by classifying the performance measures (Neely et al. 1995). Bailey (1994) uses the term classification as the process of "ordering entities into groups or classes on the basis of similarity". The CRM performance measurement framework (i.e. a system) by Kim & Kim (2009) is adopted, which was identified during the backward reference search. It is a high ranked, widely used framework that provides a high degree of external validity. The corresponding framework uncovers a company perspective and includes four categories: (1) infrastructure, (2) process, (3) customer, and (4) organizational performance. The subsequent classification process follows the rigorous approach of Bailey (1994). Conducting a sorting procedure validates the quality of the classification. According to Petter et al. (2007) and Walther et al. (2013), a sorting procedure "can be one of the best methods to assure content validity" (Walther et al. 2013). In sequential rounds a researcher (i.e. a PhD student) as well as a practitioner classifies the Social CRM performance measures within the performance measurement system, respectively. The participants are requested to read the definitions of the 16 Social CRM performance measures, and then classify them into the descriptions of the four Social CRM categories. The calculated inter-rater reliability

[3] The entire list of investigated articles is presented in the appendix.

follows Perreault and Leigh's formula (1989) in order to identify problematic areas (e.g., in the definitions, wordings) after each round[4]. The sorting procedure stops when the inter-rater reliability reaches a threshold of 1.0. After each round the problematic areas are improved, re-written or even totally re-defined to enhance the intelligibility and seek clarification. The overall results of the sorting procedure are presented in Table 6.

	Round 1	Round 2	Round 3	Round 4
Inter-rater reliability	0.5	0.7	0.86	1.0

Table 6: Sorting procedure of the classified Social CRM performance measures

Table 7 is based on the findings from the sorting procedure and presents the results of the classifications, including: the adopted categories of the performance measurement system, their corresponding definitions in a Social CRM context, and the respective classified performance measures (Kim & Kim, 2009).

Categories of the performance measurement system	Definitions in the Social CRM context	Social CRM performance measures
Infrastructure	The category describes the resources, and cultural aspects of a business that are necessary to implement Social CRM.	Social Media Monitoring
		Online Brand Communities
Process	The category describes aspects that relate to the processes and activities of Social CRM.	Customer Insight
		Customer Orientation
		Customer Interaction
		Market and Customer Segmentation
		Customer Co-Creation
Customer	The category describes the effects of Social CRM on the customers (customer perception) and the aspects, which are perceived by customers.	Customer-Based Relationship Performance
		Customer Loyalty
		Peer-to-Peer-Communication
Organizational Performance	The category describes the effects of Social CRM on the company success and business results.	Customer Lifetime Value
		Financial Benefits
		Brand Awareness
		Organizational Process Optimization
		Competitive Advantage
		New Product Performance

Table 7: Classification of the Social CRM performance measures

Table 7 depicts the findings of the article. Concerning the definition of a performance measure it can be stated that the Social CRM performance measures from the categories "infrastructure" and "process" describe terms of the actual efficiency and effectiveness of an action. The Social CRM performance measures from the remaining categories describe the end result of that action. Furthermore, the identification of Social CRM performance measures has new contributions to research and practice. Firstly, Social CRM performance measures extend research within this new realm of research, provide

[4] Inter-rater reliability by Perreault and Leigh (1989):

$$I = \sqrt{((F/N) - (1/k))/(k/(k-1))} \quad \text{for} \quad F/N \geq 1/k$$

I = Inter-rater reliability, F = Number of judgments on which the judges agree,
N = Total number of judgements, k = Number of coded categories

new insights to the scientific community. Secondly, the identification of performance measures facilitates the assessment of Social CRM activities and enables new benchmark systems to compare Social CRM efforts of an organization with competitors.

4 Research Agenda

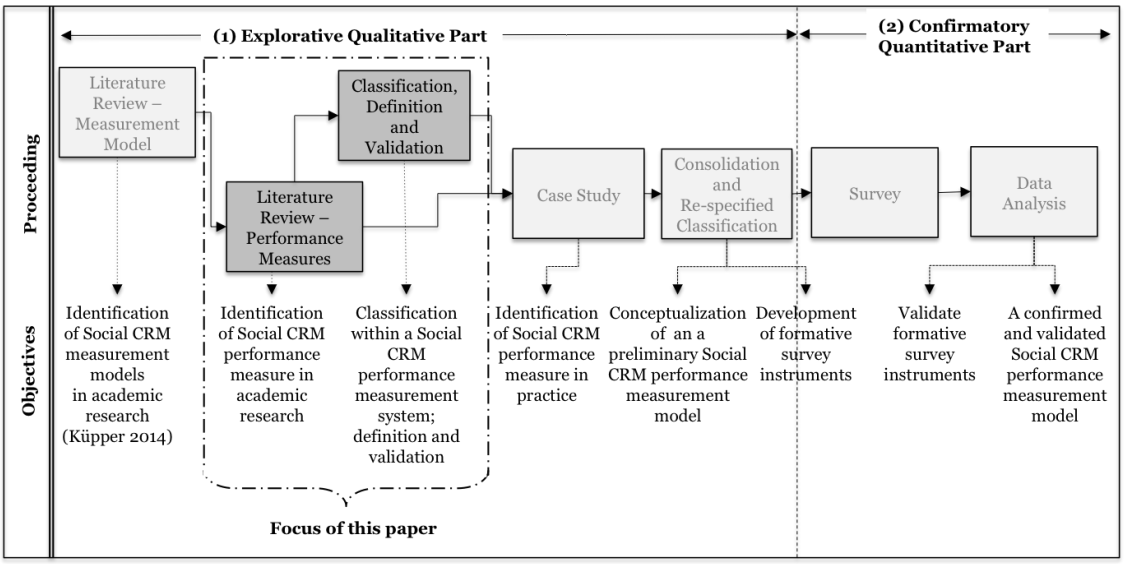


Figure 2: Research design of the overall research project

Figure 2 presents the overall research project following a two-stage multi-method approach (Creswell 2003; Sedera, Wang, and Tan 2009; Venkatesh and Brown 2013). The research design is an approach, which attempts to measure Social CRM performance. It comprises (1) an explorative qualitative part and (2) a confirmatory quantitative part. This article emphasis on the two steps within the first part of the overall research project, which is qualitative in nature and adheres to a conceptual approach.

The ongoing qualitative research describes a case study approach, conducted in cooperation with companies of a research consortium, which facilitates a practical perspective to the existing research outcome. The analysis of expert interviews from different industry sectors completes, extends, and provides new performance measures for Social CRM. Subsequently, the objective of the overall qualitative research is to consolidate the findings in order to develop a preliminary Social CRM performance measurement model.

Based on these findings, new formative survey instruments are defined and sampled in a field test. After the data collection, formative survey instruments are tested and validated a posteriori with a quantitative method (e.g., confirmatory factor analysis applied by a redundancy analysis (Cenfetelli and Bassellier G. 2009)). The question to be answered is: *Does the corresponding instruments factors constitute the factors of Social CRM performance?* Subsequently, causal relationships derived from literature and the coefficients of the influencing factors are confirmed by conducting a structural equation model, with a partial least square method, according to Hair et al. (2013). The corresponding research question is: *How are the Social CRM performance measures interrelated?*

Going beyond the overall research design, the development and implementation of key performance indicators, as operationalization of a performance measure, address the practical need for the companies. The corresponding research question is: *What are operative Social CRM performance measures within specific industry sectors?* A suited research method to answer the research question is action research, which can be conducted with the cooperating companies in the consortium (Sein, Henfridsson, and Rossi 2011).

5 Conclusion

The goal of this paper is to analyze current academic literature underlying the research topic Social CRM performance measures. A literature review is conducted to derive performance measures and to classify them within a performance measurement system. In particular, 37 articles are analyzed and synthesized. The major findings are threefold: Firstly, the analysis of current literature reveals 16 Social CRM performance measures. Secondly, a performance measurement system for Social CRM is introduced which aligns on four categories being infrastructure, process, customer, and organizational performance. Thirdly, the Social CRM performance measures are classified into four categories (see Table 7). Conducting a sorting procedure the classification process with PhD students and practitioners ensures a high degree of external validity.

Three limitations restrict the results of the research. Firstly, the search phrases are not all encompassing and possibly miss assemblies, even though they are derived from the key variables. Other and additional key variables would lead to different search phrases and therefore to diverse articles which could influence the result. Secondly, the classification is conducted with eight participants and misses an additional falsification through a focus group or a case study approach. By following a quantification analysis, this can lead to a problem of content validity, which is becoming apparent in the factor analysis. Finally, the categories of the performance measurement system are derived from CRM literature and could be a possibly inappropriate framework for the research topic. The validation of the underlying framework covers the limitations for a thoroughly rigorous literature analysis and synthesis.

Further research builds on the presented findings and is concerned with an inductive study intending to develop a preliminary Social CRM performance measurement model.

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Appendix

Article	Customer-Based Relationship Performance	Customer Insight	Financial Benefits	Customer Orientation	Competitive Advantage	Customer Loyalty	Organizational Process Optimization	Customer Interaction	New Product Performance	Market and Customer Segmentation	Customer Lifetime Value	Customer Co-Creation	Social Media Monitoring	Peer-to-Peer-Communi-cation	Online Brand Communities	Brand Awareness
Woodcock, Green, and Starkey 2011	x	x	x	x	x	x	x	x			x	x	x			x
Greve 2011	x	x	x						x	x		x	x	x	x	x
Reinhold and Alt 2012	x	x	x	x	x		x			x		x	x	x	x	
Wang 2011	x	x					x	x						x		
Trainor et al. 2013	x	x	x	x	x	x	x	x	x			x	x	x	x	
Lockwood 2011		x	x	x	x			x				x	x			
Dutot 2013	x	x	x	x	x	x		x	x		x	x	x			x
Nadeem 2012	x	x	x	x	x	x	x	x		x	x	x	x	x	x	
Trainor 2012	x	x	x	x	x	x	x	x	x		x	x	x	x	x	
Greenberg 2010	x	x	x	x	x	x	x	x	x			x	x	x	x	
Nguyen and Mutum 2012	x	x	x	x	x	x	x		x	x	x	x	x			x
Sigala 2004	x	x	x	x	x		x	x	x					x	x	
Kimiloglu and Zarali 2009	x	x	x	x	x	x	x	x			x					x
Harrigan et al. 2010	x	x	x	x	x	x	x	x	x							x
Liu, Zhou, and Chen 2006	x	x	x	x		x		x	x							
Cowan et al., 2006	x	x	x	x	x	x	x	x	x	x						
Andriole 2010		x		x				x								
J. Kim, Suh, and Hwang 2003	x	x	x	x	x	x	x	x	x		x					
Duńu and Hălmăjan 2011	x	x	x	x	x	x	x	x	x	x	x					
Coltman 2007			x	x	x	x	x		x							
Rapp, Trainor, and Agnihotri 2010	x		x			x										
Ang and Buttle 2006	x		x		x	x			x							
J. Chen et al. 2004	x	x	x	x	x	x	x	x		x						
J. J.-S. Chen et al. 2009	x	x	x	x	x	x	x		x	x	x					
Ernst et al. 2011	x	x			x	x			x							
Richards and Jones 2008	x	x	x	x	x		x	x		x	x					
Roh, Ahn, and Han 2005	x	x	x	x		x										
Chang, Park, and Chaiy 2010	x		x		x											
Tan, Yen, and Fang 2002	x	x		x	x	x	x		x	x	x					
Shannahan and Shannahan 2010	x		x		x		x			x						
Kalyar, Rafi, and Azeem 2013		x		x	x		x		x							
Zablah et al. 2012	x	x	x	x	x	x	x	x	x	x						
Palmatier et al. 2006	x	x		x		x	x	x								x
Ku 2010	x	x	x	x	x	x	x	x								
H.-S. Kim and Kim 2009	x	x	x	x	x	x					x					
Lindgreen et al. 2006	x	x	x	x	x	x	x	x		x	x					x
Jain, Jain, and Dhar 2003	x	x	x			x		x	x	x						

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Positive Disruptions Caused by SCRM Activities in the SECI process of Knowledge Creation: Insights from Four Case Studies

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Abstract

Web 2.0 has been in the foray for a while playing an important role in threading business processes, various departments, systems and key stakeholders (within firms) to activate customer participation and involvement. In order to re-emphasize customer centricity, firms have been using SCRM (Social Customer Relationship Management) approach as a part of their CRM (Customer Relationship Management) strategy. The activities under SCRM are a major source for organizational knowledge creation that occurs due to a continuous dialogue between tacit and explicit knowledge. Also, various social platforms (operating for SCRM) where collaboration takes place acts as a shared context for knowledge creation. To comprehend the actions and limitations of a knowledge-creating firm thoroughly, this research paper examines the process of knowledge-creation by (1) revisiting Nonaka-Takeuchi SECI (Socialization, Externalization, Combination & Internalization) process to recognize how SCRM activities can be prolific in organizational knowledge creation (2) exploring positive disruptions created by integrating SCRM activities with four modes of SECI process for additional knowledge creation (3) analyzing case studies of four firms from consumer products sector that use SCRM approach and (4) discovering the elements under SCRM approach that satisfy 'BA' as a shared context.

Keywords: SECI, Knowledge Creation, SCRM

1 Introduction

In the past decade business world has been transformed into a knowledge intensive ecosystem. Though firms are aware of knowledge creation, only lately have they realized the importance of knowledge creation. Firms can create new knowledge themselves (internally) just with the support of their resources (employees, systems, strategies, etc.), (Nonaka, Toyama, & Konno, 2000) but there are boundaries and limitations after which they cannot attain appropriate tacit knowledge for competitive advantage (Nonaka, 1994a). To

consistently create new knowledge, firms must collaborate (externally) with the environment in order to expand its knowledge base and simultaneously withstand and amplify their competitive advantage (Prahalad & Ramaswamy, 2004). Furthermore, in order to adjust accurately with ever-changing dynamics of the market, firms have to acquire 'specific' knowledge from the environment to create new products and services. We, as humans (individuals) with variable capacities define this environment. Adding to it the knowledge intensive society has changed human thinking in a productive way and at the same time restructured business processes related to organizational knowledge creation (Mukhtar, Ismail, & Yahya, 2012). Individuals from both sides (organization and larger ecosystem) play a crucial role in knowledge creation using web technological advancements. From the organizations' side, human resources (employees) take active part to acquire and create new knowledge, and from the ecosystems' side, customers (as crucial stakeholders) share knowledge and experiences with the organization to help create new specific tacit knowledge. For this to happen firms should develop their knowledge creation capacity in order to positively provoke the customer to participate, collaborate and share their know-hows (Nonaka & Toyama, 2002). The more access organizations have to their customers, the higher is the knowledge creating capacity. And here, Web 2.0 known as the social web has created a smooth passage for collaboration with customers (existing and new). This social web has propelled the knowledge creating capacity through its features of user-generated content, social networking, wider reach, multiple-way communication and the ease of use (Faase, Helms, & Spruit, 2011). The core function of social web designed by organizations is to facilitate customers to participate and create new knowledge (Sawhney, Verona, & Prandelli, 2005a).

The significance of social web has been realized only after the functionality of CRM systems, which seems to have reached its capability limit of acquiring 'accurate' customer knowledge relevant to the marketplace (Baird & Parasnis, 2011). While CRM systems used for customer forecasting through historical or transactional knowledge (stored in the database) has lacked the swiftness in capturing the current customer experiences, the social web applications has filled the gap by acquiring and creating contemporary customer knowledge. The unification of social web into CRM activities (mainly CRM systems) has been striving to complete the connotation of SCRM approach (Reinhold & Alt, 2012). The SCRM activity that involves social media technologies (online communities, blogs, firms interactive web pages, emails, etc.) is an excellent source for knowledge creation that leads to an increase in specific organizational knowledge. Having said that, firms create knowledge by a constant exchange of tacit and explicit knowledge on collaborative platforms between organization and individuals (existing or to-be customers) complementing the Nonaka-Tekeuchi SECI process (Nonaka et al., 2000). The SECI model of knowledge creation has four processes; namely socialization (tacit to tacit), externalization (tacit to explicit), combination (explicit to complex explicit) and internalization (explicit to tacit). These processes are explained in the sections ahead. The core elements that define SCRM approach construct a shared context, known as BA' (BA'- (Nonaka & Konno, 1998)), where there is an online setting created for sharing and creating knowledge. That then explains how the implementation of SCRM approach has reduced the need of a physical space where two or more individuals have to be present in person to create knowledge, making the exchange of tacit and explicit knowledge virtual (online). Moreover, the introduction of SCRM activities (firm specific-Social Media,

blogs, online communities, etc.) has brought in positive disruptions in the regular pattern of SECI process of knowledge creation. Also, these disruptions have increased the ability to create additional organizational knowledge with higher relevancy. These disruptions too are explained in this paper and substantiated with evidence found in case studies.

The paper is structured as follows. The first section describes the dimensions of knowledge creation focusing specifically on SCRM. The second section theorizes and conceptualizes the influence of SCRM activities on SECI process. This section also explores the positive disruptions caused by integrating SCRM activities with four modes of SECI process for additional knowledge creation. It extends to identify the core elements of SCRM approach that represent 'BA' – a shared context for knowledge creation. The third part provides four case studies as evidence for SCRM activities being an excellent source for knowledge creation followed by the analysis of pattern change (positive disruptions) within SECI's process. The paper concludes with a summary and discussion, revisiting the main points covered and throwing light on future research.

2 Constituents of organizational knowledge creation in the socialized world

Tacit and Explicit knowledge

While explicit knowledge is termed to be objective and rational in nature, tacit knowledge is considered idiosyncratic, experimental and difficult to validate (Nonaka, Reinmoeller, & Senoo, 1998). That's perhaps why, explicit knowledge is expressed in the form of concrete instructions, documents, mathematical formulas, particular actions and guides and tacit knowledge comes in the form of beliefs, viewpoints, intellectual models, philosophies and principles (Nonaka, Krogh, & Voelpel, 2006). But there is a point where these two seemingly different concepts of knowledge collide (with the help an external factor - social platform) to create 'new' knowledge (Polanyi, 1966). For instance, idea generation happens in the minds of individuals (tacit knowledge) and a social collaboration between two or more individuals plays a significant role in developing these ideas further (making it explicit).

2.1 Social Web as the driving force for social experimentations

A significant technological innovation that organizations have incorporated into their enterprise and specifically into their CRM strategy is the Social Web. This Social Web with its dynamic capabilities has helped organizations find ways to accommodate innovative methods of sharing and creating knowledge (Kaplan & Haenlein, 2010). To name a few, customer collaboration, two-way knowledge transfer, product/service specific discussions and feedbacks are the fundamental consequences of Social Web, which ultimately has lead to knowledge creation (Bolton et al., 2013). In addition, social networking sites, online communities, blogs and investments in enterprise 2.0 have offered platforms for Social Web to be prosperous. And because of these platforms there has been a huge influx of customer knowledge, which has allowed firms in saving costs, improving product/service innovation and redefining non-profitable products/services (Razmerita, Kirchner, & Sudzina, 2009). These Social Web platforms are facilitating the creation of new organizational knowledge that

allows customer retention, proper segmentation and campaign management, amongst others (Baird & Parasnis, 2011). To extend it further, knowledge creation on Social Web occurs through productive collaboration and constant sharing of experiences between disseminated groups within a firm and various communities outside the firm (Razmerita et al., 2009). However, the existence of Social Web will depend mostly on its capability to face the challenges of knowledge creations (Greenberg, 2010). Having said that Social Web is an excellent platform to connect two entities for business purposes; it can only be used as a channel and hence cannot be replaced or treated as a main application for core business (finance, operations, etc.) (Askool & Nakata, 2010). Therefore the applications of Social Web tremendously support the central functions of NPD, Marketing, Sales, Design and Services. However, the Social Web is signified by a set of websites and functions where the user (customer) with his or her participation is the primary driver for organizational knowledge creation. Also, these users have modified Web 2.0 as a living web. From a low interaction function like RSS feeds, wikis, tags, blogs, etc. to a high interaction function like Facebook, Twitter, online communities, organizational interactive feedback and interactive service webpages fall under the umbrella of Web 2.0. What makes this Web 2.0 a Social Web is the coming together of wisdom of online crowd, specific user generated content and collective intelligence to name a few.

2.2 The SCRM approach for customer knowledge creation

An SCRM activity includes Internet based applications constructed on the technological and conceptual fundamentals of Web 2.0. To be firm specific, it is combined with various CRM processes and strategies, allowing the informal creation of knowledge. Also, certain business practices functioning under CRM strategy has evolved as socially enabled processes (Lehmkuhl & Jung, 2013). Due to its lightweight and technical feasibility (Levy, 2009), SCRM is described as an innovative notion that connects social media technology with CRM strategy. Although, social technology can support collaboration, it requires organizational users and customers to create knowledge for sharing. Although, there are boundaries when we discuss about knowledge management and knowledge creation just within firms (Dous, Salomann, Kolbe, & Brenner, 2005), but these limitations tend to fade out when creating knowledge, specific to the firm through SCRM activities (Roblek, Bach, Meško, & Bertoncelj, 2013). Having said that, Social Media majorly defines SCRM where collaborators are not particularly asked to share knowledge, but this knowledge is automatically created by its daily usage (Jr, 2007). Therefore, effective structuring of SCRM activities in accordance with CRM processes builds a foundation for gathering direct understanding into thoughts, objectives and behavior of the users involved. Before the advent of Social Media, CRM strategy for a firm included processes and technologies configured to effectively handle customer relationships as a source for unearthing maximum value from their customers over a certain period of time (Akroush, Dahiyat, Gharaibeh, & Abu-Lail, 2011). Also the past literature highlights the fact that firms' CRM strategies mainly focused on the operational responses required for managing their customers (Shaw, Subramaniam, Tan, & Welge, 2001) (Liao, Chen, & Deng, 2010) (Frow, Payne, Wilkinson, & Young, 2011). But with the emergence of social media, there is a significant two-way collaboration where firms are

providing customers a virtual platform to communicate, share their experiences and enable them to make rational judgments on how to collaborate and ultimately create knowledge for the firm.

2.3 The Pioneering model for knowledge creation

2.3.1 Revisiting Nonaka's SECI process of knowledge creation

In this knowledge intensive society firms are dealing with a constantly changing environment to process information and simultaneously create knowledge. Firms create knowledge through a dialog that occurs between explicit and tacit knowledge. Eventually, through this process of knowledge conversion, knowledge is created and expanded (in quality and quantity) (Nonaka, 1994b). To elaborate further, this research revisits the four processes of knowledge conversion and creation:

1) *Socialization process*, where tacit knowledge is shared between two or more individuals.

2) *Externalization process*, where articulation of tacit knowledge into explicit knowledge takes place making it the first stage of knowledge crystallization.

3) *Combination process*, which engages conversion of explicit knowledge into more complex sets explicit of knowledge.

4) *Internalization process*, where the newly created explicit knowledge is converted into tacit knowledge.

(Nonaka & Toyama, 2003) (Nonaka, 1994a) (Nonaka et al., 1998)

This SECI process highlights dynamic processes of self-transcendence, where firms' resources transcend their limitations by engaging in collaboration processes with their key stakeholders (customers) (Nonaka et al., 1998)**.** In this contemporary world, communities of interaction provide a source for development of new knowledge. These social elements existing on technological advancements outline a new dimension for organizational knowledge creation. The process of creation begins when all four modes of knowledge creation are structurally organized to form a repetitive cycle. The basic comprehension is that individuals have to be present on both ends to create knowledge. The firms specify a context where it provokes and nurtures creative individuals to collaborate, share and create knowledge (Nonaka, 1994a).

2.3.2 BA as a shared context: The Ontological Platform for Knowledge Creation

Ba, a Japanese term is a supportive space (physical or virtual) defined by a context for knowledge creation (Nonaka et al., 2000). 'Ba' can be perceived as a shared mental space, which triggers knowledge creating process for accumulating collective intelligence. Data, information and knowledge, all are rooted in theses spaces and in the minds of individuals that are a part of these spaces. In these spaces or platforms, knowledge is attained through one's own understanding of the know-how of others. Ba can arise from groups or communities or between any two individuals. Therefore, Ba as a shared context gives the necessary support for SECI Process. There are four types of BA that integrate with SECI

Process and provide platforms for multi-dynamic knowledge creation (Nonaka & Konno, 1998).

Originating BA (linked with Socialization phase): Individuals communicate feelings, experiences, emotions, and conceptual models, which is the beginning of knowledge creating process or Originating Ba.

Dialoging BA (linked with Externalization phase): To create a dialoging Ba, there is need for choosing people with the right mix of specific knowledge and proficiencies, critical to activate conversion.

Cyber BA (linked with Combination phase): Explicit knowledge is combined with existing knowledge further creating new explicit knowledge, which is distributed in the firm.

Exercising BA (linked with Internalization phase): Enables the conversion of accumulated explicit knowledge (from the above processes) to tacit knowledge.

(Nonaka & Konno, 1998)

3 The influence of SCRM approach in SECI process for Knowledge Creation

3.1 Socialization-SCRM approach

Socialization is termed as conversion of tacit knowledge to tacit knowledge derived from shared experiences by spending time in the same environment. This environment has so far largely been defined in terms of physical space but now tacit knowledge can also be obtained from a 'virtual' space, beyond organizational boundaries (M. Vuori, 2012). When firms frequently yield benefits from tacit knowledge rooted in customers through virtual ideation labs, collaborative online communities and personalized online chat application (Sawhney, Verona, & Prandelli, 2005b), new tacit knowledge is created. It is created over discussions and negotiations where different individuals share their experiences that are available for new interpretation resulting in new meanings (Shang, Li, Wu, & Hou, 2011). This process establishes collective intelligence bringing together variety of knowledge bases and capabilities representing firm's intellectual capital (Swan, Newell, Scarbrough, & Hislop, 1999) . A significant way to nurture knowledge creation within a firm is to introduce ways for individuals to interact both within the company as well interact with external stakeholders (customers). For example, the various online resources under a specific firms' tag name facilitate content generation and community building postulating a brand new platform for knowledge exchange, knowledge creation and network development (Mahr & Lievens, 2012) . Having said that the SCRM approach that includes the abovementioned activities amongst others, highlights innovation, discussions, product debates and feedbacks as progressively interactive (Reinhold & Alt, 2011) (Zyl, 2009). That's because these systems connect heterogeneous groups of individuals both within the organization as well as outside (Mahr & Lievens, 2012) (Bolton et al., 2013). As social media are used for creating, sharing and exchanging various kinds of content**,** the users contribute and provide value to the company's knowledge creation capability thereby highlighting the role of SCRM approach in Socialization.

Originating BA: Collaborative online communities, virtual ideation labs, personalized online chat, etc.

3.2 Externalization-SCRM approach

Externalization is the process of articulating tacit knowledge into explicit knowledge. That is to say, crystallization of knowledge begins when tacit knowledge is made explicit. Considering firm's personalized blogs, web pages, wikis, online feedback and service webpages, amongst others are applications that support externalization process. These online applications offer freedom of expression and a source to acquire customers' personalized knowledge that is disseminated in discussions across web platforms. From an externalization point of view, collaboration through SCRM activities contextualizes the created content. Firms' interactive (online) feedback page and customer service webpage provide an excellent source of actionable collective intelligence, as they offer a place for social interaction (Ahlqvist, Bäck, Heinonen, & Halonen, 2010). That's crucial because in a social media space sharing one's unique know-how is the central source of tacit knowledge. For instance, companies like Trip advisor, Google, Apple, Dell, Starbucks, Procter and Gamble (Connect and develop) facilitate a constant knowledge creating process from socialization and externalization of knowledge (through online platforms), reiterating the growing significance of SCRM activities.

Interacting BA: Service and Network interactive webpages, blogs, interactive feedback space.

3.3 Combination-SCRM approach:

Combination signifies conversion of explicit knowledge into further complex sets of explicit knowledge, creating new set(s) of knowledge. Therefore, re-organizing of existing knowledge by the process of sorting, accumulating, re-classifying and re-conceptualizing of explicit knowledge builds new knowledge (Nonaka, 1994a). Having said that, web based application has also contributed where combination of explicit knowledge is efficiently handled in collaborative environments by exploiting social media networks, web portals, intranets, groupware and CRM databases (where knowledge is retrieved by the already defined functions and modeling process) (Nonaka et al., 2000). Hence, synergies and knowledge derived from online platform and the organizational database has the capacity to create new knowledge (Alt & Reinhold, 2012). And with the current Social web advances such as wikis, blogs and collaborative platforms, give prospects for firms to develop their internal operations and collaborate with their business partners (Prahalad & Ramaswamy, 2004). Therefore, practices of social media can be exploited for improving existing business processes, creating new business models and banking on new sources of knowledge. Furthermore, this combination process delivers broad domain coverage, diversity of opinions, and good amount of specific knowledge (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011). Higher the inflow of social knowledge (explicit) within an organization - better is the functionality of organization systems. That's because knowledge conversion encompasses the use of social media processes to combine explicit knowledge within individuals. For example, mash-ups, a social tool is used to extract content from various online sources and reproduced in a new form (Mohan, Choi, & Min, 2008). Here collective intelligence plays an important role by deciding what is appropriate via feedbacks, online reviews, ratings, recommendations and criticisms. Also, well-expressed artifacts are connected and combined in models through

social tools such as RSS syndication, social bookmarking, search engines, etc. (V. Vuori & Okkonen, 2012). Combination is thus embedded in knowledge processing of both existing organizational knowledge and social knowledge, derived from an efficient use of SCRM approach.

Cyber BA: Contemporary Social Media resources, online communities, etc.

3.4 Internalization-SCRM approach:

Internalization is the process of expressing explicit knowledge into tacit knowledge. Once explicit knowledge is created from externalization and combination, it is shared among departments of the firm and then converted into tacit knowledge by individuals working in those departments. Personal experience (tacit), existing organizational knowledge (explicit-product, norms, service, transactional, historical, etc.), real world knowledge (explicit) and experience sharing from fellow functional departments (tacit), to name a few are expended in the Internalization process finally obtaining tacit knowledge for product/service innovation and development. To add to that, the Social web provides a flexible online space for firms to be an innovative entity by collaborating with consumers, sharing more knowledge in a collective way and then taking constructive advantages of the consumer's wisdom for product innovation (M. Vuori, 2012). From playing a passive role, online consumers with the support of the social web are becoming active participants in one or all New Product Development (NPD) phases' (Sawhney et al., 2005b). To complement it further, online platforms created by firms offer a space for online discussion (forums), for product design debates and for concept testing and product support activities. Consequently, within an online community, customers spontaneously disclose knowledge that incites others to further build on it with their own experiences (Kaplan & Haenlein, 2010). Thus, Social web creates a setting for individual customers to display their product-related knowledge and problem-solving skills (tacit knowledge made to explicit), which at the end benefits both, organizations and customers.

Exercising Ba: Online design platforms, social media resources, online review and feedback sites, etc.

3.5 Positive Disruptions within the SECI process

The integration of SCRM activities has given different departments of an organization the opportunity and freedom to stay connected with their target customers at their discretion to create knowledge. So, different departments are connected online to understand 'live' dynamics of the users (ongoing participation, live feedback, co-creation, etc.) through which they tend to optimize their business processes and become more customer oriented. This paper establishes that incorporating SCRM activities within four modes (SECI) of knowledge conversion and knowledge creation leads to positive disruptions in standard patterns. According to (Nonaka et al., 2000)

The standard process within SECI process is the conversion of tacit to tacit knowledge, tacit to explicit knowledge, explicit to explicit knowledge and explicit to tacit knowledge. Every mode with the standard pattern of knowledge conversion between tacit and explicit reacts to the continuous feed of customer knowledge accessed through social platforms. This brings in disruptions in one or all stages of knowledge creation. Also, the knowledge acquired through

social platforms is mostly tacit in nature. Integration of such tacit knowledge at different steps of SECI process positively alters direct conversions from Tacit→Tacit, Tacit→Explicit, Explicit→Explicit and Explicit→Tacit (Figure 1). For instance, if tacit knowledge from SCRM approach is added into combination stage, then the standard knowledge conversion process is positively disrupted and knowledge conversion flows as Explicit→tacit→explicit→….→Explicit (Figure 1). Similar positive alterations have been observed in other stages of SECI process and have been explained later in detail with the help of case studies. Different firms use a permutation of the four modes of SECI (with an integrated SCRM approach) either separately or together. If these modes are used efficiently (all together) then the scope of knowledge creation increases tremendously.

It is important to note that these positive disruptions do not change SECI process in any way, but only adds value to the final outcome at every stage by creating additional knowledge.

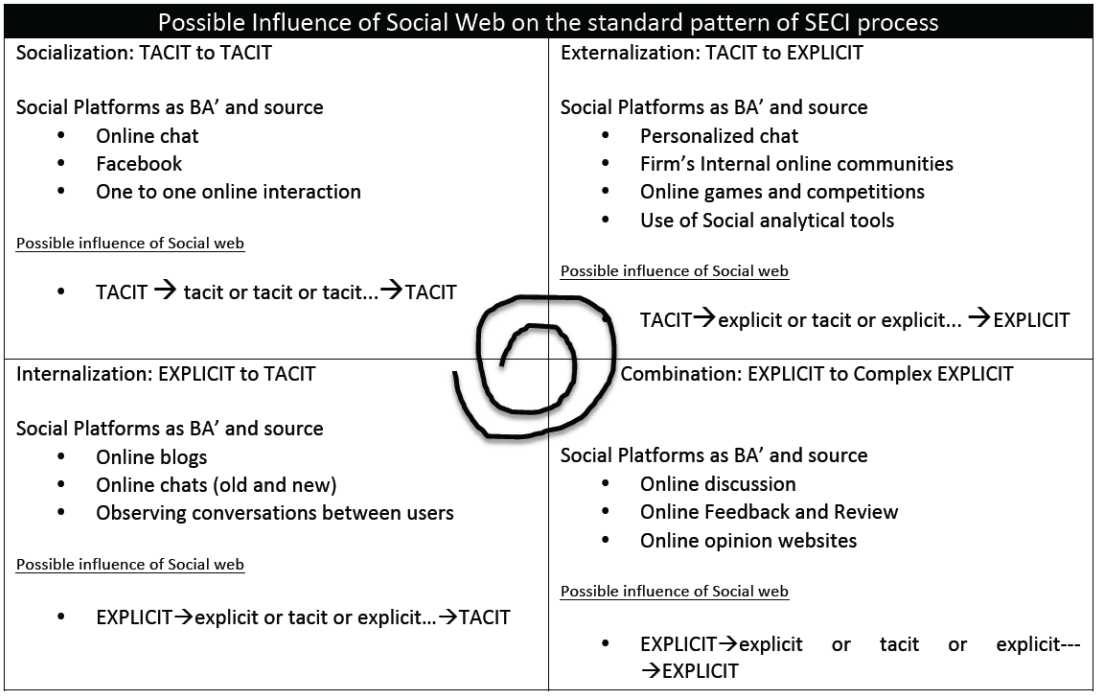


Figure 1 Possible influence of Social Web on SECI process

4 Case Studies explaining the knowledge creation process

4.1 Designing the cases for analysis

This study through a qualitative research intends to contribute to the theory of organizational knowledge creation (SECI process) by introducing the SCRM approach and its key elements that facilitate creation of more knowledge. This research focuses on organizations that have an active SCRM strategy and aims to understand how the use of SCRM approach generates crucial customer knowledge for various departments and turns into an asset for the entire firm. The study maps the process of SCRM activities within the existing SECI process and

comprehends how Socialization, Externalization, Combination and Internalization process unfold in the online world. Keeping the focus on SECI process of knowledge creation, the interview questions (appendix 1) were both comprehensive and in-depth. For the purpose of this paper, four case studies representing four companies (15 interviews) from Consumer Products industry have been chosen. The case studies range from an increasing level of dependence on SCRM activities for customer knowledge creation to an already established SCRM approach as a principal pillar for CRM strategy. An organization where SCRM approach is already reputable, customer knowledge is created and used extensively, directly building the organizational knowledge for competitive advantage.

4.2 Profile of the companies interviewed

Abiding by confidentiality norms of organizations included in this research, their names have not been disclosed. Nevertheless, brief descriptions about the companies have been provided.

1) A Mobile Tele-systems company that manufactures mobiles, Internet dongles and data products has started focusing on SCRM activities in the past year to acquire and retain customers. They are in the initial stages trying to involve customers and their knowledge in few business activities.

Tools used: Facebook, E-Commerce Plugin and Online Chat Operations.

2) A Cellular company with an integrated GSM operator providing 2G and 3G services has been using social media for online brand management for the past three years.

Tools used: Service Delivery online tool, Facebook and Personalized Blog.

3) A leading Brewery has been active online for more than half a decade (for brand awareness) with activities involving almost 6 million users on Facebook. Tools used: Facebook, Twitter, YouTube, Instagram, etc.

4) A widely renowned and trusted brand name in house and kitchenware products have been using Social Media even before the term was coined. The company is closely connected with its online customers at almost all levels. Tools used: Dedicated webpages on their website, Microsites, Blogs, Facebook.

4.3 Assessment and Findings

The analysis of case studies examines if knowledge is indeed created through SCRM approach and if it fits the SECI process for knowledge creation. The concepts and linkages mentioned above in the literature review have been kept in mind and used while evaluating all case studies. The evaluations are explained in Table 1. The interviews were conducted keeping SECI process in mind and accordingly the findings from the analysis were fitted into respective knowledge creating dimensions across Socialization, Externalization, Combination and Internalization.

	Mobile &Telecom FIRM A	Cellular FIRM B	Brewery FIRM C	Home & Kitchenware Storage FIRM D
Department	Social Media & digital marketing team.	Branding.	Social Media.	SPOC's from all departments, marketing, campaign, dedicated online team.
Online Ba: Social Platforms used	Facebook, online chat, E-commerce Plugin.	Service delivery online tool, Facebook, personalized blog.	Facebook, Twitter, YouTube, Instagram, Flicker.	Dedicated webpages, microsites, Mouthshut.com, Facebook, Pin-interest, blogs.
Socialization (Tacit-to-Tacit)	Use of Personalized online chat with customers and suppliers (providing trending knowledge).	Extensive approach of One to one interaction with customers regarding brand- philosophy, engagement, ideology discussions, ideation for social problem.	Very little or no one to one or focus group online interaction.	Priority to personal complaints generated online, extensive online dialog for getting specific reasons. Understanding cues from certain online interaction about developing products.
Externalization (Tacit-to-Explicit)	Online Sharing of service problems and picking up discussion about their brand image for brand development. Online design competition with design agencies, customers and experienced designers for developing new designs for their products (dongles, phones, etc.).	Sharing network problems and delivery problems through online collaboration. Extensive use of Social Media listening tools to capture keywords, emotions, etc.	Nothing is tacit as the product is a 'Happy product' and mostly generates positive reviews on their website, on Facebook and on Twitter that is open to all.	Use of Social Analytics to analyze traffic and navigation path, number of hits and likes on Facebook and their website, social demographics, etc. 24/7 monitoring of online community and webpages. Frequent innovative Online water games provoking 360 degrees dialog with their customers.
Combination (Explicit-to-Explicit)	Digital marketing team connect with other departments and third party design agencies through their in house online platforms and also have personalized meetings with the customer insight teams which is also connected online. Limited or no use of Social Media at this stage.	SPOC's from every department with the relevant skills and knowledge are connected online.	Updating the sense of emotions & positive feedback on their webpages and also connect through online communities. Having Online games (such as Beer Commandments Contest) to get a better sense of their product popularity and which also helps them create new merchandise. Core departments (Marketing, Branding, Communication, Sales, Campaign, etc.) constantly connected online.	High degree of combining knowledge from both CRM database and Social Media. Extensive use of SEO, SEM, Mouthshut.com relevant to Subject Matter Expert, SPOC's, NPD teams, sales teams, amongst others.
Internalization (Explicit-to-Tacit)	Nothing is developed with the online customers.	Co-Creating all Brands with online customers	No co-creations with customers for Beer flavors or bottle style etc.	Extensive online debating on feedbacks and reactions related to new products. Regular Implementation of colors trends, seasonal trends, that is acquired through their customers and continues revisiting of all the online communities. As such it is not a formalized process but the online customer knowledge is used during all NPD phases.
Change in Pattern at different stages of SECI process	In Externalization stage. When compared to Tacit to Explicit (T→E), the change is T→E→E→T→E.	In Combination stage. When compared to Explicit to Explicit (E→E), the change is E→T→E	In Combination stage. When compared to Explicit to Explicit (E→E), the change is E→T→E	In Combination stage. When compared to Explicit to Explicit (E→E), the change is E→T→E In Internalization. When compared to Explicit to Tacit (E→T), the change is E→T→T
SCRM Integration level	**Low integration**	**Medium integration**	**Very Low integration**	**High integration**
Knowledge Created	New Designs, best practices (about common and complex network and service issues)	Brand knowledge, emotions, knowledge through positive and negative feedback	Understanding the day-to-day popularity and the sales growth.	Product knowledge, current trends, ergonomic knowledge, sales knowledge, etc.

SPOC-Single Point of Contact T-Tacit E-Explicit

Table 1. Four Case studies showcasing the influence of SCRM approach on the SECI process for knowledge creation

4.3.1 Influence of SCRM approach

There is an evident use of the SCRM approach in all the four cases. Various departments engage with their customers or target groups through social web to extract as much knowledge as possible. Firms on the other hand provide their customer with knowledge about their brand ideology and philosophy, about problems and issues through online contest and competitions. Customers and their knowledge via SCRM activities are taken seriously, as shown in all modes of knowledge creation. Table 1 summarizes the knowledge conversion at different stages of the SECI process for the companies considered in this study. The important section to be considered is the 'change in pattern'. Observing at the Externalization, Combination and Internalization mode, SCRM activities tend to change the regular pattern of knowledge conversion and knowledge creation.

Socialization (two or more users interacting online to share tacit knowledge) is quite straight forward and prominent in Firm 'A', 'B' and 'D', where they use one-to-one personalized online interaction through their online chat systems (OCS, Facebook, etc.). While the main interaction between customers and Firms 'A' & 'B' relate to service and network issues, for Firm 'D', it relates to personalized chat for complaints and trend updates. Both kinds of feedback help the firms to realize the contemporary undercurrents about their brand and products in the market. The ultimate goal is to share tacit knowledge and receive as much as tacit knowledge as possible.

SCRM activities alter Externalization too. It is observed that while Firm B uses Social Media listening tools regularly to pick up keywords on emotions, beliefs, thoughts and single word feedbacks, Firm 'D' relies on Social Analytical tools to analyze user navigation path, time spent, buying pattern, social demographics, amongst others Table 2.

	FIRM A	FRIM B	FIRM C	FIRM D
Socialization	T→T	T→T	T→T	T→T
Externalization	T→E→E→T→E	T→E	T→E	T→E
Combination	E→E	E→T→E	E→T→E	E→T→E
Internalization	E→T	E→T	E→T	E→T→T

T-Tacit E-Explicit

Table 2.

For instance, Firm 'A' tried to create dongle designs from tacit knowledge acquired from online space (by making it explicit within the company). Having hit a roadblock, the design team decided to include another layer of SCRM activity and introduced an online design competition (explicit). Online customers including design experts and design agencies were allowed to participate. The successful contest helped Firm 'A' collect huge amount of quality designs and gave them a freedom to choose the best designs (tacit). These designs were once again made explicit throughout various departments for further development (T→E→E→T→E). There were more tacit and explicit conversions in order to strengthen the externalization process conclusively leading to explicit knowledge creation.

Combination plays an important role in enhancing organizational knowledge. Although Firm 'B' 'C' & 'D' have historical knowledge (explicit) in place, the SPOC's (single point of contact), marketing, sales, communication, NPD teams, etc. play a crucial role in constantly being connected to Social Web extracting specific live feed (tacit) and constantly sharing it within the organization (E→T→E). It is observed that firms are constantly looking for tacit knowledge from the online world and evaluating their previously acquired knowledge (explicit) and making sure that it has been shared throughout the organization.

In Firm 'B' & 'D', Internalization mode achieves a logical end. In Firm B, all the SPOCs are connected to each other and also with the customers to co-create a brand strategy that stands out when compared to other competitors. In Firm 'D', the product development team takes online reaction (tacit), color trends (tacit), etc. into account and revisits all online communities before producing the product (tacit) (E→T→T). It is evident from the cases that SCRM activities are monitored by a Social Media agency (controlled by Marketing department) or the Marketing and Branding department itself staging that SCRM has quickly matured and integrated well across firms at varying degrees.

4.3.2 Elements that constitutes BA' as a shared context

In all the four cases, it has been observed that the online space provided by firms significantly constitutes a shared context and satisfies BA'. At first, considering the originating BA, (Firm 'A') there is an online chat option for network and service issues (context created by the company) and therefore customers have a personalized online communication sharing their experience about network speed and service issues. Firm 'B' has created a personalized blog and a Facebook page (Brand context) to push its brand and has a personalized interaction about brand ideology and at the same time understanding the market perception about their products. For Firm 'A' a specific design competition is conducted on the online platform, which represents the interacting BA' and for Firm 'D' their Social Analytical tool is coded specifically to track the online action of users (navigation path, time spent online, etc.). In Cyber BA', the SPOCs from Firm 'B' and Firm 'D' have a flexible online space (changing their context as per the need of the hour). Firm 'B' and Firm 'D' best fit the Exercising BA' as they create an online space sharing existing knowledge about a specific brand and product respectively. Online users aware and interested (in the brand or product prototypes) participate and share more knowledge via feedback and reviews. This feedback and review collected is used to build new unique products (Firm 'D') and redefine a brand (Firm 'B').

4.3.3 Integration level of SCRM approach

The integration of SCRM activities differs in four case studies. While Firm 'A' proactively connects with its customers through its Social Media unit for feedback and product design, Firm 'B' employs SCRM activities largely for branding its ideology and creating brand awareness. Firm C uses SCRM to increase its products' (Happy Brands) sales by attracting customers through Online Brand Games and convincing them to buy more Beers, but does not use online customer knowledge in developing flavors or designing bottle size and colors. That is unlike Firm D, which integrates online customer knowledge in all phases of product development.

4.3.4 Knowledge Created through the SCRM approach

This research shows that knowledge is created extensively in all the four cases. In Firm-A, new designs, trending knowledge to specific network and service issues are created. Online customer perceptions for Firm B's brands are significantly given importance and knowledge is created through personalized online chat on network and service issues. Also SPOCs from every department are looking out to extract as much knowledge as possible. In Firm C, there is huge knowledge creation as the beer products produce positive emotions and indulge their target customers in Beer games. Firm D, is the highlight among all four as knowledge creation is the motto and there is high dependency on customer knowledge from multiple sources.

5 Conclusions & Discussion

In this research paper the varying knowledge creation capacities of SCRM approach have been investigated with Nonaka's SECI process as reference. This research analyzed and showcased the importance of SCRM approach as an excellent source for knowledge creation through case studies. It also linked the concepts and key literature of SCRM with Nonaka's pioneering model of knowledge creation.

This research has described the regular pattern and process of SECI model. It explains how firms (mentioned as case studies) in the quest of acquiring additional tacit knowledge for extensive knowledge creation, integrate SCRM activities leading to a change in the regular pattern of SECI process. This paper terms these changes as 'Positive Disruptions'

All four case studies were different in nature and had varied reasons to expand SCRM approach. While some were risk averse, others invested and relied on SCRM approach and led by example. This paper established a two-pronged impact of SCRM approach – at an industry level and in the academic world. The research identified SCRM approach as an important business activity or process that can certainly benefit the firm beyond limits. It was observed that departments (within firms) that stayed closely connected with social media units had better and consistent access to their consumers and that online consumer connect differed in all four case studies with a corresponding varying degree of SCRM integration.

The earlier mentioned 'Positive Disruptions' were triggered by SCRM activities and the platforms on which they were carried out. It can thus be said that all social media platforms and elements that constitute the Social Web have been identified as a shared context representing BA'.

This research forms a base for further analysis of SCRM approach. New research hypotheses can be developed in SCRM and tested within organizations from different sectors. It will be interesting to document new dimensions of SCRM in the field of organizational knowledge creation. Research can possibly integrate evolving SCRM approach with the core pillars of CRM Strategy – namely, marketing, sales, new product development (NPD) and new service development (NSD). Findings of this paper can be used for future research to build a strong academic literature around SCRM.

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Appendix 1

List of Questions
1. How do you use social media to interact with your customers? And how has your social interaction evolved over the years?
2. What are the online methods and tools that you use?
3. What are the types (formal or informal)/platforms of interaction you have with your customers?
4. Could you please walk me through process of customer interaction or collaboration?
5. What are the others departments, business units and people connected with the social media platform within your organization and how does the customer knowledge get distributed to them?
6. How do you process the knowledge or data that you get via social media (data categorization)?
7. What has been the traditional way of collecting customer knowledge and what is the reason for this shift towards social media platforms?
8. How strong is the online space that you have created?
9. You might be having your own New Product Development (NPD) process and phases. Does the knowledge get disintegrated across these different NPD Phases? How?
10. Do you combine Historical data with the new knowledge created through Social Media (Historical data=Transactional data or the data collected through traditional way and accumulated in the companies database)?
11. What was the product failure rate initially with respect to Historical data when compared to knowledge created through social media?
12. Define or explain your structure for Social Media/SCRM approach
13. Can you give me an example of a case study? (Success or Failure)

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SOCIAL COMMERCE IN RETAILING – WHY YOU USE IT?

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Abstract

Social media has not only reshaped the way people make decisions, but also changed the norms of how people interact with others. Due to the popularity of social media, social commerce is becoming a new form of e-commerce approaches. This study attempts to investigate what motivates individuals' use of social commerce in the context of grocery retailing service based on the theoretical framework of the Uses and Gratifications theory. The empirical data was collected from a Finnish social commerce website offering a social media environment for social commerce in grocery services. Based on both survey data and clickstream data, we found that i) individuals are motivated to use social commerce in grocery retailing service mainly due to their utilitarian gratification in using it as social commerce platform can meet their functional needs; ii) social gratification plays weak role in determining social commerce in grocery retailing service as individuals has less social needs compared to their functional needs in social commerce; and iii) hedonic gratification might be a potential reason as the hedonic needs seems to be very weak. The functions (searching for products and recipes, compiling shopping lists and online shopping, etc.) offered by the social commerce services meet individuals' functional needs, and motivate them to use social commerce. Finally the limitations of the current research are discussed, and the directions for further research are also suggested.

Keywords: Social media, social commerce, uses and gratifications theory, e-commerce.

1 Introduction

Social media has experienced a rapid expansion of its popularity after its inception in the early 2000s. There are various social media channels for individuals to use, such as blogs, bulletin boards, chat rooms, discussion forums, newsgroups, wikis, email, personal web pages, social networking websites, and virtual communities (Litvin et al. 2008; Reichheld et al. 2000). According to a recent report released by Facebook, currently the most famous social networking site, it has an estimated 800 million active users. Madden et al. (2011) found that approximately 65% of adult Internet users visit social network sites, such as Facebook, Twitter, LinkedIn. Social media has gained substantial popularity among users.

Recent research indicates that more and more people are using social media for various reasons, such as making friends, searching information, keeping connected with friends or for entertainment. Social media has also been widely used by business communities to accommodate the growing trend of social media for business values, such as increasing sales, raising customer loyalty and retention, improving customer satisfaction, customer support and branding (He et al. 2013). Qualman (2009) argued that social media has not only fundamentally reshaped the way people make decisions, but also profoundly changed our lives and how we interact with others.

Nowadays, consumers rely more on social media to find the information they need and gain substantially more power in making their decisions on purchasing products or services. The increased popularity of social media has opened opportunities for business considering the new innovative platform offered by the social media environment (Liang and Turban 2011). Social media has been widely employed in different industries, such as Facebook, Twitter, LinkedIn, Groupon and other professional social shopping communities (Harris and Dennis 2011; Olbrich and Holsing 2011; He et al. 2013; Xiang and Gretzel 2012). The new business model of using web 2.0 social media technologies to support e-commerce has been regarded as a new extension of e-commerce, and has often been referred to as social commerce (Liang and Turban 2011; Stephen and Toubia 2010; Zwass 2010).

Recently, social commerce has attracted researchers' attention from different disciplines, such as, marketing and information systems. Prior research has explored social commerce from different perspectives, such as user behaviour, social media techniques (e.g. tools, platforms and technology), and commercial activities or outcomes of social commerce (Pagani and Mirabello 2012, Liang and Turban 2011).

Prior research on social commerce has focused more on the process or the outcome of using social commerce, while limited efforts have been made to explore the motivations beyond users' usage of social commerce. In addition, social commerce fits well to the retailing industry, but research on social commerce, especially in the grocery retailing industry is still scarce. Furthermore, prior research mainly investigates individuals' use of social commerce based on data collected via survey, little effort has been made to integrate both real users' clickstream data and survey data to deeply investigate individuals' use of social commerce.

In response to the above research challenges, this study attempts to examine the factors motivating individuals' use of social commerce from the perspective of the Uses and Gratifications theory (U & G). The research was conducted in the context of social commerce in grocery services. Thus, our research questions is:

RQ: What motivates individuals' use of social commerce in grocery services?

The empirical data in the current study includes both clickstream data of real users and data collected via survey among a sample of the registered users. Therefore, this research might in essence offer a theoretical account of the motivations for individuals to use social commerce for grocery shopping through combining both data sources. The findings of the current study are also expected to shed light on how social commerce sites should be designed to attract more individuals.

The structure of the paper is as following: first a summary of the literature on social commerce and the U & G theory is presented. Then, the research strategy is introduced. After discussing the findings of the current study, the paper highlights the implications for both research and practices. Finally, the limitations of this study and the implications for future research are pointed out.

2 Literature review

2.1 Social commerce

Social commerce was first introduced in 2005, and has been driven more by practices rather than by research after its launch (Wang and Zhang 2012). In the literature there is still no universal definition of social commerce. According to Olbrich and Holsing (2011), social commerce is a new form of e-commerce, which connects consumers and shopping together due to the linkage of online shopping and social networking. Social commerce involves the use of Web 2.0 technologies to assist in acquisition of products or services, such as, social networks and virtual communities (Amblee and Bui 2011; Dennison et al. 2009). Wang and Zhang (2012) defined social commerce as a form of commerce mediated by social media involving convergence between online and offline environment. According to Liang and Turban (2011), social commerce is a subset of e-commerce that "involves using Web. 2.0 social media technologies to support online interactions and user contributions to assist in the acquisition of products and services" (p. 5). In essence, social commerce is a combination of social and commercial activities.

In a social commerce website, people can communicate with other users online, get advice from others, find needed information for goods and services, and conduct purchasing online or offline. Social commerce is posited to have the following three major attributes: social media technologies, social interaction and commercial activities (Liang and Turban 2011). The two major configurations of social commerce websites are: i) social network websites adding commercial features that allow advertisements and transaction; and ii) traditional e-commerce websites adding social networking capabilities to serve and understand customers better via taking advantage of the power of social networking (Liang and Turban 2011).

2.2 Uses and gratifications theory

The U & G theory has been widely used in mass communication research to investigate the reason why people choose a communication medium over alternative media to gratify their various needs (Katz et al. 1974). According to the U & G theory, people are active in choosing and using media based on their needs. They are aware of their needs and their behaviors are goal-oriented. The U & G approach has been widely applied in the traditional

mass communication research, such as radio (Mendelsohn 1964), newspapers (Elliott and Rosenberg 1987), and television (Babrow 1987), and was recently applied to explore the new media and communication technologies, such as social network sites (Xu et al. 2012), social media (Zhou et al. 2011) virtual community (Cheung and Lee 2009), as well as social network game (Li et al. 2013).

The U & G approach posits that people's use of a media mainly determined by the functions offered by the media. And the recent research results based on the U & G approach, such as in the research contexts of Internet (Stafford et al. 2004), social network sites (Xu et al. 2012), social network game (Li et al. 2013), found that people's use of the new medias are determined by not only functional need, but also social need and hedonic need (Li et al. 2013; Zhou et al. 2011).

Thus, we employed the U & G approach as the theoretical framework in the current study to explore individuals' use of social commerce, for that social commerce is based on social media platform and the U & G approach fits to our research context. The U & G approach provides a nomological network for research rather than the predefined set of constructs or factors. In this study, according to the unique features of the U & G theory, we do not suggest any predefined categories of needs, but examine the main needs motivating individuals' use of social commerce with both the survey data and the clickstream data.

3 Research strategy

In the current study, we collected empirical data in a Finnish social commerce website, Foodie.fm. It offers social commerce platform for grocery shopping in Finland, in cooperation with one major Finnish retailer, S-group.

Foodie.fm provides a social commerce platform to meet consumers' needs for grocery shopping, where consumers can engage and interact with other users in topics related to recipes or products, compile shopping lists based on the product and recipe information, order products or ingredients for recipes online and order delivery service to their homes. Consumers can access Foodie.fm via personal computers, mobile phones, and tablet devices.

We collected two datasets in this study to explore the factors motivating individuals' use of social commerce in grocery retailing services, one is the clickstream data from the server of Foodie.fm, and the other is survey data collected among Foodie.fm users.

We collected the user clickstream data from the server of the company based on a defined period for 3 months. Our data span the period from March 1st to May 31st, 2012. The clickstream data recorded the pages viewed, the viewing duration of pages and each session happened in the 3 months. User actions are also recorded, such as a user's viewing a specific product or recipe, or adding a product to the cart. There are 22 different user actions coded in the clickstream data as events according to the coding methods used by the company (See more details in Table 4). In the clickstream data, every event is stored to the server of this site based on the move of the mouse and change of action of each user. The product and recipe view actions were not stored from mobile user interface. Totally there are about 20 million user events collected in the three months. The clickstream data offers us accurate information about individuals' activities in using Foodie.fm.

Based on the clickstream data we can have a better understanding on what individual users really do while using Foodie.fm. In order to understand what motivate them to use Foodie.fm, we also performed a survey to collect empirically data among the registered users. Both structured questions and open questions are included in the questionnaire. In the structured question part, the respondents were asked to indicate their perceptions on the importance of some predefined reasons why they use Foodie.fm and the importance of some predefined features of Foodie.fm. A five-point Likert-scale ranging from *Not Vey Important* (1) to *Very Important* (5) was used to measure each predefined reason or feature. In the open question part, the respondents were asked to answer questions regarding what are the most important reasons for them to use Foodie.fm, and the other reasons that were not listed in the questionnaire.

The survey questionnaire was delivered to 1500 registered users of Foodie.fm by email and we received 146 valid responses. More detailed demographic information on the respondents is presented in Table 1. We employed SPSS to conduct analysis on the data collected from the structured questions and conducted content analysis on the data collected via open questions.

Demographic profile	**Category**	**Frequency**	**Percentage (%)**
Gender	Male	67	45.9
	Female	79	54.1
Age	20-30	24	16.4
	30-40	35	24.0
	40-50	41	28.1
	More than 50	43	29.5
	Missing value	3	2.0
Where do you live	City centre	20	13.7
	Suburb	97	66.4
	Small town	18	12.3
	Countryside	10	6.9
	Missing value	1	0.7
Social media use	Facebook	108	74
	Google+	52	35.6
	YouTube	94	64.4
	Twitter	39	26.7
	LinkedIn	45	30.8
How often do you use Foodie.fm	Very rarely	2	1.4
	Once per month	55	37.7
	Once per week	35	24
	Once per day	46	31.5
	More than once per day	6	4.1
Devices	Computer	95	65.1
	iPad	32	21.9
	iPhone	48	32.9
	Windows phone	13	8.9
	Android phone	16	11
UsingFoodie.fm to do online shopping	Yes	101	69.2
	No	45	30.8

Table 1 Demographic information of the respondents

4 Research results

4.1 Research results from survey data

Based on the answers to the structured questions, we found that individuals mainly use Foodie.fm to meet their needs for searching product and recipe information and for planning grocery shopping (See Table 2). The most important features of Foodie.fm for the users are planning shopping list and search products (See Table 3).

Motivations	**Mean**	**S.D.**
I use Foodie.fm to search information about products and recipes.	3.86	1.327
I use Foodie.fm only if I am planning shopping.	3.21	1.435
I use Foodie.fm to always know beforehand what products and recipes I am interested in.	2.77	1.292
I use Foodie.fm to order food to home.	1.92	1.424
I use Foodie.fm to see what updates my friends have made.	1.46	0.926

Table 2 Motivation results

Foodie feature	**Mean**	**S.D.**
Search products with keywords.	3.93	1.219
Planning future shopping (shopping list).	3.86	1.349
Browsing products and product categories.	3.59	1.269
Finding products to suit diet.	3.40	1.402
Getting familiar with nutrition information of products.	3.21	1.448
Advertisements and bargains.	3.13	1.298
Ordering groceries from the web.	2.51	1.699
Barcode scanning.	2.34	1.568

Table 3 Foodie.fm feature results

The respondents were also asked to list the main reasons for them to use Foodie.fm in an open question. Based on their answers, we found that individuals use Foodie.fm mainly for the following three reasons:

- To search product or recipe information;
- To plan shopping lists;
- To conduct online shopping.

These results are consistent with the results from the structured questions.

Users can search the products or recipes they like or prefer, and further see the ingredients or product information. When users make the purchasing decision, they can easily make a shopping list to aid their shopping later in the shop, or to purchase the products online. Users can access Foodie.fm at the shop via mobile phone to support their shopping. The functions for searching products or recipes and making shopping lists help users to make decisions on their future shopping or real-time shopping at shops. As indicated in the answers to the open-ended questions the reasons why individuals use Foodie.fm:

"At home while I am planning grocery shopping and sometimes at the shop as a shopping list"

" When I am planning grocery shopping or menu for the whole week."

"When I need food stuff from shops I will add recipes or products to my shopping basket. I also check the prices."

Some users indicate why they prefer to do online shopping:

"I am an older lady and I have no strength to go shopping very often."

"We do not have a car, but a small child, so this helps our life."

"Orderliness of grocery shopping, avoiding impulse buying, easiness and saving time".

In addition, some users list some other reasons why they use Foodie.fm, such as getting inspiration for cooking or having fun for some specific groups, such as those who are allergic or on a special diet, they use Foodie.fm also because it offers them accurate product ingredient information.

"I can order products, which I have checked beforehand and which are suitable for me."

4.2 Descriptive statistics of the clickstream data

According to the major attributes of social commerce, we categorize all 22 actions in using Foodie.fm into 3 high-level activities: i) general activity, ii) social interaction, and iii) online shopping. User actions on logging in or creating new account are grouped in the *general activities*, all actions related to votes, likes, comments and invitations are included in *social interaction*, and all actions related to online shopping are categorized as online shopping activities, such as product or recipe view, adding products to cart, ordering grocery stuff, ordering delivery service and checking out. Table 4 presents more details about the actions individuals have done in the three months based on the clickstream data. Clearly, Foodie.fm retained its current users as well as attracted new users. Product view and recipe view actions are the most popular actions, followed by adding products to the shopping cart. In the social interaction activities, users make more actions on votes and likes on products and recipes.

Activities	**1.1.1 Action Name**	**1.1.2 Action Description**	**Code**	**1.1.3 Count**
General activity	CreateUser	A new user is created	4	48012
	ReturningUser	A registered user has logged in	5	61674
Social Interaction	EntryVote	Voted product	13	**14735**
	RecipeVote	Voted recipe (thumb up, thumb down)	14	**13735**
	EntryFavourite	Added the favourite product	15	3841
	EntryUnfavourite	Removed the favourite product	16	278
	RecipeFavourite	Added favourite recipe	17	**6864**
	RecipeUnfavourite	Removed favourite recipe	18	495
	EntryComment	Commented on product	19	86
	RecipeComment	Commented on recipe	20	75
	InvCreate	Sent a family member invitation	21	38
Online shopping	EntryView	Viewed a product.	1	**16361002**
	EntryToCart	Added product to shopping cart	2	**291210**
	EntryAdToCart	Added advertised product to shopping cart	3	114546
	RecipeView	Viewed a recipe	6	**2618092**
	OrderNew	Started the order process	7	16515
	OrderCheckout	Checked out the order, i.e. actually ordered something	8	7327
	EntryFromCart	Removed product from shopping cart	9	71306
	EntryAdFromCart	Removed advertised product from shopping cart	10	20774
	RecipeToCart	Added recipe to shopping cart	11	8681
	RecipeFromCart	Removed recipe from shopping cart	12	2376
	OrderSelectDeliverySlot	Selected delivery slot for order	22	7490

Table 4 Actions based on clickstream data

The use of online shopping features is quite high whereas the use of social interaction feature is relatively low. The results indicate that users are more interested in conducting online shopping related activities, such as, searching products or recipes and ordering online. These results are consistent with the findings from the survey data that individuals really do more product and recipe views and making shopping lists for online shopping or future shopping at shops when they are using Foodie.fm.

5 Discussion

This study attempted to explore the motivations for individuals to use social commerce in the context of grocery services. The results show that the main reason for individuals to use social commerce in grocery service is that social commerce can gratify their functional needs for recipe and product search and view and for compilation of shopping lists. Social gratification and hedonic gratification might motivate them to use social commerce, but these two factors are not so important.

Consistently with our expectations, we found that individuals mainly use Foodie.fm to support their shopping, including both online and offline shopping. It is taken for granted, that the main service offered by Foodie.fm is primarily used for supporting individuals' decisions on grocery shopping, but not social interactions as in using Facebook and Twitter. The results based on the clickstream data (See Table 4) show that the use of social shopping features is quite high, whereas, the use of social interaction features is relatively low. These results indicate that individuals' use of Foodie.fm is really goal-oriented behaviour. Users are quite aware of the features provided by Foodie.fm, and understand that Foodie.fm can support their decision in grocery shopping no matter online or offline. This finding offers validation to the claim that social commerce offers strong instrumental value to users (Pöyry et al. 2013).

The second major finding is that social gratification is a reason but not an important reason for individuals to use Foodie.fm. This was partly out of our expectations as the IS literature celebrates the positive effect social interaction has on individuals' social commerce intention. For instance, Liang et al. (2011) found that social support is a main determinant of individuals' social commerce intention. It has also been shown that active social engagement reflects a stronger intention to use social commerce (Pagami & Mirabello 2011). This difference might be due to the different research contexts. As indicated in prior research, individuals rely more on WOM or social interaction to support their purchasing decision on heavy-involvement products, expensive products and experience-oriented services. The consumption of grocery stuff in consumers' daily lives happens very often and the price of grocery stuff is also cheap compared to some expensive products, which might lead to consumers' unwillingness to spend so much effort on social interaction or social engagement to get support for their purchasing decisions on grocery stuff. Another important reason is that Foodie.fm offers accurate information on the grocery products and recipes, which already offers strong support for individuals' shopping decisions, and consumers do not need further information via social interaction to support their shopping decision.

Thirdly, though hedonic gratification might be a reason for some users to use Foodie.fm, its role seems to be quite weak. Foodie.fm is mainly used as a utilitarian IS at the beginning. With the increased use of Foodie.fm, individuals might increase their need for hedonic and

social interaction. This might help to explain the weak role of both social gratification and hedonic gratification in motivating individuals' use of Foodie.fm. The finding still validate the findings from the prior research that both hedonic motivation and utilitarian motivations driving individuals' online shopping behaviour.

6 Implications for research and practices

The findings of this study have significant implications for both academia and practices relating to the issues of social commerce usage. Firstly, our findings add knowledge to social commerce research. This research integrates user perceptions and real use behaviour in examining social commerce, which offers more accurate findings on usage of social commerce. In addition, in this research utilitarian gratification was found to be the main driver for using social commerce in grocery retailing service, which reflects that individuals' use of social commerce in grocery retailing service is a goal-oriented behaviour. The finding indicates that the U & G theory can be a good theoretical framework to explain individuals' use of social commerce.

Practical implications for social commerce in the context of grocery shopping can be drawn from these findings. Firstly, considering the importance of gratifying individuals' functional needs in using Foodie.fm, Foodie.fm should develop the features related to online shopping to meet the needs of users, such as always updating products and recipes to offer more products and recipes to consumers, offering easy product and recipe searching navigation. Secondly, Foodie.fm can also try to offer some artefact related to hedonic activities, such as flash game involved in cooking, to meet the different needs of different user groups. Foodie.fm can also examine whether these strategies can help improve business, such as attracting new users, retaining users as well as making current users to be more active.

7 Limitations and Future Research

This study offers valuable insight into social commerce studies. However, this study involves a number of limitations that need to be acknowledged. First, the clickstream data time span is three months. The time period might be a little bit short to gain sufficient insight. In the future, we should make a further study on social commerce based on a longer time span, such as, one year or even longer. In addition, a deeper investigation on social commerce user behaviour should be conducted based on clickstream data, such as clustering user groups based on user activities and defining their behaviour features, examining the relationship between social interaction and online shopping behaviour.

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Are Facebook Brand Community Members Really Loyal to the Brand?

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Abstract

Although research into consumer participation in online brand communities has grown in recent years, still little is known about how membership in a Facebook brand community is related to brand loyalty. This study tests the direct and indirect effects of brand community engagement, electronic word-of-mouth (eWOM) intention, and community promotion behavior on attitudinal loyalty, repurchase intention, and positive word-of-mouth. Partial least squares modeling is used to test the conceptual model on data from a survey of 1,936 Facebook brand community members. The results support most of the hypotheses and show that whereas brand community engagement and eWOM intention are strongly associated with all the aspects of brand loyalty, community promotion behavior only affects word-of-mouth. The results also reveal that user activity in the Facebook brand community has no effect on positive word-of-mouth.

Keywords: Brand Community Engagement, Electronic Word-of-mouth, Community Promotion, Brand Loyalty

1 Introduction

The social nature of the Web, built as it is on user-generated content, has revolutionized the online interface (Kaplan & Haenlein, 2010), empowering consumers to interact with brands and with one another in content creation activities. This situation has led to traditional marketing activities being considered less effective than they once were (Trusov et al., 2009), forcing companies to change their communication practices and branding, so they reflect a more participatory approach. Research on brand communities has concentrated on identifying specific attributes of communities (Muniz & O'Guinn, 2000) and brand community engagement (Algesheimer et al., 2005), exploring relationships among brand use, brand

communities, and social networks (Schau et al., 2009). Previous studies have shown a positive link between online brand community participation and customer loyalty (Casaló et al., 2007; Gummerus et al., 2012). Brand community membership predicts individuals' behavior within and outside the community (Algesheimer et al., 2005) and indicates and stimulates their buying intentions (Cheung & Lee, 2012).

The importance of how customers spread positive messages about a company and its products to others has been widely recognized and linked to company profits and revenues (Kumar et al., 2007). The content of a peer message is perceived as more meaningful and relevant (Mazzarol et al., 2007), as well as more trustworthy (Brown et a., 2007; Martin & Clark, 1996), when the sender is not connected to the brand. However, further research is needed on the causal linkages between the conversational elements within consumer networks— such as WOM—and performance outcomes (Adjei et al., 2010). The European Communication Monitor (2012) highlighted the importance of online brand communities and emphasized the need to increase competence in the use of this medium for marketing activities. Prior studies have also been limited to the use of college student samples (Chu & Kim, 2011) and have examined brand communities in a single-brand context (Marzocchi et al., 2013), measured behavioral intention to share WOM rather than actual WOM behavior (Yeh & Choi, 2011), and examined eWOM as a unidimensional construct, although evidence suggests that more than one aspect of eWOM should be considered (Koh & Kim, 2004; Yeh & Choi, 2011). In sum, there are still notable gaps in our understanding of how consumers' engagement in online brand communities such as Facebook brand communities is manifested in different forms of eWOM and brand loyalty.

In Finland, the source of the empirical data for this study, close to 90% of people aged 18–24 and half of the Finnish adult population have user profiles on Facebook (Statistics Finland, 2013). Moreover, this platform's global, active user base has exceeded one billion (Tech Crunch, 2013). Therefore, an examination of online brand communities, especially Facebook brand communities, is currently relevant and concerns almost every company wanting to build stronger online relationships with their customers and prospects.

This study aims to address the limitations in existing research and attempts to contribute to current knowledge in several respects. First, we build and empirically test a comprehensive, conceptual model that explains how brand loyalty is formed and strengthened through the components of users' online brand community engagement, eWOM intention, and community promotion behavior. Second, we contribute to prior research by testing the effects of brand community engagement on eWOM intention, community promotion behavior, and brand loyalty. Finally, we examine the direct and indirect effects of eWOM intention and community promotion behavior on three aspects of brand loyalty: attitudinal loyalty, repurchase intention, and WOM. This information will help companies to understand better the value of a Facebook brand community for brand loyalty, specifically WOM.

Brand community engagement refers to a set of practices that reinforces members' escalating engagement with the brand community (Schau et al., 2009). Hur et al. (2011, p. 1196) define brand community as a "group of people who possess a particular brand or who have a strong interest in a brand, and who are active both online and offline." We examine eWOM with two distinctive constructs; one deals with eWOM intention and the other with promotion behavior in an online brand community (Brown et al., 2005). Previous studies have shown that

information-sharing intention and behavior outside the community is the most relevant type of eWOM in the social media context (Chu & Kim, 2011; Yeh & Choi, 2011). Therefore, eWOM intention in this study relates to the intention to share information outside the community (Chu & Kim, 2011; Yeh & Choi, 2011). Community promotion behavior involves the activity of promoting the brand community outside the Facebook brand community (Koh & Kim, 2004). On this basis, we define eWOM as the intention to share and pass on brand-related information outside the Facebook community (Hur et al., 2011; Yeh & Choi, 2011), and community promotion behavior as positive WOM behaviors generated by community members (Koh & Kim, 2004). Manifestations of brand loyalty are not restricted to any communication context, thus making a distinction between online and general behavior. Our conceptualization of brand loyalty includes three aspects: attitudinal loyalty, repurchase intention, and general WOM (de Matos & Rossi, 2008).

In the following section, we briefly describe the study framework and subsequently develop hypotheses on how brand community engagement, eWOM intention, community promotion behavior, attitudinal loyalty, and repurchase intention drive general WOM. This is followed by a description of the methods and measures used to test the framework. We present the results in the penultimate section and close with a discussion of the findings, addressing their theoretical, managerial, and further research implications.

2 Effects of Online Brand Community on Brand Loyalty

Brand community engagement and social networking behavior are complex and closely intertwined constructs that collectively create value for a company and its customers (Schau et al., 2009). Brand owner-led communities enable companies to commit to closer and more collaborative relationships with customers and gain a better understanding of their behavior (Laroche et al., 2012). Online brand communities are considered effective platforms for both brand owners and customers (Adjei et al., 2010) that enhance the development of loyal customer relationships (Casaló et al., 2007). Brand communities act as a means of customer involvement in the marketing dialogue with brands and customer interaction with one another (Andersen, 2005). These interactions have been found to positively affect customers' brand perception (Marzocchi et al., 2013) and brand loyalty (Gummerus et al., 2012; Hollebeek, 2011; Matzler et al., 2008), for example, in terms of purchasing and WOM behavior (Algesheimer et al., 2005; Hur et al., 2011). Customers' engagement with—and behavior within—online brand communities varies significantly among different contexts and with a customer's state of mind (Brodie et al., 2013).

2.1 Research Hypotheses

This study's conceptual framework is presented in Figure 1. The model suggests that brand community engagement is directly associated with eWOM intention and community promotion behavior, which in turn are hypothesized as antecedents of attitudinal loyalty, repurchase intention, and general WOM.

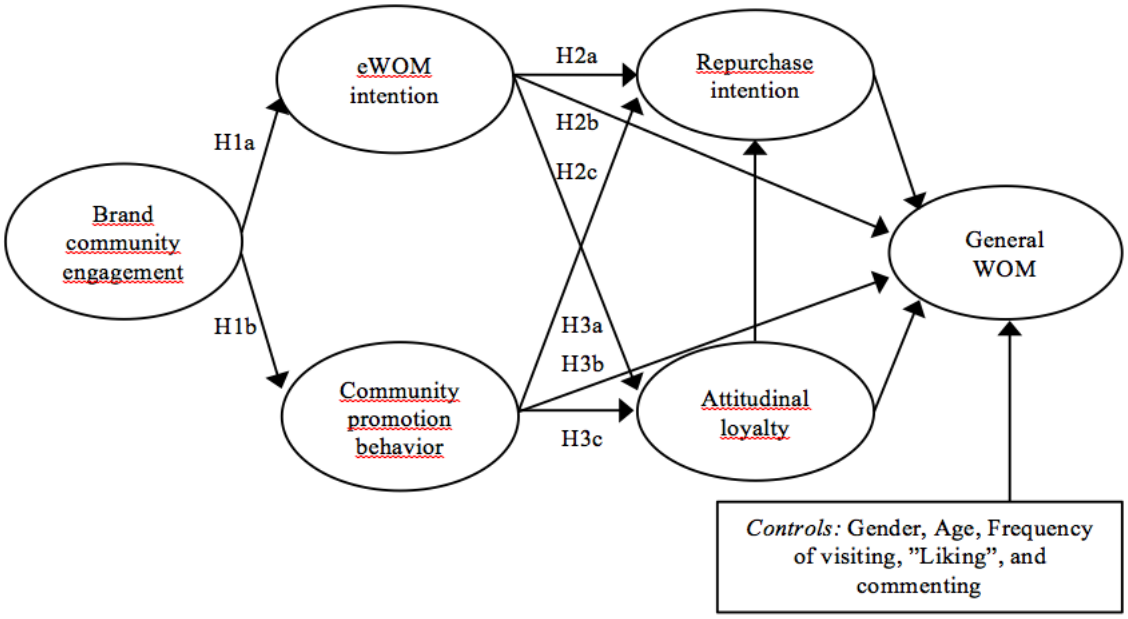


Figure 1: Conceptual model and hypotheses

Brand community engagement positively relates to more intense social networking behavior by customers (Algesheimer et al., 2005; Schau et al., 2009). The loyalty that customers feel toward a brand may be enhanced by encouraging them to interact within the brand community, thus fostering identification with the brand community and the brand itself (Casaló et al., 2007; Holland & Baker, 2001). Brodie et al. (2013) found that consumers' engagement is most often triggered by their information needs. They further showed that consumers co-create value in these relational exchange processes, which affect brand satisfaction, loyalty, and commitment. Gummerus et al. (2012) indicated that consumers' engagement with and participation in online brand communities positively affect their satisfaction and loyalty toward the brand. This positive association between brand community engagement and brand loyalty is supported by several studies (Algesheimer et al., 2005; Hollebeek, 2011; Matzler et al., 2008).

Brand community engagement increases the members' WOM activities, as they are more prone to interact with one another (Mathwick et al., 2008; Wasko & Faraj, 2005). For example, Lee et al. (2012) showed evidence of a positive effect of brand community engagement on eWOM intentions. As stated, brand community members' community promotion behavior is related to eWOM behavior directed outside the online community (Yeh & Choi, 2011). Therefore, the pattern of behavior in the case of community engagement and community promotion is expected to be similar to that of community engagement and eWOM intention. Prior studies support this argument by showing that consumers' online brand community engagement is an antecedent of community promotion behavior and that they are positively associated (Algesheimer et al., 2005). Thus, the more an individual feels a sense of belonging to a brand community and the more motivated he or she is to participate in it, the more likely he or she will promote it to individuals outside the community. Against this

backdrop, we postulate that brand community engagement has a positive, indirect relationship with brand loyalty:

H1a–c:Brand community engagement is positively associated with eWOM intention (H1a), community promotion behavior (H1b), and brand loyalty (H1c).

Prior research has suggested a positive association between membership in an online brand community and brand loyalty (Muniz & O'Guinn, 2001). Loyalty is considered a key mediator in company success and sustainable development, and it is positively connected to the intention to spread positive WOM (Casaló et al., 2007). Prior research has offered several antecedents of WOM, including brand community engagement, satisfaction, commitment (Brown et al., 2005; Royo-Vela & Casamassima, 2011), brand value (Gruen et al., 2006), writing intensity (Casaló et al., 2007), and loyalty (Chu & Kim, 2011; Hur et al., 2011). Additionally, Casaló et al. (2008) stated that commitment precedes the formation of brand loyalty, leading to positive WOM communication. The aforementioned evidence points out that brand loyalty is the outcome of brand community engagement, eWOM intention, and community promotion behavior. Therefore, the following hypotheses are formulated:

H2a–c: Electronic WOM is positively associated with attitudinal loyalty (H2a), repurchase intention (H2b), and general WOM (H2c).

H3a–c: Community promotion is positively associated with attitudinal loyalty (H3a), repurchase intention (H3b), and general WOM (H3c).

We control the model for gender, age, and user activity, which have been associated with the outcome variable (WOM) of our study (for gender, see e.g., Garbarino & Strahilevitz, 2004; for user activity, see e.g., Casaló et al., 2008).

3 Methodology

To test our hypotheses, an online questionnaire was developed to collect data from social media users. Data were collected in February 2013 from users who were customers of a Finnish firm that offers prestigious home décor and kitchen products. During the two-week data collection period, the survey was accessed 3,580 times, and 1,936 responses were gathered, producing an effective response rate of 54.1%. No nonresponse bias was detected. In line with the general population of home décor online communities, our sample was female dominated (93.6%). In terms of the respondents' ages, the sample was well-balanced, as all age groups were represented to some extent. A majority of the respondents had been members of the Facebook community for a year or more (61.5%). The items used in this study and their origins can be found in the Appendix. All the scales measuring the model constructs were operationalized with multi-item reflective scales.

4 Results

All measures were subjected to confirmatory factor analysis using partial least squares (PLS) structural equation modeling (SEM) and SmartPLS (Ringle et al., 2005). PLS-SEM has lately become a key research method in marketing, information systems and strategic management, mostly due to its advantages to the more popular covariance-based SEM (Hair et al., 2014, p. xii). In this study the reasons for using PLS-SEM are the complex model with many indicators and model relationships, and the primary objective of modeling relationships

between target constructs (Hair et al., 2014, p. 14-26). Convergent and discriminant validity was achieved (see Table 1). The common method bias was tested with a common method factor in SmartPLS. The results showed the average method-based variance to be low (0.006), compared to the average variance explained by the indicators (0.679), indicating that the common method bias was not a concern in our dataset.

	AVE	CR[a]	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
BCE[b] (1)	0.548	0.829	**0.740**										
eWOM[c] (2)	0.746	0.898	0.575	**0.864**									
CPB[d] (3)	0.854	0.946	0.624	0.625	**0.924**								
ATTL[e] (4)	0.686	0.897	0.324	0.356	0.242	**0.828**							
RI[f] (5)	0.671	0.891	0.329	0.380	0.246	0.701	**0.819**						
GWOM[g] (6)	0.692	0.870	0.409	0.550	0.417	0.625	0.636	**0.832**					
FV[h] (7)	n/a[k]	n/a	0.019	0.005	-0.012	-0.016	0.000	0.000	**n/a**				
FL[i] (8)	n/a	n/a	-0.003	-0.020	-0.029	0.015	0.010	0.014	0.455	**n/a**			
FC[j] (9)	n/a	n/a	-0.019	-0.030	-0.021	-0.020	-0.015	-0.020	0.556	0.566	**n/a**		
Gender (10)	n/a	n/a	0.049	-0.007	0.036	0.024	-0.016	-0.032	0.012	0.012	-0.029	**n/a**	
Age (11)	n/a	n/a	0.061	0.046	0.190	-0.112	-0.091	-0.045	-0.015	-0.031	0.001	-0.032	**n/a**
Mean	-	-	2.63	2.64	1.81	3.59	3.90	3.52	2.31	3.03	1.79	n/a	n/a
SD	-	-	1.06	1.20	0.98	1.02	0.95	1.13	1.27	1.01	0.90	n/a	n/a

Table 1: Average Variance Extracted (AVE), Reliabilities, Construct Correlations, Square Root of AVE (on the diagonal), Means, and Standard Deviations (SD)

[a] CR – Composite reliability
[b] BCE – Brand community engagement
[c] eWOM – Electronic word-of-mouth intention
[d] CPB – Community promotion behavior
[e] ATTL – Attitudinal loyalty to the brand
[f] RI – Repurchase intention
[g] GWOM – General word-of-mouth
[h] FV – Frequency of visiting
[i] FL – Frequency of "liking"
[j] FC – Frequency of commenting
[k] n/a – Not applicable (construct measured using a single indicator; composite reliability and AVE could not be computed)

To test our hypotheses, we first examined the direct effects, followed by the analysis of the mediation test, including an assessment of indirect and total effects. In assessing the direct paths, a path weighting scheme with a maximum iteration set to 300 and an abort criterion set to 1.0E-5 was employed. The significance of the paths was assessed using bootstrapping with 5,000 re-samples (Hair et al., 2013, p. 132). The results of the PLS estimation for the direct effects are presented in Table 2.

	β	f^2	q^2
H1a: Brand community engagement → eWOM intention	0.574***	n/a	n/a
H1b: Brand community engagement → Community promotion behavior	0.624***	n/a	n/a
H2a: eWOM intention → Attitudinal loyalty	0.337***	0.079	0.052
H2b: eWOM intention → Repurchase intention	0.150***	0.027	0.012
H2c: eWOM intention → General WOM	0.262***	0.079	0.041
H3a: Community promotion behavior → Attitudinal loyalty	0.032 (ns)	0.001	0.001
H3b: Community promotion behavior → Repurchase intention	-0.007 (ns)	0.000	0.000
H3c: Community promotion behavior → General WOM	0.115***	0.018	0.010
Attitudinal loyalty → Repurchase intention	0.656***	0.779	0.378

Attitudinal loyalty → General WOM	0.289***	0.097	0.049
Repurchase intention → General WOM	0.301***	0.099	0.050
Gender → General WOM	-0.038***	0.005	0.002
Age → General WOM	-0.020 (ns)	0.002	0.000
Frequency of visiting → General WOM	0.004 (ns)	0.000	0.000
Frequency of "liking" → General WOM	0.023 (ns)	0.002	0.001
Frequency of commenting → General WOM	-0.016 (ns)	0.000	0.000

	R^2	Q^2
eWOM intention	0.330	0.245
Community promotion behavior	0.390	0.331
Attitudinal loyalty	0.128	0.087
Repurchase intention	0.520	0.344
General WOM	0.567	0.390

Table 2: Direct Effects Model

*** $p < 0.01$
ns - not significant
n/a - not applicable

Brand community engagement has strong positive associations with eWOM intention and community promotion behavior, providing support for H1a and H1b. With respect to H2a–c, all the relationships are supported by the data. Our findings do not support the positive association between community promotion behavior and attitudinal loyalty (H3a) or that between community promotion behavior and repurchase intention (H3b). Community promotion behavior is only positively related to general WOM (H3c). Furthermore, the model confirms the positive paths between attitudinal loyalty and repurchase intention, attitudinal loyalty and general WOM, and that between repurchase intention and general WOM. Of the control variables, only gender has a positive association with general WOM. This finding implies that women are slightly more willing to provide positive WOM about the brand. The results of the total effects confirm H1c by showing that brand community engagement has a significant positive association with brand loyalty (Table 3) and has the strongest effect on general WOM.

	Attitudinal loyalty	Repurchase intention	General WOM
H1c: Brand community engagement	0.213***	0.222***	0.350***
eWOM intention	0.337***	0.371***	0.471***
Community promotion behavior	0.032 (ns)	0.014 (ns)	0.128***
Attitudinal loyalty	-	0.656***, [a]	0.487***

Table 3: Total Effects

*** $p < 0.01$
ns - not significant
[a] Same as the direct effect

The indirect effects and mediation were assessed by calculating the significance of the indirect effects, which was done by bootstrapping the sampling distribution (5,000 bootstrap samples, no sign changes) and calculating the variance accounted for (VAF) value. The results show that the effects of eWOM intention on general WOM are partially (VAF = 0.444) mediated by attitudinal loyalty and repurchase intention. In this equation, attitudinal loyalty is a slightly stronger mediator. Moreover, the effects of community promotion behavior on general WOM are not mediated by attitudinal loyalty or repurchase intention. Thus, we can

conclude that the relationship between community promotion behavior and general WOM is more direct than indirect. Finally, we find that the effects of attitudinal loyalty on general WOM are partially (VAF = 0.406) mediated by repurchase intention.

5 Conclusion

This is among the first studies to investigate how online brand community engagement, eWOM intention, and community promotion behavior within a Facebook brand community affect consumers' attitudinal loyalty to the brand, repurchase intention, and positive WOM behavior about the brand. Our findings make an important contribution to the discussion of the consumer online brand community from a WOM perspective, giving rise to several implications for online brand community management.

We extended the prior literature by offering a theoretically grounded, conceptual model and testing it empirically with a large sample of online community members. Our key empirical findings shed light on the relationship between a Facebook brand community and purchasing behavior in four respects: a) brand community engagement has a significant direct effect on eWOM intention and community promotion behavior, and a significant indirect effect on the three aspects of brand loyalty; b) eWOM intention explains a considerable volume of all the outcome constructs, and it has the strongest effect on general WOM; c) community promotion behavior only affects general WOM; and d) attitudinal loyalty exhibits strong associations with repurchase intention and general WOM, and its effect on WOM is partially mediated by repurchase intention.

The positive relationships between brand community engagement and eWOM, and between community promotion behavior and brand loyalty are consistent with prior research results (Algesheimer et al., 2005; Casaló et al., 2007; Schau et al., 2009). Our findings add to the existing knowledge of brand loyalty, especially WOM, by showing that eWOM intention is closely linked to all types of brand loyalty and acts as the most relevant type of WOM in the social media context (Chu & Kim, 2011; Yeh & Choi, 2011), outweighing the importance of community promotion behavior in driving brand loyalty.

The findings of the current research offer two managerial implications for those building and maintaining an online brand community, especially in the Facebook context. First, our results confirm a positive relationship between a Facebook brand community membership and brand loyalty. Managers should be aware that eWOM intention is the main driver of building brand loyalty, followed by brand community engagement. An online brand community on Facebook can thus be a valuable asset for companies aiming to have their community members spread positive news online about their brands and products. Second, we advise managers to create strategies that foster participation and interaction in the brand community. Bagozzi and Dholakia (2006) also suggested that loyalty and commitment to a brand might be enhanced by encouraging community members to interact with one another, since it also reinforces identification with and a sense of belonging to the community. This approach typically requires companies to generate discussion around their brands and products by creating interesting and relevant content for the audience and by interacting with the latter (e.g., by asking questions, collecting ideas and feedback, having people vote on products, and answering customer queries).

We have identified three main limitations of the current study. First, the empirical data come from the members of just one Facebook brand community, and participation was voluntary, resulting in a convenience sample and thus limiting the generalizability of the results. Future research should therefore be conducted in other communities, possibly outside of Facebook. Second, given the short history of Facebook and its brand communities, perhaps membership in these kinds of communities is not always a sign of interest in the brand or loyalty. Since our research did not inquire about the motives for participating in the community in great detail, one promising future research area would be an examination of what motivates Facebook brand community membership. Finally, as with any single survey study, the impact of the common method variance cannot be completely ruled out without collecting data from various sources or applying a longitudinal study design. In order to fully validate the causality of the relationships, an experimental design would be necessary.

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Appendix

Constructs and items	Factor Loadings
Brand community engagement[a]	
In general, I'm very motivated to participate actively in the virtual community activities.	0.765
I feel a sense of belonging in this brand community.	0.776
I will exchange information and opinions with the members of this brand community.	0.757
I will collect information through this brand community.	0.657
Electronic word-of-mouth intention[b]	
I would recommend Organization X's Facebook community to other people.	0.876
I would pass on information I get from the Organization X's Facebook community to other websites.	0.827
I would pass on information about Organization X I get from the Facebook community to other people who are not Facebook community members.	0.886
Community promotion behavior[c]	
I invite my close acquaintances to join our Facebook community.	0.894
I often talk to people about benefits of Facebook community.	0.939
I often introduce my peers or friends to Facebook community.	0.939
Attitudinal loyalty to the brand[d]	
I consider myself to be loyal to the littala brand.	0.895
I am willing to pay more for littala products.	0.801
I am committed to this brand.	0.836
I would be willing to pay a higher price for this brand over other brands.	0.775
Repurchase intention[e]	
I will buy Organization X's products the next time I buy tableware or decorative items.	0.822
I intend to keep purchasing Organization X's products.	0.808
I intend to buy Organization X's products in the near future.	0.844
I would actively search for this brand in order to buy it.	0.803
General word-of-mouth[f]	
I often tell others about Organization X.	0.868
I recommend Organization X's products to others.	0.898
I would recommend Organization X to other potential users other than the brand community members.	0.719
Frequency of visiting[g]	
How often do you visit the community?	n/a
Frequency of "liking" [g]	
How often do you 'like' the content of the community?	n/a
Frequency of commenting[g]	
How often do you write comments?	n/a

Table 4 Measurement scales

Scale sources:
[a] Brand community engagement – Hur et al. (2011)
[b] Electronic word-of-mouth intention – Koh and Kim (2004)
[c] Community promotion behavior – Chu & Kim (2011) and Yeh & Choi (2011)
[d] Attitudinal loyalty to the brand – adapted from Chaudhuri & Holbrook (2001) and Laroche et al. (2012)
[e] Repurchase intention – Algesheimer et al. (2005) and Chaudhuri & Holbrook (2001)
[f] General word-of-mouth – Hur et al. (2011)
[g] Frequency of visiting, Frequency of "liking", Frequency of commenting – Gummerus et al. (2012)
n/a – not applicable

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Advocacy participation and brand loyalty in virtual brand community

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Abstract

Brand owners use virtual communities to strengthen brand loyalty by engaging consumers in active content creation activities. Personal and reciprocal communication and consumers' participation in virtual brand communities are the main sources through which communities contribute to brand loyalty formation. This research examines the antecedents and consequences of advocacy participation in virtual brand communities. The results show that the VBC members' advocacy participation is strongly contributed by the community's ability to promote reciprocal and personal use experience, which also directly affects the members' brand satisfaction. The results further show that advocacy participation and participation frequency positively contribute to especially attitudinal loyalty formation. Participation is found to be negatively related with brand satisfaction.

Keywords: Virtual Brand Community, Social Media, Advocacy Participation, Loyalty

1. Introduction

Virtual brand communities (VBC) are important forums for consumers to share product and brand information and experiences. For companies VBCs provide a channel to understand consumer needs, engage customers, and promote brand loyalty (Casalo et al., 2007). Cova and White (2010) outline that by the interactions within VBCs value is co-created, and thus, the brands act as social platforms. According to Chi (2011) the main benefit of VBCs is that dialog and content creation is more efficient than in offline

communities. Brand communities also act as a reference group for its members, thus affecting their buying behavior (Bagozzi & Dholakia, 2002). Furthermore, along with taking part in information sharing activities VBC members simultaneously promote the brand around which the community is set up, and further influence the members' loyalty formation (Koh & Kim, 2004). For example Laroche et al. (2012) state that brand owner-led VBCs are set up to enable brand owners engage in closer and more interactive relationships with consumers and gain better insights into their brand perceptions. Therefore, VBCs are considered effective platforms for brand owners' and consumers' interaction (Adjei et al., 2010), which enhance customer relationship management (Casaló et al., 2007). Thus, the focal factor of a well-functioning and effective VBC is that its members actively participate in the community activities (Muniz & O'Guinn, 2001).

As noted, VBCs are applied as means of engaging consumers in dialog with brand owners (Hur et al., 2011). In the present study VBC participation is examined as an active type of participation called advocacy participation, which is defined according to van Dyne et al. (1994) as behaviour targeted at other members of a community and described as maintaining high standards, challenging others, and making suggestions for change. Advocacy participation is seen as the essential type of participation for a VBC that effectively acts as the means of brand loyalty formation by engaging the members in active and diversified communication with other members and with the brand. Although advocacy type of participation is studied in offline context, little is known about its consequences in VBC context and how the community members' overall intensity to take part in posting and lurking behaviour moderates the effectiveness of advocacy participation as the means of loyalty formation. Therefore, this study examines, firstly, the effects of advocacy participation in a virtual brand community on brand satisfaction and brand loyalty. Secondly, we study how the VBC's ability to provide reciprocal and personal use experiences affects the VBC members' propensity to participate in advocacy type of communication. Finally, the moderation effect of overall participation intensity in VBC activities on the community members' loyalty formation towards the brand is explored.

2. Social media participation and brand loyalty

Customer loyalty towards the brand has been considered an important consequence of participating in an online brand community (Algesheimer et al., 2005; Muniz & O'Guinn, 2001). According to Laroche et al. (2012) the main idea of brand communities is to strengthen already satisfied customers' loyalty towards the brand. Therefore, the VBC members are commonly those customers that already have positive use experiences of the brand's products or services and hold positive attitudes towards the brand. In the present study brand loyalty is understood to be constructed of attitudinal and behavioural aspects, which measure the customers' degree of attachment to a brand and is connected to prior use experience and brand satisfaction (Liu et al. 2012). Several studies have shown a positive linkage between brand community participation and brand loyalty (e.g. McAlexander et al., 2002; Royo-Vela & Casamassima, 2011). Shang et al. (2006) studied the effects of consumers' participation in virtual communities on brand loyalty. They found that different forms of participation had different causes and effects. While visiting and reading in brand communities affected positively to brand loyalty, no positive relationship was found between posting and loyalty.

Royo-Vela and Casamassima (2011) studied the relationship between belonging to a Facebook brand community and brand loyalty by examining different types of participation: active participating, passive participating and non-participative belonging. They found that belonging to a Facebook community has a positive influence on brand loyalty. Also some indications of positive correlation were found between active participation and brand loyalty. Also Bagozzi and Dholakia (2006) showed a brand community participation to positively affect the community members' brand loyalty. The previous studies also suggest that participation and satisfaction are positively related (Gummerus et al., 2012; Shang et al., 2006). According to these studies, brand satisfaction and belonging to a virtual brand community are positively associated. The active type of participation in VBC, such as advocacy participation, is found to have lesser effect on the community members' satisfaction and loyalty towards the brand. For example Gummerus et al. (2012) state that although the community members can be expected to possess some level of positive brand satisfaction and loyalty, by engaging them in virtual community activities their brand relationship can be strengthened. Based on the prior evidence we expect the VBC members' advocacy participation to have positive consequences in their brand satisfaction as well as brand loyalty. Therefore, we propose the following hypotheses:

> *H1: Advocacy participation is positively associated with the members' brand satisfaction.*
>
> *H2: Advocacy participation is positively associated with the members' attitudinal and behavioural brand loyalty.*

Consumers' perception of reciprocal and personal communication in VBCs is created by the community's ability to respond to its members' actions and postings, treat the members as active participants of conversations, and ensure that the members' opinions are heard. This, in turn, decreases frustration for waiting and feelings of being disregarded, and thus, increases satisfaction. (Liu 2003) In addition, Anderson et al. (1994) propose that interactive communication enhances satisfaction, intimacy, and involvement. Thus, interactive communication is likely to contribute to positive attitudes toward a virtual community as well as the sponsor of the community. Song and Zinkhan (2008) show, that interactive communication positively affects satisfaction and loyalty. However, only few studies have examined how interactive communication affects consumers' engagement behavior. Anderson et al. (1994) makes an exception of this. He shows that interactive communication increases participants' satisfaction and engagement in the conversation. Based on this, we are putting forward the following hypotheses:

> *H3: A community's ability to provide personal and reciprocal experience positively affects the VBC members' satisfaction with the brand*
>
> *H4: A community's ability to provide personal and reciprocal experience positively affects the members' advocacy participation in the VBC.*

We define loyalty according to Oliver (1999) to consist of attitudinal and behavioural aspects. Attitudinal loyalty refers to a customer's overall commitment to the brand and behavioural aspect to a customer's commitment to repeat purchases of the brand over time (e.g. Dick & Basu, 1994). Chaudhuri and Holbrook (2001) define behavioral loyalty as purchase loyalty, referring to a consumer's intention to repurchase the brand. Attitudinal loyalty refers to a consumer's commitment towards the brand. Oliver (1999)

suggests that attitudinal loyalty may convert into behavioral loyalty as a result of repeated positive experiences with the brand. A number of studies suggest a positive correlation between satisfaction and loyalty (e.g. Casalo et al., 2010). Likewise, studies conducted in the online environment in general, and virtual communities in particular support the correspondence (Song & Zinkhan, 2008). Thus, we put forward the following hypotheses:

H5: VBC members' satisfaction to the brand positively affects attitudinal and behavioural loyalty.

H6: Attitudinal loyalty is positively associated with behavioural loyalty.

Previous research shows that the consumers' loyalty formation is affected by their differing brand communities' participation practices and participation intensities. In particular, the participation intensity has been found to influence loyalty (Shang et al., 2006; Royo-Vela & Casamassima, 2011). Prior research shows that customers engage more often in noninteractive behaviour like lurking other members' comments in VBC than active participation in VBC discussions. Shang et al. (2006) suggest that noninteractive behavior increases customer loyalty even more than active participation. However, according to Algesheimer et al. (2005) active participation in content creation generates positive associations and strong relationship towards the brand, and is the main source of a vibrant and independently active brand community. In addition, Gummerus et al. (2012) posit that in VBC context, consumers differ significantly from each other in terms of their tie strengths towards the brand and other individuals, which is reflected into their VBC behaviour. Thus the final hypothesis is set:

H7: VBC participation intensity strengthens the paths in the conceptual model.

3. Research methodology

This research tests a conceptual model shown in figure 1, which examines the antecedents and consequences of consumers' participation in VBCs. The empirical data were collected through an online questionnaire survey in 2012. The link to the survey was placed on the case company's Facebook brand site. At the time of data collection, the Facebook site had 13.000 "likers".

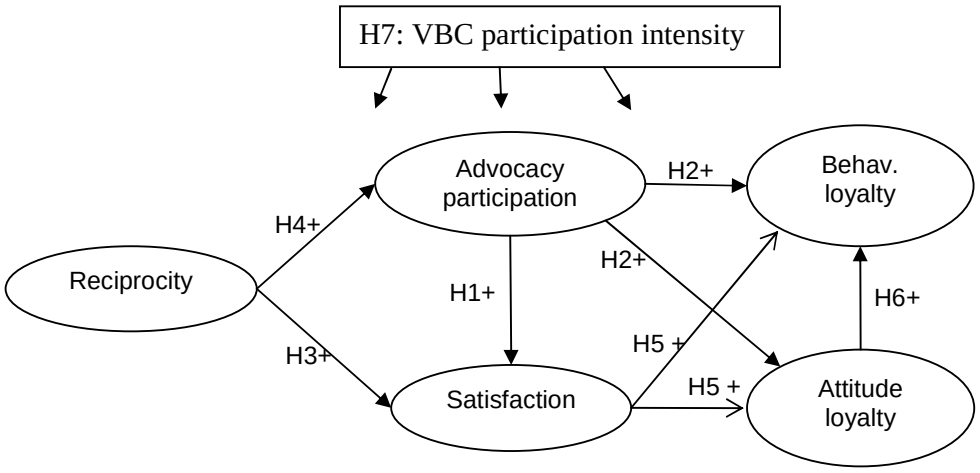


Figure 1: Conceptual model

The most of the respondents are members of the case company's virtual brand community. Table 1 displays the profiles of the respondents, clustered into "passive" and "active" segments. A two-step cluster analysis method was applied to identify the clusters, which describes how the respondents differ in their demographics and brand community participation. A dummy variable was formed to analyse how a consumer's belonging to either passive or active cluster moderates the paths in the conceptual model. The clusters differ from each other most significantly in terms of community posting intensity.

Variable (predict import.) N 478	**Passive** 60.5 % (289)	**Active** 39.5 % (189)
Posting (1)	No (93.8%)	Yes (89.9%)
Advocacy participation (0.43)	Mean 1.36	Mean 2.24
Visiting (0.34)	Rarely (54 %)	Often / rather often (93.1%)
Attitudinal loyalty (0.24)	Mean 2.94	Mean 3.69
Reciprocity and personality (0.21)	Mean 3.11	Mean 3.57
Age (0.17)	Under 35 (52.2%)	45 or higher (48.1%)
Behavioral loyalty (0.15)	Mean 3.76	Mean 4.22
Education (0.06)	Polytechnic (36%)	Vocational (23.3%)
Satisfaction (0.03)	Mean 4.54	Mean 4.67
Annual income	30.000 – 49.999€/v (34.6%)	30.000 – 49.999€/v (38.6%)

Table 1: The description of data.

The most items were on 5-point Likert scale (1=completely disagree…5=completely agree). Two items measured the members' degree of posting and visiting activity with 5-point scale (1=never, 2=once a month, 3=few times a month, 4=weekly, and 5= daily; Royo-Vela et al., 2010). The respondents' advocacy participation was measured with a scale constructed by van Dyne et al. (1994) and Koh and Kim (2004). Reciprocity and personality was studied with the scales of Wu (2005) and Liu et al. (2003). Satisfaction was studied with the scale of Janda et al. (2002). Attitudinal and behavioural loyalty was measured with the scales of Shang et al. (2006).

4. Empirical findings

The original research instrument consisted of 30 items. The items were designed to measure seven constructs. An EFA was applied for the pre-analysis and scale reduction. Instead of the original seven-factor model, a model with five factors was produced (see table 2): behavioral loyalty, attitudinal loyalty, satisfaction, reciprocity and personality, and advocacy participation. Reciprocity and personality are the measures of interactivity, which were separate scales in the original scale. In the final measurement model, the personality and reciprocity factors were merged as one. The validity of the measurement model and unidimensionality of the constructed scales were tested with CFA. Cronbach's alphas ranged from 0.83 to 0.95, demonstrating good reliability. The AVEs of the factor constructs, presented in table 2, range between 0.516 and 0.737. The component loadings of each item also varied between 0.539 and 0.929, the items were found to converge on their assigned factors. The correlations between the constructs were below the square roots of the AVEs, thus, the factor constructs are distinctive and suggest acceptable discriminant validity.

	Factor constructs and items	**Loading**
Behav. Loyalty (α 0.837)	I feel important to buy Pentik's products instead of other brands.	0.791
	I will actively look for the products that I need from Pentik.	0.753
	I always use Pentik's products.	0.734
	I am going to buy Pentik's products.	0.730
Att.Loyalty (α 0.925)	I am more interested in Pentik than the other brands.	0.931
	I feel more attached to Pentik than the other brands.	0.927
	I pay more attention to Pentik products than the other brands.	0.900
	I find myself consistently buying Pentik products over the other brands.	0.756
	I always think of Pentik's products when intending to buy decoration products.	0.742
	If Pentik products were not available at a store, I would rather not buy at all...	0.705
Satisf (α 0.932)	My overall evaluation of Pentik is very good.	0.875
	Overall, I am satisfied with the decision to use Pentik products.	0.872
	I think I did the right thing when I decided to buy Pentik products.	0.871
	My choice to buy Pentik products was a wise one.	0.864
	Based on all of my experience with Pentik, I feel very satisfied.	0.801
Recip & Person (α 0.833)	The Pentik's Facebook site understands my information needs.	0.840
	When clicking the links on the FB site it feels like the site responds to me.	0.802
	…like a personal conversation with a friendly and knowledgeable…	0.749
	I easily find information that I need.	0.615
	Finding information that I need from the Pentik's FB site is very fast.	0.540
Advoc. Particip (α 0.891)	…provide to other members…valuable information.	0.928
	I usually participate in the Pentik's FB site to evoke discussions.	0.827
	I usually write and respond to others' discussion with great excitement.	0.815

Correlations, AVEs, and square roots of the AVEs (in bold)

	Mean	Std.	CR	AVE	1	2	3	4	5
1. Satisf	1.71	0.85	0.933	0.735	**0.857**				
2. AdvPartic	3.29	0.67	0.893	0.736	0.077	**0.858**			
3. BehLoyal	3.94	0.45	0.837	0.563	0.749	0.253	**0.750**		
4. AttLoyal	3.30	0.94	0.930	0.693	0.399	0.256	0.746	**0.832**	
5. RecipPerson	4.59	0.52	0.839	0.516	0.418	0.394	0.450	0.342	**0.718**

Table 2: Testing the measurement model by CFA, correlations, and AVEs

The structural model was tested with AMOS 18. The main results of SEM are summarized in table 3. Several goodness-of-fit indices were simultaneously examined to evaluate overall model fit. The present model was assessed to indicate a good fit, despite the high chi-square: $\chi^2(220) = 512.26$; IFI = .961; TLI = .955; RFI = .923; RMSEA = .053 (Jöreskog & Sörbom, 1993). RMSEA 0.06 indicates a reasonable fit to the model (Browne & Cudeck, 1993). Table 3 also displays the results of the direct effect model. In addition to direct effects we have tested indirect effects of advocacy participation on attitudinal and behavioural loyalty through brand satisfaction. In addition, indirect effect of brand satisfaction on behavioural loyalty through attitudinal loyalty was also examined. The mediation analysis was conducted by the bias-corrected bootsraping method. The moderation effect of participation intensity is also reported in the table.

The direct effect model supports the hypothesized relationships on most parts. A VBC's ability to provide personal and reciprocal use experience is found to be a strong driver of the members' brand satisfaction (β 0.42) and their advocacy participation (β 0.43). Contrary to our hypothesis, advocacy participation is negatively associated with brand satisfaction (β -0.11). Advocacy participation affects directly (β 0.23) attitudinal loyalty. The effect was also found to be partially mediated through brand satisfaction with β -0.04, total effect of being β 0.19. Participation was found to have a direct effect (β 0.08) but no mediation effect on behavioural loyalty through satisfaction. The results further show that the community members' overall brand satisfaction contributes directly to attitudinal loyalty (β 0.54) and behavioral loyalty (β 0.08). The effect of brand satisfaction on behavioural loyalty is partially mediated through attitudinal loyalty (β 0.19) with total effect β 0.74.

Direct effect model	**β**	**CR**	**R^2**	**Moderation effect of VBC intensity**
Reci&Person → Satisf	.466	8.42***		.053
Reci&Person → Particip	.397	7.71***	.16	.262*
Particip → Satisf	-.109	-2.12*	.19	-.049
Satis → AttidLoyal	.384	7.97***		.060
Particip → AttidLoyal	.231	5.00***	.21	-.015
Particip → BehavLoyal	.082	2.52*		-.081
Satis → BehavLoyal	.542	13.52***		.145*
AttidLoyal → BehavLoyal	.506	11.24***	.81	-.129*
	Indireffect	**Total effect**		
Particip → Satisf→ AttidLoyal	-.042*	.189***		Partial mediation
Particip → Satisf→ BehavLoyal	.037	.119*		No mediation
Satisf→ AttidLoyal → BehavLoyal	.194***	.736***		Partial mediation
Model fit: $\chi^2(220) = 599.16$; IFI = .952; TLI = .945; RFI = .916; RMSEA = .060				
Moderation effect of participant segment (χ^2 difference test on model-level differences): unconstrained model $\chi^2(440)$ 861.43 vs. constrained $\chi^2(466)$ 914.49, χ^2 difference: 53.06***				

Table 3: The results of direct effect model and moderation effects.

Note: difference significant *** at the 0.001 level, ** at the 0.01 level, * at the 0.05 level.

The moderation effect of the member activity intensity was analyzed by examining how overall community participation intensity affects the paths in the direct effect model. The VBC members' participation intensity was found to have a significant effect on the model level (χ^2 difference 53.06). Further analyses show that participation intensity

moderates three paths: ReciPerson-AdvocParticip, Satis-BehavLoyal, and AttidLoyal-BehavLoyal. The respondents' higher overall participation intensity strengthens the relationship of ReciPerson on advocacy participation (β 0.26) and satisfaction on behavioural loyalty (β 0.15). However, the effect on the link between attitudinal loyalty and behavioural loyalty was weakened by the community activity (β -0.13). That is, attitudinal loyalty is less strongly converted into behavioural loyalty when the VBC members' participation intensity increases.

5. Discussion

The objective of this study was to examine the construct of advocacy participation in the case of a virtual brand community (VBC) and its influence on the formation of satisfaction, attitudinal, and behavioural loyalty towards the brand. The results show that active participation in VBCs' content creation activities positively contributes to brand loyalty. The direct effect model shows that the community members' higher participation in the community's information exchange fosters their attitudinal and behavioural loyalty towards the brand, thus supporting hypothesis two. However, a negative relationship was discovered between participation and satisfaction, thus, hypothesis 1 was rejected. This suggests that as VBCs act as channels of customer support and exchange platforms for use experiences, the active members of VBCs are thus also influenced by other members' negative experiences of the brand, lowering their satisfaction to the brand. In line with hypotheses three and four, a VBC's ability to provide reciprocal and personal user experience was discovered to significantly affect the community members' engagement in advocacy activities with the community and also increase their brand satisfaction. Support was also found for hypotheses five and six as the analyses showed the VBC members' brand satisfaction to positively affect their attitudinal and behavioural brand loyalty, and that, attitudinal type of loyalty precedes the behavioural type. The final hypothesis anticipated VBC participation intensity to strengthen the paths in the model. The effect of overall participation intensity in the VBC was studied through moderation analysis. The results showed partial support for the hypothesis. The VBC members' posting frequency was found to especially affect the conceptual model. The analyses suggest that higher participation frequency increases the direct effects of satisfaction on behavioral loyalty and interactivity on advocacy participation. However, higher participation frequency seems to weaken the link between attitudinal and behavioral loyalty. That is, among less active members behavioural loyalty is more commonly formed through attitudinal loyalty, whereas among active users behavioral loyalty is influenced directly by satisfaction. Thus, brand owners are advised to identify advocacy participation and reward such behavior to strengthen the effectiveness of virtual brand communities.

6. Conclusions

As shown above, the results of hypothesis testing mostly support prior findings. The findings of this study are in line with Royo-Vela and Casamassima (2011) that satisfaction positively affects loyalty, but not the positive relationship with participation (Shang et al. 2006; Royo-Vela & Casamassima, 2011). We further found new evidence of the effects of advocacy type of participation, which has not been examined previously in the VBC context. Our results also support that interactivity of VBC

positively affects the members' brand satisfaction (Song & Zinkhan, 2008) and advocacy participation (Anderson 1994). The findings also are congruent with the prior studies that suggest satisfaction to have positive effect on attitudinal loyalty and that attitudinal loyalty precedes behavioral loyalty (Oliver, 1999; Casalo et al., 2010). However, we show that the route to behavioral loyalty differs between consumers depending on their participation on the VBC. Thus, this study supports the suggestion that consumers buying behavior differ significantly from each other based on their degree of VBC participation (Gummerus et al., 2012).

For managers this study provides evidence of how the VBC members' active engagement in content creation activities strengthens their brand loyalty. The results suggest that advocacy type of participation positively affects the community members' attachment to the brand and also increase their repurchase intensions of the brand (though with lesser degree). The participation negatively affects brand satisfaction as the active members of the VBC' are under the influence of other members' negative experiences of the brand's products. This highlights the need for the company to actively provide support and take part in the discussions where the brand-related problems and negative experiences are tackled. This shows the community members that the company is concerned of the members' problems with the products and actively developing products based on the customer feedback. This study also highlights that companies should invest in careful planning of VBC infrastructures to be able to provide interactive and personal use experiences, which strongly contributes to the members' propensity to take actively part in content creation activities and to brand satisfaction, therefore, effectively acting as the means of relationship building platform.

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Customersourcing: *to Pay or be Paid*

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Abstract

Customersourcing is a newly coined term representing the on-line version of an older practice, and a defining a sub-category of the now popular Crowdsourcing practice. This article starts with a brief overview of Crowdsourcing and its various sub-categories such as Crowdfunding, and Crowdvoting. Further, the conceptual development of the Customersourcing Model is discussed in which a 'community of customers' become the 'suppliers' from which a business draws resources such as input to their value chain activities. Finally, a financial framework for categorizing a spectrum of financial models is developed for Customersourcing, including appropriate examples.

Keywords: Customersourcing, Crowdsourcing, Supply Chain, Value Chain

1 Introduction

Crowdsourcing leapt into the on-line and business vocabulary in 2006 when it was first coined as a new term in the landmark article, "*The Rise of Crowdsourcing*" (Howe, 2006). The original article did not provide an explicit definition, allowing other authors to propose a variety of definitions. Paying homage to the initiator, the authors choose to follow the definition later proposed by Howe:

> "Crowdsourcing is the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call." (Howe, 2008)

The Crowdsourcing concept is rather old, having been used as early as the 1700's with the Alkali Prize, and the 1800's by the Oxford English Dictionary. Each of which

called on the general public for contributions as a means of solving a business problem (Brabham, 2013). However, it was not until the rise of the Internet, and especially the dynamically enabling Web 2.0, that the concept became a growing and significant factor in business and society (Tredinnick, 2006; DeVun, 2009; Chaordix, 2014).

There are two important factors in Crowdsourcing; first, the capabilities which the Internet provides in reaching and communicating with people - the crowd. Second, the rising public awareness of Crowdsourcing as an effective and efficient business tool (Horton & Chilton, 2010). This has given rise to a myriad of sub-categories of Crowdsourcing. As a brief overview, some common examples of subcategories include:

- CrowdFunding: the process of raising funds for projects by asking a multitude of people each to contribute a small amount; in order to attain a certain monetary goal (Prive, 2012).
- Cloud Labor (aka: Microwork and Macrowork): Leveraging of a distributed virtual labor pool, available on-demand to fulfil a range of tasks from simple to complex. Users complete tasks which can be completed independently, and require a fixed amount of time. Work is compensated based on the size of the task and the skills required to complete it. Participants are paid in exchange for their work (Howe, 2006; Yang & Ackerman 2008; Crowdsourcing.org, 2014).
- Crowdvoting: where a website gathers a large group's opinions and judgment on a certain topic (Brabham, 2008; Robson, 2012).
- Crowdsearching: a version of crowdsourcing through geographic location anchoring, which builds a virtual search party of smartphone and internet users to find lost items (such as a pet or person), and return found items (Lombard, 2013).
- Implicit Crowdsourcing (aka: Piggyback Crowdsourcing): users do not necessarily know they are contributing, yet can still be very effective in completing certain tasks. Users do another task entirely, while a third party gains information for a different purpose, based on the user's actions (Brabham, 2008; Kittur, Chi & Sun, 2008).
- Customersourcing: wherein a community of customers contributes to a firm by performing its value chain activities and/or acting as its supplier (Crane & Kitchens, 2013).

This concept article focuses specifically on Customersourcing, as described by Crane & Kitchens (2013), and investigates the spectrum of financial costs and/or rewards to the customers associated with the business' use of customers in their role as contributors to the value chain activities.

2 Development of Customersourcing

Crowdsourcing existed as an acknowledged business activity prior to Howe putting a name to the activity in 2006. Similarly, Customersourcing started to emerge as a sub-category of Crowdsourcing prior to Crane & Kitchens putting a name to the activity in 2013. By way of developing the concept, the traditional value chain and supply chain

models should be reviewed, with modern modifications discussed as they apply to Internet and electronic business functions; because e-commerce has caused some significant changes to the way traditional business is handled (Laudon, 2012).

2.1 Supply Chain Model

In the traditional supply chain model, the Supplier and the Customer are at opposite ends of the chain, separated by the Firm, Distributor, and Retailer, as depicted in *Figure 1: Traditional Supply Chain Model* (Kathawaia, 2003).

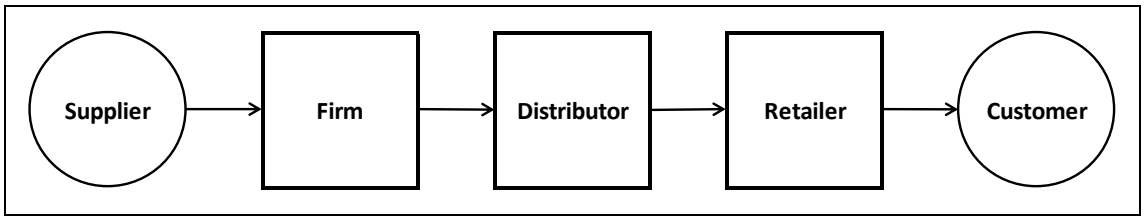


Figure 1: Traditional Supply Chain Model

2.2 Value Chain Model

From the Supply Chain model, specifically within the "Firm," the traditional value chain activities are conducted as described by Porter (1985), as depicted in *Figure 2: Traditional Value Chan Activities*.

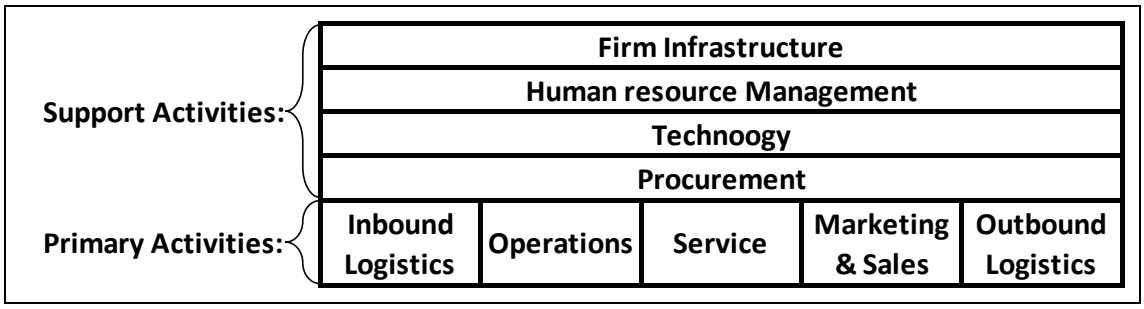


Figure 2: Traditional Value Chain Activities

In an on-line environment, all of the value chain and supply chain functions continue to exist, although the lines of distinction often become blurred. This is particularly true in the case of pureplay e-commerce situations, where all functions are conducted in an electronic environment. In addition, almost any business function in the supply chain and value-chain has the potential to be sub-contracted to a third party. In this case, the conceptual merging of the value chain and supply chain models forms one large, complex entity; as depicted in *Figure 3: Merging of Value Chain and Supply Chain*.

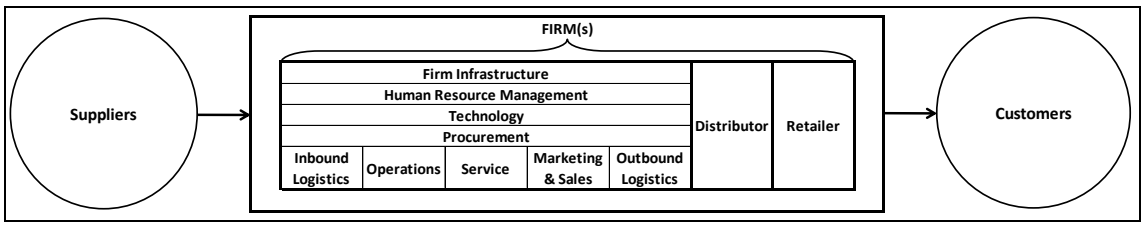


Figure 3: Merging of Value Chain and Supply Chain

2.3 Customersourcing Model

It is important to recognize that some of the value chain and supply chain functions may be outsourced, and acknowledge that such outsourcing could be offered to a firm's very own customers. As such, a new model arises – visually simplistic, yet conceptually quite complex. The complexity comes from the merging the value chain and supply chain models, then merging the suppliers and customers into one blended entity (Crane & Kitchens, 2013). The Customersourcing model depicts the Firm as one box (and all of its related value chain and supply chain functions), providing goods and services to its customers. The customers, represented as two overlapping circles, are in turn providing the firm with goods (including data) and potentially services (including value chain functions). The Customersourcing model is depicted in *Figure 4: Customersourcing Model*.

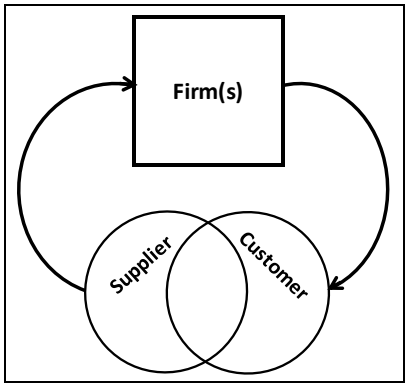


Figure 4: Customersourcing Model

3 Costs and Benefits

In business, when participants (the crowd) provide goods or services, it is generally expected that there is an exchange of some type in reciprocity for the participants' time and effort. Customarily, in a business environment, this is generally a financial exchange for goods and services. Further, the contributors of goods and services are usually receiving the financial portion of the exchange. However, in Crowdsourcing, and by extension Customersourcing, this is not always the case. Indeed, there may be three financial conditions:

- Net income: The participants realize a financial profit by their participation
- Break-even: The participants realize neither financial improvement nor financial cost through their participation
- Net outflow: The participants ultimately contribute financially as a result of their participation

As depicted in *Figure 5: Range of Financial Exchanges*, These conditions exist for Crowdsourcing as well as its sub-category, Customersourcing.

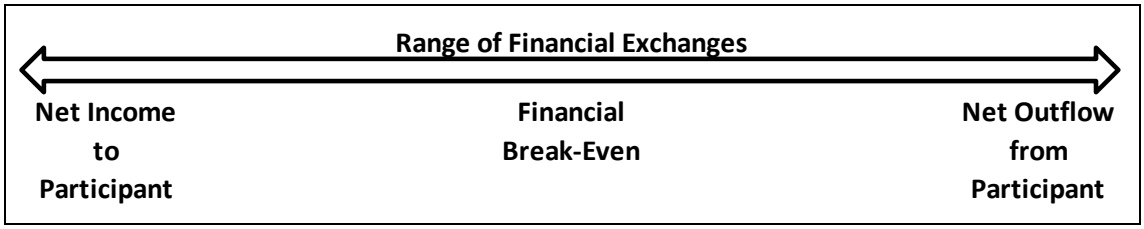


Figure 5: Range of Financial Exchanges

3.1 Crowdsourcing's Financial Exchange

Unlike traditional employment, Crowdsourcing does not necessarily require financial compensation in exchange for the services provided by the so-called 'crowd,' or participants. As a broad over-arching category of on-line exchanges, Crowdsourcing has a multitude of examples in which a community of disparate participants, working individually, for the benefit of a common goal – with net income, break-even, and net outflow situations abounding.

3.1.1 Crowdsourcing with Net Income to Participants

Communities of crowd-participants are often able to profit financially by participating in Crowdsourcing opportunities. In particular, Microwork and Macrowork are previously described sub-categories of Crowdsourcing in which participants may profit for their efforts (Howe, 2006). For example, Amazon's so-called "Mechanical Turk" provides an environment allowing users to contribute time and effort to help Amazon complete small tasks. Typically, these are tasks which are difficult to automate, yet not worth hiring a full time employee to complete. They need to be completed none the less (Doan & Halevy 2011; Howe, 2006).

3.1.2 Crowdsourcing with Break-Even Proposition for Participants

Participants may actually be interacting with a community of volunteers on a not-for-profit bases, such as the previously mentioned Crowdsearching subcategory (Lombard, 2013). In this case, a "search community" may be set up on a 'free' site such as FaceBook. There may be no profit motive at all (aside from an occasional and voluntary "Reward if Found"). The benefit to the participating 'searchers' may be entirely intrinsic – to be the hero-of-the-day, for a complete stranger.

3.1.3 Crowdsourcing with Net Outflow from Participants

The most extreme case of a net outflow from participants is Crowdfunding. In these cases, participants take the time to review start-up business concepts, and decide whether they would like to offer a portion of the venture capital required to get the business started (Prive, 2012). While any amount may be contributed, the typical scenario involves a large number of participants, each offering a small investment. In many cases, but not all, investors are offered a good or service in exchange for their investment. Typically, the offering participants receive is worth significantly less than the funding they are providing – which only makes sense given the goal, to raise capital.

3.2 Customersourcing's Financial Exchange

Crowdsourcing has entire sub-categories representing the financial net income, break-even, and outflows associated with individual participation. Customersourcing, as a sub-category of Crowdsourcing, has specific organizations practicing each of these financial states.

3.2.1 Customersourcing with Net Income to Participants

A company founded in 2000 in Chicago, called Threadless, is an example of a situation where Customersourcing results in a net inflow of profit to the participating customers. Threadless sells t-shirts. The designs on the t-shirts are created and submitted through the on-line community of users, hoping that their design will be selected for production. For those whose design is selected, Threadless pays $2,000 cash, plus $500 in Threadless gift certificates – thus ensuring that in case the participant was not already a customer, they soon will be (Brabham, 2013; Howe, 2008). While not every design is selected, financially there is a calculable *expected rate of return*.

3.2.2 Customersourcing with Break-Even Proposition to Participants

In some cases, customers join a community of participants with absolutely no expectation of financial gain, and no fear of financial loss. From a purely financial perspective, their behavior may appear to be a complete waste of time. For example, customers who voluntarily leave customer feedback and reviews after purchasing products on web sites such as Amazon.com. In these cases, a few days after a purchase is made, the customer receives an email from Amazon, asking for a review of the product. The reviews are posted on Amazon for other potential buyers to review before making their own purchase. While this behavior is much appreciated by others, it serves no financial gain or loss on the part of the customer providing the review. It is therefore a break-even proposition, from a purely financial perspective.

3.2.3 Customersourcing with Net Outflow from Participants

As opposed to Threadless, where customers are actually paid in exchange for their design-services; there are situations where the customer not only provides a resource to the company, but also pays the company; in exchange, they may receive some service from the organization. For example, on-line dating services such as eHarmony will both collect their raw material from customers, and charge them for access to other customers' data. Participants are often required to set up an account and contribute their own personal data as a condition of membership in the community. Then, they are required to pay a fee before they can receive any product or service – in this case, they are seeking personal information about other customers.

Understanding the financial exchange is vital to a complete understanding of Customersourcing. The exchange of money for goods and services is the basis of e-commerce. It is the financial basis of every business plan. Many on-line businesses have gone out of business due to a lack of complete business plan, including sound financial planning.

This analysis of net income, break-even, and net outflow demonstrates the full range of financial exchange situations available under Crowdsourcing and its subcategory,

Customersourcing; as depicted in *Figure 6: Range of Financial Models for Crowdsourcing and Customersourcing*.

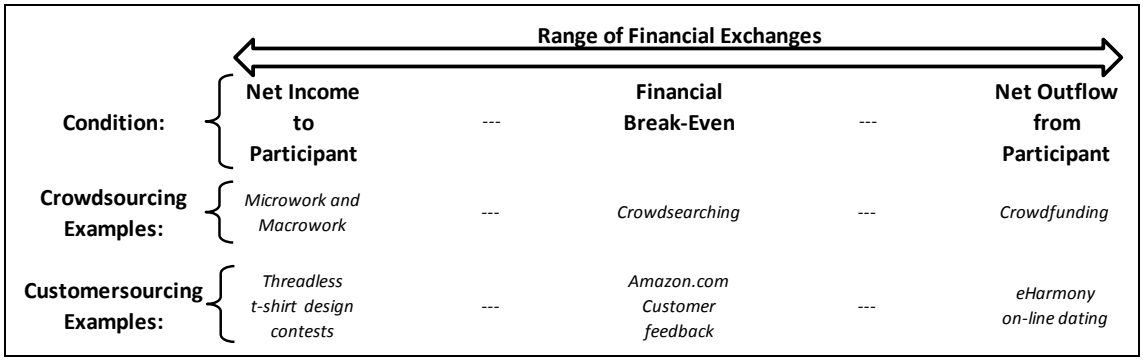


Figure 6: Range of Financial Models for Crowdsourcing and Customersourcing

3.3 Customersourcing's Financial Proposition for the Customer

The unfortunate condition for the customer/participant is that the financial proposition is generally rather bleak. In all three conditions, the customer may be considered the victim when viewed from a purely financial perspective.

3.3.1 Net Financial Income

Studies have shown that the average net financial gain for profit-seeking customers and participants is rather low. One study found that the overall median wage for paid crowdsourcing projects is only USD $1.38 per hour (Horton & Chilton, 2010). This is far less than the current minimum wage standards in the United States.

3.3.2 Financial Break Even

In the case of break-even prospects, the customer/participant contributes time and effort, with no expectation of financial return. From a purely financial perspective this situation would be considered a waste of time. Fortunately, it appears that these participants find intrinsic value in their activities.

3.3.3 Net Financial Outflow

In the case of Crowdsourcing situations where there is a net financial outflow, such as Crowdfunding, there is quite often an exchange of product or service. For example, the participant might be promised a limited edition first-run product, or a signed edition, or the original prototype product. However, the purpose of Crowdfunding is to raise capital to launch a new business. Thus, in all but a very a few situations, any product or service offered in exchange is likely to be far over-priced – if anything is offered at all.

In the case of Customersourcing, such as eHarmony and other on-line dating sites for example, many of these services can be obtained elsewhere at reduced cost (people have been meeting other people without the assistance of the Internet for many thousands of years). One of the benefits they are receiving is simply convenience. From a purely financial standpoint, the net financial outflow is generally a losing proposition for the customer. Yet, for convenience, they are willing to pay.

4 Conclusions

Fortunately, the basic economic principles of supply and demand, along with basic human desire for convenience and intrinsic rewards, are all alive and strong. Many of the examples presented here in the context of Crowdsourcing and its subcategory, Customersourcing, already existed as proven techniques *before* these terms were coined in 2006 and 2013 respectively. Indeed, it was necessary for these practices to be tested and proven, and to become popularized in order for these terms to become necessary in the categorization of business processes.

Future research should address the intrinsic rewards received by customers and participants. Based on the losing financial propositions, intrinsic rewards are clearly an important component in Crowdsourcing and Customersourcing. Empirical research should be conducted to quantify and document the current status and condition.

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How Complaint Handling Procedures Influence Consumer Decisions to Shop Online?

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Abstract
When online shopping increases, the number of risks and complaints associated with online transactions will also rise. The importance of maintaining and improving Business-To-Consumer (B2C) e-business competitiveness by adequately addressing consumers' complaints has been acknowledged. Yet the issue of how the complaint handling procedures are used to influence consumers' decisions to shop online has yet to be adequately understood. This study focuses on the influence of complaint handling procedures on consumers' decisions to shop online from both the online consumer and merchant perspectives. The authors found that complaint handling procedures have more impact on consumer confidence and trust and therefore affect their decision to shop online, especially when accessible and responsive complaint handling procedures are required.

Keywords: B2C, consumer complaint, e-business, online, purchasing, shopping.

1 Introduction

This paper presents a study of the influence of complaint handling procedures on the decisions of consumers to shop online. The study focuses specifically on online consumers and merchants located in Melbourne, Australia, and on the influence of merchants' complaint handling procedures on consumer decisions to shop online.

According to the National Australia Bank online retail sales index, in the twelve months to June 2013, Australian online retail spending totalled AUD$13.9 billion (NAB, 2013). With the growth of online shopping, it is important to understand what influences a consumer's decision to purchase from an online merchant or to shop on a website that is not within their physical reach. However, as e-business activities increase, the number of complaints related to online transactions also rises. The Australian Competition and Consumer Commission (ACCC) has identified that online shopping contributed the second-highest number of complaints. In 2012 ACCC received 8275 complaints about online shopping, up from 5012 in 2011 (ACCC, 2012). In 2012, the Federal Trade Commission reported there were 22,572 consumer complaints reported from ten

countries between January 1 and December 31. Australia was the second highest after the United States.

In truth, consumer complaints constitute valuable feedback in that they provide opportunities for merchants to understand and to rectify issues occurring in online shopping (Luo, 2007). However, in B2C online shopping, it does not adequately address the issue of how the role of complaint handling procedures is used to influence consumers' decisions to shop online. This issue represents a gap in the literature. The objective of this current research is to address the identified gap by providing a theory-based understanding about the role of complaint handling procedures from both the online consumer and merchant perspectives.

2 Consumer Complaint

Bearden and Teel (1983) suggest that consumer complaints are actions resulting from the emotions of dissatisfaction. Owing to monetary costs, frustration, anxiety and tension, consumers begin to withdraw from the transactions (Oliver, 2010). A complaining consumer usually feels that he or she has been harmed and cheated by the merchant through defective or otherwise unsatisfactory products purchase or poor services. This encourages the consumer to expect restitution will be offered for the damage caused and unsatisfactory experience. Just as a consumer who feels dissatisfied with the shopping transaction, is likely to complain and will expect to receive a refund or replacement for a new product from the merchant (Goodwin & Ross, 1989).

Hughes and Karapetrovic (2006) show in their research of ISO 10002: 2004 that complaints handling procedures need to look beyond the problems that occur instead of merely addressing individual complaints and compensating consumers. Since it has never been easy to retain ongoing consumer relationships in the online environment, satisfaction with the merchant complaint handling procedures was therefore more vital in online shopping than offline (Shankar et al., 2003). Xu and Yuan (2009) assert that those consumers' complaint handling procedures and expectations need to be fair and responsive. This is because consumers show higher levels of post-complaint satisfaction than those who perceive the response was sluggish and unfair (Patterson et al., 2006).

3 Complaint Handling Procedures

3.1 Complaint Responsiveness

Complaint responsiveness is the merchant's willingness to address a transaction failure in a timely manner, to provide a complaint handling mechanism and compensation (Tax et al., 1998). This takes into account the efforts of the merchant to ensure that there is no breakdown in customer service, when it comes to responding to consumer concerns and complaints. Furthermore, merchant commitment to consumers is demonstrated by promptly resolving and dealing with complaints in a way that is fully satisfactory to the consumer (Anderson & Swaminathan, 2011; Davidow, 2003). This commitment refers to the strength of the ongoing relationships with the consumers.

Hong and Lee (2005) argue that if responsiveness to complaint appears to be effective and genuine, consumers are more satisfied than they would have been if no complaint had occurred at all. The study conducted by Bitner and Bernard (1990) shows that it is

not necessarily transaction failures that cause dissatisfaction because consumers accept that sometimes problems occur that are not within the merchant's control. However, it is the merchant's responsiveness to respond promptly to complaints and to effectively compensate for the problems caused. As underscored by Poleretzky, Cohn and Gimnicher, "In the physical world, if I make a customer unhappy, they'll tell five friends, on the Internet they'll tell 5,000" (1999, p. 76). Complaints are now publicly shared on social network sites, (anti)brand communities, review sites and (micro) blogs. The opportunity for consumers to voice their complaints to a broader public poses new challenges for merchants (Hennig-Thurau et al., 2010). Due to the rise of web 2.0, complaining has changed from a private phenomenon into a public phenomenon (Ward & Ostrom, 2006). Before the era of participatory media, complaints were expressed in one-to-one communication which gave merchants some level of control in terms of recovery strategies. This has changed now as complaints are diffused over the Internet (Van Noort & Willemsen, 2012). This would suggest the importance of getting back to the complaints as fast as possible.

3.2 Effective Complaint Handling

An effective complaint handling procedure means that consumers' expectations have been met or exceeded. This will demonstrate to the consumer that the merchant not only cares about the consumer but will take all necessary steps to meet the consumer's expectations (Black & Kelley, 2009).

Effective complaint handling not only improves consumer confidence, but it also helps to build a long-term relationship in B2C e-business (Stauss & Seidel, 2004; Tang, 2007). Huppertz (2003; 2007) asserts that resolving problems effectively is likely to influence consumers to make repeat purchases from those merchants. Magnini et al., (2007) also claim this offers an opportunity to convince consumers that the merchants' efforts are genuine. Effective complaint handling is continuing to receive increased attention, in part owing to rising consumer expectations and competitive marketplace responses. Merchants compete in changing market conditions and need to understand the way in which consumers react to transaction failure and how they respond to different approaches of complaint handling (Siddiqui & Tripathi, 2010). Knowledge of consumer expectations during complaint handling thus holds important implications for the merchants. Because merchants not only need to know whether they meet, exceed or fall short of consumer expectations, they also need to know which elements of the complaint handling procedure consumers evaluate (Gruber, 2011; Stauss, 2002).

Moreover, the Internet enables consumers to express their problems easily with a product or a service purchased. When merchants actively listen, provide explanation and note down the problems, these perceptions of complaint efficacy convince consumers that voicing complaints will solve the problems and improve their sense of confidence in online shopping (Susskind, 2005). Consequently, it is crucial that complaint handling procedures are forceful and effective, because research has shown that failed complaint handling actions have caused consumer-switching behaviour (Alvarez et al., 2010). In most industries consumers do not bother complaining (Gruber, 2011; Homburg & Fürst, 2007) and the absence of complaints is, therefore, not a true indication of effective complaint management. As consumer complaints are a valuable source of important market intelligence, merchants should incorporate these into their

business strategies (Priluck & Lala, 2009). Therefore, effective complaint handling requires thoughtful procedures for resolving problems and handling disgruntled consumers. This would go a long way in effectively handling consumer complaints, providing appropriate solutions, and ensuring customer satisfaction and confidence in online purchasing (Tripathi & Siddiqui, 2010).

3.3 Complaint Accessibility

Complaint procedures should be accessible to all complainants, regardless of circumstances. Accessibility involves consumer awareness of the procedure's existence and functioning as well as available options to lodge a complaint that is clearly explained to consumers. The supporting information should be easily accessible in a clear instruction (Volkéry et al., 2012; Ang & Buttle, 2012).

The concern of access to complaint procedure was discussed decades before the advent of e-business (Day & Landon, 1977). This study believes that complaint accessibility offers a perception of a merchant's commitment to solving problems and consumers are confident that their efforts are not likely to be wasted. Conversely, there are consumers who decide not to complain because they do not believe the complaint outcomes would sufficiently compensate the problems (Donoghue & Klerk, 2009) due to complicated complaints procedures (Xu & Yuan, 2009). For example, a consumer is uncertain on where/or how to communicate the complaint or, even worse, if a consumer doubts the merchants' interest in receiving the complaint (Schwartz, 2006). This is because merchants tend to personalize complaints, seeing them as personal attacks, so they prefer to avoid the issue or simply make it difficult to get a complaint resolved (Homburg & Fürst, 2007). Take the case of a consumer who made a purchase online and the product has not arrived after two weeks. Then the consumer is required to complete lengthy forms and then email to the customer service department, and told to look up a call centre number if the product does not arrive in seven working days. Is this complaint procedure unnecessarily complex (Prasongsukarn & Patterson, 2012)?

Online complaints commonly take place on public platforms (e.g. forums, company Facebook profiles, Twitter) which experience a constantly increasing participation of information-seeking consumers and hence present a far-reaching influence on merchant reputation (Tripp & Grégoire, 2011). For example, a United Airlines customer complaint went viral on YouTube (titled 'United Breaks Guitars') and was estimated to have cost the airline $180 million (Huffington Post, 2011). The fast real-time ripple effect of reputation damage raised urgent needs to address the challenges of consumer complaint handling procedure and implementation (Woodside & LaPlaca, 2014).

It is therefore very important that easy-to-use and non-confrontational methods of eliciting feedback are essential for a successful complaint handling procedure (Hansen et al., 2010). It should take account of the needs of different social groups and, even in an era of rapidly increasing online shopping, recognize that there are many people without the necessary skills required to complain online (Brewer, 2007). Merchants and consumers can agree with the importance of accessible complaint handling procedure in order to have a fair opportunity to exchange information, to present their views, to retain the option of representation, and to meet face-to-face, if possible (Ponte, 2001). Complaining is an inherent part that merchants cannot afford to overlook.

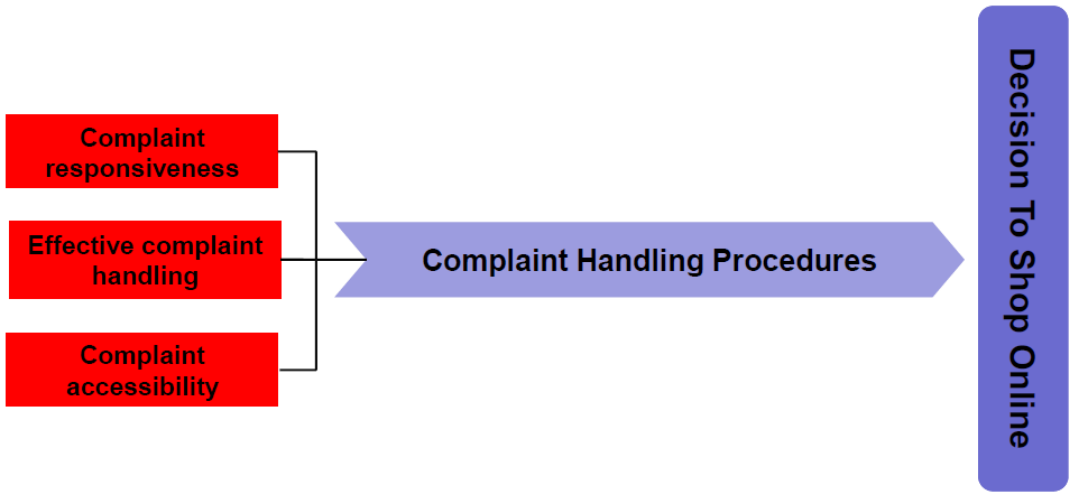


Figure 1: The Role of Complaint Handling Procedures in Influencing Consumer Decision to Shop Online

Figure 1 presents an overview of the role of complaint handling procedures based on existing research and how they influence consumers' decision to shop online. This model highlights the three key factors (complaint responsiveness, effective complaint handling and complaint accessibility) that are important in understanding the role of complaint handling procedures influencing online shopping decisions by consumers. This model forms the basis for data collection activities in this research and for generating the findings. It is important to note, however, that although all three procedural aspects are likely to influence consumers' decision to shop online. This model will be refined, altered and amended through the finding before it emerges as the representation of research outcomes.

4 Research Methodology

This study employs a research methodology based on an interpretive philosophical perspective (Klein & Myers 1999) to generate a descriptive understanding of how complaint handling procedures influence consumers' decisions to shop online.

Two types of data collection were utilised to facilitate in-depth understanding of the topic: individual face-to-face interviews were conducted between 7 October to 28 November 2008, followed by Focus Group discussions which were held from 7 and 15 November 2011, as a means of confirming the interview findings. Strauss and Corbin's (1998) grounded theory analysis was drawn upon to analyse the interview data. This method analyses interview data to derive themes that become evident through iterative textual interpretation. Transcript-based analysis was used to analyse the findings gathered from the Focus Groups to generate the primary source of data for analysis which is presumed to best capture reality (Krueger, 1998). Both methods of analysis were utilised to allow the interpretation to emerge from the study participants, and understanding of the research context to be inductively derived from the empirical data (Bowen, 2008). Consequently, the findings provide a rich and meaningful interpretation of ordinary events that create a convincing picture of the real situation in the study (Huberman & Miles, 2002).

Data collection was undertaken with two groups of participants: online consumers (Buyers) and online merchants (Businesses/Sellers). In this context, consumers are individuals who purchase products through the Internet (Weitz et al., 2001), while merchants sell goods and services directly to the end consumers via the Internet (Davis & Benamati, 2003). The participants were selected based on their ability to directly address the research goals during the discussions, their relevant experience in online shopping and their understanding of what online shopping involves. In this research, semi-structured interviews with open-ended questions were carried out with 15 online consumers and six online merchants, and two online consumer Focus Groups were conducted with six participants in each group. Interviews and Focus Group discussion typically lasted 45 to 60 minutes.

For the interview stage, consumer participants were selected from among postgraduate students enrolled in the College of Business, RMIT University, and were approached in person. Selection of the target sample of students was influenced by the work of Drennan et al., (2006), who claim that university students are more likely to be online shoppers. In selecting the sample of merchants, a list of potential participants was compiled from a number of Melbourne online shopping directories such as onlymelbourne.com.au and www.shopbot.com.au. For the Focus Group sessions, consumers who were invited to participate had to fulfil the eligibility criteria mentioned above before being selected for participation. Furthermore, determining how many subjects to interview or to involve in the Focus Group was based on the issue of data saturation – the researcher did not pursue further data collection at this point because no new or relevant data emerged, and all concept categories were well developed, with linkages between categories well established (Strauss & Corbin, 1998).

5 Research Findings

Analysis of the interview and Focus Groups led to identifying of the themes outlined below which characterise the participants' experience with and understanding of complaint procedures with reference to online shopping.

5.1 Consumer Interview: Accessible and Responsive Complaint Handling

Accessible and responsive complaint handling positively influenced consumer confidence and showed that they perceived trust in merchants from two perspectives. Firstly, a satisfactory outcome from having complaint procedures accessible and acting responsively on them was an opportunity to demonstrate the merchants' accountability in handling problems. Responsive actions showed that merchants did not just ignore the problems or deny their responsibility. Consumers interviewed did not consider that the risk factors would hinder their shopping confidence or stop their return to merchants. Instead they were concerned about receiving responsive complaint support in exchange for accepting that mistakes happened and minimum loss was involved. One of the consumers stated that:

> *If you have shown your attitude and responsiveness to fix this problem it doesn't only gain my trust and confidence, but this is a very trustworthy company. It makes mistakes but it can also improve them and do better and why couldn't I trust them and use their services more….*

Secondly, the interviewees noted that accessible complaint handling allowed them to voice their dissatisfaction and to gain immediate attention from merchants. These are part of the important procedures to reinstate confidence, they claimed. In particular, responsiveness in solving problems and answering complaints helped to demonstrate the effectiveness of the complaint procedures when implemented. Alternatively, an irresponsible action leaving the problems unattended was likely to worsen consumer confidence and to escalate their perceived risks. The findings corroborate the ideas of Donoghue and de Klerk (2009) and Kim et al (2009), who found that it is important that merchants address complaints without any delay. One of the consumers commented:

> *People make mistakes and you can't expect them to be 100% perfect. If they try to resolve the situation to my satisfaction I will give them a second chance….*

This study also shows that uncomplicated complaint procedures and policies that are acted upon is all that consumers want from the merchant. At least consumers will have less concern and frustration, for example, not knowing what, where or how to complain. With these practices, consumers perceived merchants were prepared to fulfil their promises. As a result, they were convinced that the merchants were trustworthy in assisting consumers, especially when problems occurred in transactions. Again, the findings of the current study are consistent with those of Donoghue and de Klerk (2009) who show that uncomplicated complaint services are important. The perceptions of complaint efficacy influence consumers to believe that the effort to voice complaints will reclaim their initial shopping confidence (Susskind, 2005).

As a result, there is a need to show what the existence of a complaint policy and set of procedures can accomplish, especially when consumers were seeking assurance and protection for their own purchase interest. Alternatively, consumers were likely to lose their online shopping confidence and their trust in merchants if the existing complaint procedures failed to fulfil its role as promised.

5.2 Merchant Interview: Accessible Recompense Practice

Accessible recompense practice was essential, for the merchants to demonstrate their accountability to communicate and to care for consumers in online shopping. This recognition of accountability gave the merchants, the opportunity to respond to problems occurring, to reclaim their trustworthiness and to reinstate consumer purchase confidence. Alternatively, if they failed to exercise this practice, problems occurred then the outcome was likely to cause distrust and unsatisfactory online shopping experience among consumers. The findings support the existing literature which argues that inaccessible and difficult complaint procedures will reflect on merchants as irresponsible and untrustworthy (Stauss & Seidel, 2004; Gregg & Scott, 2006). One of the merchants commented:

> *You definitely need those contact options and you need to respond promptly, or message service, whatever. Otherwise when someone calls up and they can't get through then…basically is like you were dealing with someone in the garage and that was not going to impress consumers.*

Merchants also believed that they should not impose any constraint on consumers when seeking compensation. It was important to show that merchants did not take the issue lightly because it could be the last resort to regain business trustworthiness. Therefore,

merchants must ensure that consumers have sufficient support, for example, to initiate a convenient and flexible complaint approach that allow consumer to communicate the problems or just to express their dissatisfaction. This is consistent with Svantesson and Clarke (2010) who found that merchants have the obligation to offer accessible contacts instead of trying to avoid their responsibilities by imposing ambiguous complaint policies and could therefore confuse consumers. One of the merchants noted:

> *I think it is as simple as having a channel through which the consumers can speak to you…you just have to give people the confidence that if they call or e mail there will be a response. It is for them to choose.*

A flexible complaint procedure and policy is, according to the merchants interviewed here, an advantage that allows them to respond to the problems and to pacify unhappy consumers immediately. It is essential to have this recompense practice accessible because a merchant cannot always anticipate what can happen in a transaction and when it will happen. Merchants believed that a flexible complaint procedure was a common practice expected by consumers. It is a win-win situation, they stated, because it allows merchants to prove their dependability and commitment and at the same time to enhance consumer confidence. Offering complicated and confusing complaint procedures was unlikely to benefit anyone in the transaction. These findings support existing research regarding complaint procedure, which claims merchants should focus on accessibility, flexibility and uncomplicated procedures (Pizzutti & Fernandes, 2010). The research also shows that complaint responsiveness helps to promote merchant responsibility and improves consumer satisfaction (Bloemer et al., 2008).

5.3 Focus Group Discussion: Accessible and Responsive Complaint Handling

The Focus Group discussion showed that consumers were unlikely to completely withdraw from the transaction when merchants demonstrated their responsiveness to address the problems through appropriate complaint procedures. Therefore, apologies from the merchants did not necessarily cause a negative image of their business, but may in fact help to mitigate damage caused to consumers' trust and purchasing confidence. On the other hand, merchants who failed to respond were likely to result in additional consumer dissatisfaction beyond the original complaint. One of the consumers noted:

> *That was this comic book merchant that I purchased the book from and they sent me the wrong one. I emailed them a notice and they sent me an extremely comical reply that also served to reassure me the correct one will be shipped at no cost and I can keep the wrong one. That made me feel very loyal to that vendor because I enjoyed both the humorous response and great responsibility because it's a very small company and that made me sure I will return to them for my future comic book needs.*

The Focus Group discussion showed that consumers did not trust the current complaint handling procedures and they did not feel confident about obtaining support from the merchants. Consequently, consumers showed little confidence in complaint outcomes that would sufficiently compensate their unsatisfactory shopping experiences. There was no benefit gained and it was impractical to waste unnecessary effort, time and cost, especially when it involved an inexpensive purchase. Several previous studies have

shown that consumers were inclined to complain when benefits rose and cost declined (Cho et al., 2002), when anticipated effort to complain was low (Huppertz, 2003). One of the consumers claimed:

> *It's just too hard sometimes because you don't have the time to deal with it. If you need to return the books you have to pack it and post it. Whether they pay for the postage or not it doesn't matter, but physically it is a lot to do.*

The Focus Group discussion also showed that frustrated consumers were impatient, they expected an immediate answer and compensation without delay from the merchants. It was found that, as long as merchants were competent to offer an immediate response to the problems, then this action was sufficient to give consumers a positive complaint experience. In a post-failure situation, consumers appeared to be more emotional than they were in offline transactions (Casado-Diaz et al., 2007). Therefore, accessible and responsive complaint handling procedures in a post-failure situation would significantly reflect the distinct competency of the merchants and would have the most influence on consumer satisfaction and confidence. One of the consumers noted:

> *Amazon policy is that if the shipper has failed to deliver then you can contact customer service and they will reship the entire orders at no cost. Amazon would have replied to that and say "I am really sorry and it has obviously gone missing and we will ship you a new one.*

This study shows that accessible and responsive complaint handling procedures is a win-win strategy for the consumers and merchants. Consumers were confident and trusted the merchants, not only because responsive complaint procedures were introduced or problems were resolved responsibly, but also in the way merchants had competently demonstrated their concern for consumers.

6 Conclusion

The results of the study show (See Figure 2) that the influence of complaint handling procedures has more impact on consumer confidence and trust than in the decision itself to shop online, especially when an accessible and responsive complaint handling procedure is required. The model in Figure 2 indicates that the role of complaint handling procedures in having a direct influence on consumer decisions to shop online appears to be not as significant as previously thought. This was shown to have an influence on consumer confidence and trust in B2C online shopping and therefore impacts on their decision to shop online

Although effective complaint handling did not evidently emerge from the data, accessible and responsive complaint handling from the interview and Focus Group discussion sufficiently emphasized when a transaction failed, consumers expect merchants to take all necessary steps to respond, compensate and meet their expectations. This also demonstrates that complaint accessibility and responsiveness has an indirect impact on complaint effectiveness.

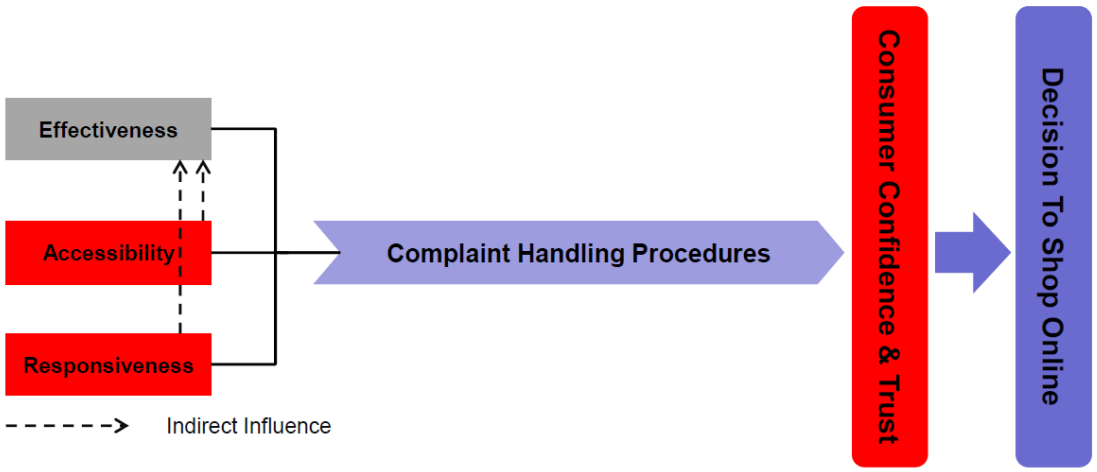


Figure 2: Influence of Complaint Handling Procedures on Consumer Confidence and Trust when Shopping Online

In this study, consumers did not appear to deliberately consider the importance of an accessible and responsive complaint handling procedure prior to making a decision to shop online. It is therefore argued here that a complaint handling procedure does influence consumers in online shopping, in this case trust in the merchant, only as an afterthought. When problems occurred in the transactions and when this then subsequently affected consumer confidence and trustworthiness to shop online. In that case, an accessible and responsive complaint handling procedure was needed to respond to the problems, and to reinforce merchant trustworthiness and responsibility in dealing with the situations and care for consumers' best interests. Therefore, accessibility to and responsiveness of complaint handling procedures became an important element in future shopping online and appears then to have a direct influence on consumer confidence and trust when shopping online. However, this study also shows that if most purchases are completed satisfactorily, consumers will likely have little or no concern about complaint handling procedure. And in such cases complaint handling procedure would then have a less influential role in determining consumer confidence and trust in online shopping.

In the three years between the first set of interviews with consumers and the Focus Groups of consumers in this research, attitudes were shown to be consistent. The emphases on accessible and responsive complaint handling procedures are always a concern to the consumers. It can be suggested that online shopping is growing and consumers have more buying power to shop not only locally but also internationally. There are more choices available online and comparisons are easier. However, when shopping online internationally, consumers want to have at least adequate complaint options and accessible procedures against faulty goods or where goods delivered do not match the descriptions advertised.

This research has contributed to the body of knowledge through an understanding of how an accessible and responsive complaint handling procedure influences consumer decisions to shop in the online environment. It addresses the lack of an explicit theory and understanding of complaint handling procedure in the current B2C e-business research community and business practice. From a practical standpoint, this research identified accessible and responsive complaint handling procedures, and the relative

impact of each on consumer trust and shopping intentions. Such an understanding may allow online merchants to better incorporate the availability of accessible and responsive complaint procedures into their business strategies by focusing on the circumstances identified in this study.

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Customer Engagement in Online Communities: A New Conceptual Framework Integrating Motives, Incentives and Motivation

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Abstract

Only a match between user's motives and incentives enables an engaging online community. The purpose of this paper is to synthesize the literature on user motivation in online communities into a conceptual framework. The framework categorizes motivational factors along motives and potential incentives and integrates the three major motives need for power, need for achievement and need for affiliation as well as the perspective of outcome- and action-related motivation. Psychological models, which explain motivation as an interrelation between different personal motives and situational incentives, demonstrate that effective incentives have to address matching motives. This paper adds to the existing literature by proposing a conceptual framework, which transfers theory of motivation psychology to the context of engagement in online communities and helps to apply successful incentives.

Keywords: online communities, conceptual framework, motivation for user engagement, effective incentives

1 Introduction

In the past few years, interest in online communities has grown enormously. Their relevance for business can be explained by their capability to enhance customer relationships. Online communities do not only reduce todays' complexity of products and brands (Earls, 2003; Herrmann, Heitmann, & Polak, 2007; Kaul & Steinmann, 2008) but they may also improve the tolerance towards mistakes and increase satisfaction with products or services (Popp, 2011). However, the requirements to fully tap into the potential of online communities are engaged consumers.

From a research perspective, much attention has been devoted to understand, which sources of motivation encourage users to contribute in online communities (e.g. Adiele, 2011; Brzozowski, Sandholm, & Hogg, 2009; Burke, Marlow, & Lento, 2009; Chen, Chang, & Liu, 2012; Garnefeld, Iseke, & Krebs, 2012; Huang, 2013; Resnick, Janney, Buis, & Richardson, 2010). However, none of those studies differentiated between person-oriented motives and situation-oriented potential incentives, whose interaction constitutes the current motivation. This differentiation is crucial to the understanding of the underlying psychological mechanisms of users' motivation to participate in online communities. Additionally, the differentiation is important in order to design and manage effective incentives to stimulate engagement in online communities. In the presented research, 'engagement' denotes user behaviour in online communities that helps communities to thrive. For example, reading others' posts (lurking), writing contributions (posting), or supporting other community members by liking their posts or helping them to get started in the community.

In order to fully understand users' motivation in online communities three relevant questions have to be answered first: (1) What personal motives drive users in online communities to engage? (2) How do those personal motives interact with incentives provided in online communities (3) In what type of motivation do they result and what kind of engagement is activated by what type of motivation? The paper addresses these questions and pursues following three objectives:

1) to provide an overview of the literature on motives, incentives and sources of engagement motivation in online communities,
2) to synthesize the existing literature with psychological theories into a conceptual framework, which distinguishes between motives and incentives, and
3) to derive propositions explaining motivation for users' engagement in online communities.

2 Theoretical Background

Although there is extensive literature on motivation in online communities (e.g. Chen et al., 2012; Dholakia, Bagozzi, & Klein Pearo, 2004; Huang, 2013; Leimeister, Huber, Bretschneider, & Krcmar, 2009; Morgan & Mor, 2007; Wang & Fesenmaier, 2004), current research misses to investigate how motivation develops from a psychological perspective.

There are several different psychological approaches and models, which aim to explain what a person motivates to contribute in an online community. While Behaviourism, for example, explains how people can be conditioned by incentives (Pavlov, 1927), social influence approaches focus on influencing principles from a social context perspective (Cialdini, 1984). Both theories explain behaviour outcomes by situational or contextual attributes and lack explanations of different individual characteristics.

The Basic Motivation Model (Rheinberg, 2008, p. 72) includes external as well as internal aspects, which can influence behaviour outcomes. The model thereby enables a more comprehensive explanation why people in online communities contribute or not. Therefore, the Basic Motivation Model is chosen as the basic framework for the research presented here.

2.1 The Basic Motivation Model

The Basic Motivation Model by Rheinberg (2008, p. 72) explains behaviour as a result of the current motivation (Figure 1). Motivation in turn results from an interaction between a person's values, goals and needs, termed "motives" and the perceived potential incentives in a current situation.

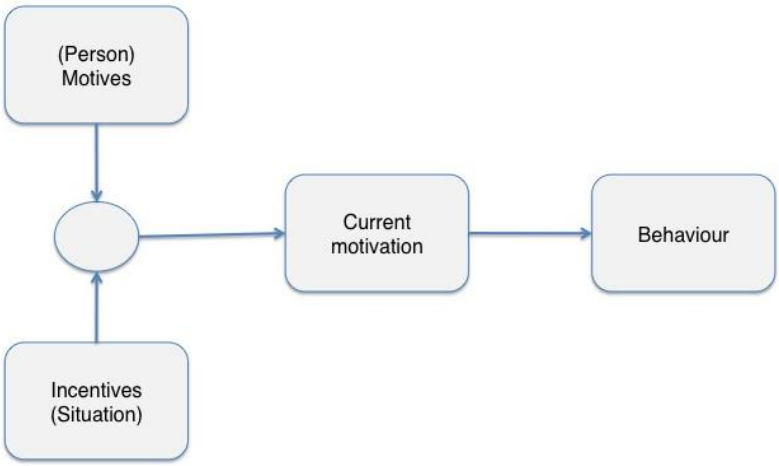


Figure 1: Basic Motivation Model (Rheinberg, 2008, p. 72)

While motives play an internal pushing role, incentives pull from outside (Cornelli & Von Rosenstiel, 1995; Rheinberg, 2002). The effectiveness of an incentive depends primarily on a person's motive. Hence, incentives activate motivation and behaviour only if they match personal motives (Rheinberg, 2008).

2.2 Motives

Motive in present context is understood as a "recurrent concern for a goal state based on a natural incentive – a concern that energizes, orients, and selects behaviour..." (McClelland, 1987, p. 590). Similarly Ryan and Deci propose that the "orientation of motivation concerns the underlying goals and attitudes that give rise to action – that is, it concerns the why of actions […]" (2000a, p. 54).

Motives, understood as traits of personality, explain why people act in certain situations with certain incentives as they do, and why people's behaviour differs (Scheffer & Heckhausen, 2010, p. 42). Motivation and a specific behaviour occur when motives, on the one hand, and incentives, on the other hand, match (Langens, Schmalt, & Sokolowski, 2005). There are several theories, which focus on human motives as traits (e.g. The Five-Factor Model (Big Five), Cattell's Trait Theory, Maslow's Hierarchical Model of Motive Classification or McClelland's Motive Theory) (Scheffer & Heckhausen, 2010). These theories analyse the number of traits that differentiate between individuals.

McClelland's Basic Motives Theory distinguishes three basic motives: 1) *need for achievement*, (2) *need for power* and (3) *need* for affiliation (McClelland, Atkinson, Clark, & Lowell, 1953, pp. 114–116). This theory is well established and has been used to study motivation in the online context (e.g. Hsu, Huang, Ko, & Wang, 2014; Merrick & Shafi,

2011; Wigand, Benjamin, & Birkland, 2008). It is, therefore, chosen to differentiate the concept of motives in this study.

The need for achievement relates to a person's need to put their best efforts and to increase their own competence. The need for power is based on the need to dominate and influence others and to win recognition. The need for affiliation describes the need to establish trustworthy, supportive and pleasant social relationships (Rheinberg, 2011).

Another relevant aspect is the differentiation between *action-* and *outcome-related motivation.* The former refers to the target goal state by carrying out a behaviour, while the latter refers to the behaviour outcome (Rheinberg, 2011). If the expected action »releases immediate well-being« it may lead to action-related motivation and the execution of a »selfinitiated, spontaneous action« (Rheinberg, 2011, p. 594). Whereas outcome oriented motivation refers to an action, which is executed because a positive perceived outcome is expected (Rheinberg, 2011).

While the need for achievement, the need for power and the need for affiliation ask for »outcome-related incentives (ergebnisbezogene Anreize)« (Rheinberg, 2011, p. 606), action-related motivation constitutes from individually different interests or mastery orientation (in contrast to performance orientation) (Heckhausen & Heckhausen, 2010; Rheinberg, 2010).

3 Research on Incentives, Motivation and Engagement in Online Contexts

Following the framework of the Basic Motivation Model (Rheinberg, 2008, p. 72), the present paper explores the research on incentives, unspecified sources of motivation and engagement in different online contexts. For the literature review different online contexts had been taken into account, which demand a user's engagement behaviour such as online communities (e.g. Online Forums for customers, Wikipedia, Web-based opinion-platforms etc.), social media (e.g. Youtube, Facebook etc.) as well as paid and unpaid crowdsourcing platforms. To the best of our knowledge, so far no research has included basic motives and their interaction with incentives in any online context.

3.1 Incentives

Empirically tested incentives in online contexts are *material and immaterial rewards* (Garnefeld et al., 2012; Resnick et al., 2010), *social validation* (e.g. Adiele, 2011) and *feedback* (Brzozowski et al., 2009; Burke et al., 2009). No research can be found on task characteristics, which mainly act on people who are motivated by the action itself. Such incentives are theoretically operationalized as *skill variety*, *task identity* and *task significance* (Hackman & Oldham, 1976, 1980).

3.2 Engagement Behaviour

If individual motives and incentives match, motivation results, which subsequently leads to behaviour. Many scholars have already classified engagement behaviour in online communities. Main classifications distinguish between active participation such as *posting*

(Kollock, 1999; Rheingold, 2000; Wang & Fesenmaier, 2003, 2004; Wasko & Faraj, 2005) and *socialising* (Hsieh, Hsieh, & Tang, 2012) as well as passive participation such as *lurking* (Brazelton & Gorry, 2003; McKee, 2002; Preece, Nonnecke, & Andrews, 2004).

3.3 Sources of Motivation

There is considerable empirical evidence about people's sources of motivation to engage in online communities. Although the existing literature lacks differentiation between situational incentives and personal motives, and labels motivation sources differently, four general types of motivation sources can be identified.

A number of researchers investigated the influence of *social-oriented motivation sources*: Huang's (2013, p. 38) for example, found evidence that liking, sharing or commenting posts on a facebook community page is activated by »maintaining interpersonal connectivity« and »gaining social benefits«, Chen et al. (2012, p. 643) found the influential factor »relation motivation«, which influences knowledge sharing in a virtual community. On a more general level, social motives and social psychology are pointed out as crucial drivers of engagement motivation in online communities (Leimeister et al., 2009; Morgan & Mor, 2007; Wang & Fesenmaier, 2004).

Next to social-oriented motivation sources, there is also a body of literature about the constant *improvement of one's abilities*. Dholakia et al. (2004, p. 244; acc. to McKenna & Bargh, 1999) for example, found self-discovery, "understanding and deepening salient aspects of one's self through social interactions", as a driver for motivation. Several authors found evidence for learning as a source of motivation. While Leimeister et al. (2009, pp. 219–220) operationalized it as "knowledge of experts or mentors", Sundaram et al. (1998, online) described it as "advice seeking".

Another category refers to *status and image*. Chen, Chang and Liu (2012) found traction as a relevant source to engage in virtual communities. Towards the same direction but on a more general level, several authors pointed out status as an engagement driver (Dholakia et al., 2004; Wang & Fesenmaier, 2003; Zhao & Wang). Goh, Ang, Chua and Lee (2009, p. 201) conducted a diary study to understand the motivation behind mobile media sharing. Amongst others they found self-expression (sharing "one's view of the world") crucial.

Further extensive empirical evidence is found for *hedonic benefits*. Yang et al. (2010), Wang and Fesenmaier (2004) and Dholakia et al. (2004) refer to these drivers by pointing out entertainment as a relevant engagement motivation. Findings of Chen, Chang and Liu (2012) are similar. They operationalize hedonic benefits as "activity reward" (2012, p. 645).

The four types of motivation sources (social-oriented motivation, improvement of one's abilities, status and image, hedonic benefits), mentioned in this chapter, refer to the four basic motives or incentives and are differentiated in the following conceptual framework.

4 A Conceptual Framework and Propositions

The overview of previous research on contribution in online contexts reveals two major gaps in the literature: (1) Previous research does not investigate the process of motivation formation and the interaction between motives and incentives. (2) Prior literature does not include basic motives that are crucial to the formation of motivation.

The present paper attempts to close these gaps by proposing an integrative conceptual framework to explain motivation in online communities (Figure 2). Addressing Gap 1, we use the Basic Motivation Model by Rheinberg (2008, p. 72) to explain the basic interactions between motives, incentives, resulting in motivation and behavior. Additionally, we add the findings of the literature review to the model. Thus we add social system, rewards (cognitive, hedonic & material) as well as the more action-related task characteristics to potential incentives. Plus, different engagement behaviours are differentiated.

Attempting to close Gap 2, we include the three types of basic motives in our framework for engagement motivation in online communities (McClelland, 1987). Additionally, we integrate the perspective of action- and outcome-related motivation and add "personal actions which lead to hedonic benefits" as a personal motive (Rheinberg, 2011).

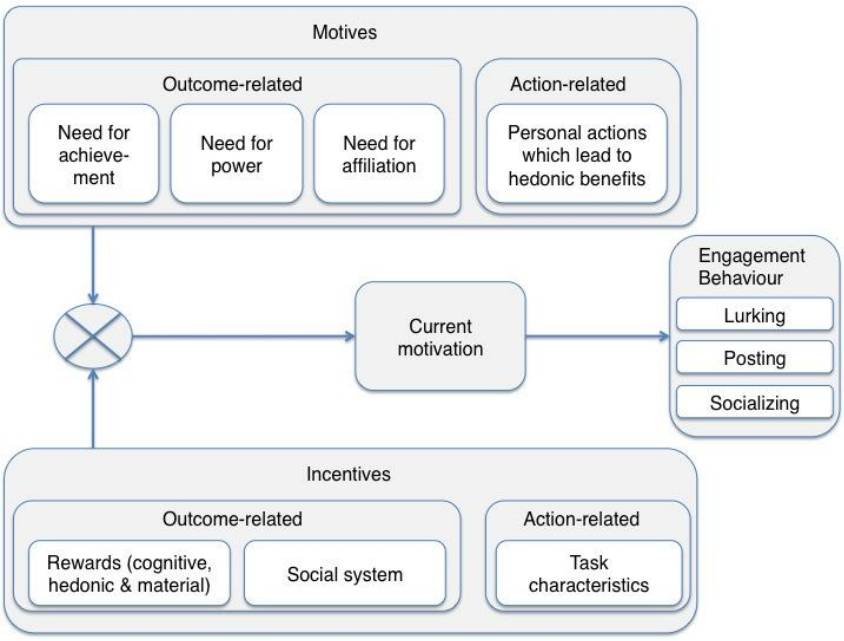


Figure 2: An integrative framework for engagement motivation in online communities

Based on the conceptual framework several research propositions can be derived:

1) Online-community users can be differentiated regarding their personal motives.
2) Motives are related to specific incentives.
3) Motives only result in motivation when they match incentives provided in online communities.
4) Specific engagement behaviour is related to specific types of motivation.

In order to test those propositions we plan to conduct a qualitative preliminary study investigating basic motives of online community users. Further, we aim to conduct a quantitative study to confirm the findings of the qualitative study and an experimental study combined with a survey within three big Swiss company-owned online communities.

5 Discussion

The paper focuses on engagement motivation in online communities. A conceptual framework was developed which contributes to the theoretical discourse by explaining how engagement motivation in online communities emerges. This integrative conceptual framework helps to better understand motivation processes by distinguishing between situational incentives and personal motives. Moreover, it integrates McClleland et al.'s (1953) classification of basic needs for power, affiliation and achievement such as the action- and outcome-related perspective on motivation (Rheinberg, 2011). Thus, this paper contributes to existing research by structuring relevant determinantes of motivation. Particularly, with its structured background incentives can now be integrated within the three categories „Rewards", "Social system" or "Task characteristics". Furthermore, the framework identifies the need for further research regarding different motivational user typologies for different engagement types in online communities, such as lurker, poster and socializer. Due to its conceptual orientation, this paper does not claim to be complete. Its aim and contribution is to develop a psychologically founded conceptual framework of the aspects, which lead to engagement motivation in online communities.

From a managerial perspective, present framework helps practitioners to better understand how to design incentives in order to increase users' engagement motivation. The model provides a structure for social media managers to let their online community thrive. Overall, the framework enables researchers to better understand the psychological interrelation between motives and incentives, and helps practitioners to apply incentives more successfully in practice.

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Environmental Performance Measurement in the Supply Chain using Simulation: The Impact of Alternative Order Patterns

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Abstract

In response to increasing demands of incorporating sustainability concerns into a firm's supply chain management, firms should take actions that exceed their boundaries. As a consequence, firms have recognized the importance of adopting green practices and reducing a combination of different types of indicators, namely operational (e.g. product output, availability, costs), and environmental (e.g. energy consumption, carbon footprint). Within this context, this paper tries to assess the impact of ordering and truck loading policies on both transport costs and CO2 emissions. The results indicate that bigger order batches can both decrease performance indicators and keep the inbound service level stable.

Keywords: Sustainable Supply Chain, Simulation, Environmental Performance, Order Patterns, Order Policy

1 Introduction

The dynamic character of today's competitive environment forces organizations to reconsider the principles existing across their supply chains. Within this context, the introduction of new methods in the general topic of sustainable supply chains has been of upmost importance.

As stakeholders' pressures (especially these originating from government regulators and global competition) strain, companies tend to adopt a certain level of commitment to environmental and sustainability practices (Hassini et al., 2012). However, these companies

are lacking a common standard for evaluating sustainability metrics (Searcy et al., 2009) and some authors even argue that there exist some incompatibilities between the known principles of performance measures and supply chain dynamics (Lehtinen and Ahola, 2010). Thus, there is need for more research on sustainable practices and environmental measures across the supply chain (Bunse et al., 2011).

Nowadays, supply chains face many problems. One of the most significant is the ordering problem, which deals with the backwards abnormalities created to the supply chain, as a part of the bullwhip effect (Lee et al, 1997). Such irregularities tend to affect not only the manufacturing, but also the transportation. Thus, costs tend to become unstable and extremely high. The existence of information sharing and collaborative practices across the supply chain seem to be of the utmost importance in the solution of this problem.

All these factors related to the supply chain's performance are quite expensive to be tested in the real world. However, simulation is offered as an ideal tool which is not only costless, but also effective. Almost any supply chain issue can be simulated. In addition, simulation can easily incorporate uncertainty (Buckley and An, 2005) and give concrete answers to business scenarios.

This paper underlines the need for tools facilitating the environmental practices adoption in order to improve the supply chain environmental performance in an operational level. In this context, this is trying to give some answers to different experimental scenarios related to the impact of alternative order patterns on the supply chain environmental performance.

2 Literature Review

This section presents a brief overview of the existing literature of sustainable supply chains. By referring to a supply chain we mean all the parties involved in fulfilling a customer's order. In particular, we underline the fact that more than one decision maker is involved in managing resources, information and processes that may not be entirely under the control of their company (Chopra and Meindl, 2007). As this decision processes become more complex, the forms of information sharing tend to become more intense (Attaran and Attaran, 2007).

Business sustainability is referring to "the ability to conduct business with a long term goal of maintaining the well-being of the economy, environment and society" (Chopra and Meindl, 2007). Elkington (1997) is credited with popularizing the latter three dimensions, called the triple bottom line (TBL) principle (also known as the three pillars: profit, planet, and people).

Keeping in mind all the above mentioned, sustainable supply chain management is defined as the management of supply chain operations, resources, information, and funds in order to maximize the supply chain profitability while at the same time minimizing the environmental impacts and maximizing the social well-being (Hassini et al., 2012).

Sustainable supply chains are very significant in today's business environment. Eltayeb et al. (2011) have viewed that green supply chain initiatives have positive effect on the supply chain outputs, showing that ecodesign has significant positive effect on the four types of

outcomes (environmental outcomes, economic outcomes, cost reductions, and intangible outcomes).

According to Seuring and Müller (2008), there are four dimensions that can be used to structure the overall debate on sustainable supply chains: (1) pressures and incentives, (2) measuring impacts, (3) supplier management and (4) supply chain management. These incentives play a major role in this structure because they determinate the outputs given of a sustainable supply chain. Moreover Hassini et al. (2012) have shown that there is a strong demand for indicators in this area and more complex indicators are required. Furthermore, they have illustrated the difficulty in developing innovative indicators to the unique needs of each organization. Thus, the need for further case studies in order to validate the metrics is more than obvious and more attention should be given to industry-specific research on sustainable supply chain management.

To sum up, companies have not the appropriate means and tools for environmental performance practices implementation. They lack of sophisticated measurement, analysis and control (Dietmair and Verl, 2009; Weinert et al., 2011) and they only monitor and report performance indicators.

3 Case Study

3.1 Case Study Description

The case examined refers to a project which aims to contribute to an energy-efficient supply chain by providing the system, services, collaboration platform and management tools. These will enable energy and carbon footprint data monitoring, management and sharing in order to support both operational and strategic decision making across the supply chain. The project specifically focuses on the consumer goods sector and emphasizes on industry adoption and quantifiable impact assessment.

In more detail, the proposed scenarios refer to the impact assessment across the supply chain. In this context, the purpose is to apply alternative ordering patterns in order to assess the impact in terms of energy consumption and carbon emissions related to these decisions.

3.2 Case Study Specifications

The AS-IS scenario models the business of supplier S with the retailer R. The key figures of the modeled network are as follows:

- 79 locations
    - 2 sites (a production site PS and a distribution centre DC)
    - 77 customers
- 158 SKUs (stock keeping units / trading units)
- Real retailer order data 2012:
    - 1,949 Orders for PS
    - 903 Orders for DC

However, after a detailed data analysis we have decided to make some simplifications for our research and to focus on two warehouses, one big (with 1048 order rows and 60 orders yearly) and a smaller one (with 185 order rows and 37 orders yearly). The time period examined is defined from 1/1/2012 to 31/3/2012.



Figure 1: Simulation Model Specifications

4 Simulation Model

4.1 The Simulation Component

The simulation component designed in the context of the project aims to support the environmental impact assessment.

The project's platform is based on different technologies. The three main sub-components of the simulation component (simulation database, simulation kernel, and user interface) are using a subset of these technologies as well as a few additional software packages.

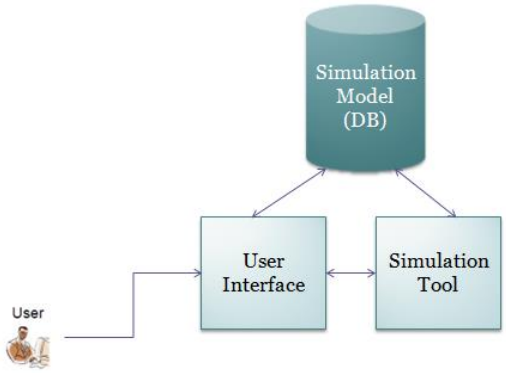


Figure 2: Simulation Component's Architecture

4.2 The Simulation Data Model

Talking about supply chains requires data such as locations, transport relations, SKUs (Stock Keeping Units) and the information flow across the supply chain. In other words, a model is needed in order to describe better situation in the supply chain. The data model described below is referring to the inputs and the outputs of the simulation component in terms of entities and attributes. By entities, one can refer to general concepts, such as the customers and the SKUs of the model and by attributes to their special characteristics such as a customer's location or calendar and a SKU's description, weight or value.

4.2.1 Model Inputs

The platform contains two parts of input data: the Basic and the Configuration Data. The Basic Data contain information about the current supplier's supply chain and the stable data which can be divided into three main categories: locations, sourcing and routes. Locations include information about the sites' locations of the supply chain and the facts related to them, such as their address and their type (customer, supplier, warehouse etc). The second category refers to the sourcing of the supply chain and includes information about the SKUs (Stock Keeping Units) and their parts. Finally, the third and the last category of the basic data is related to the routes of the supply chain and it includes information about the transportation and the generated costs.

On the other hand, the Configuration Data describe the changeable parts of this supply chain and the scenarios designed and they are also divided into three categories: locations of the supply chain, SKUs and customer demand, sourcing across the supply chain. The first category depicts the different types of location that exist in the supply chain, while the second refers to the SKUs existing in the current scenario and to the customer demand. Finally, the last category illustrates the SKUs' sourcing across the supply chain.

4.2.2 Model Outputs

The simulation component offers some ready output tables for reporting which can be categorized into three big categories: SKUs' reporting, summary reporting and daily reporting. The first group provides us with outputs about SKUs' statistics, such as statistic

information about the critical SKUs in the supply chain and the safety stocks. The second group contains aggregated information about the supply chain such as single cost categories and supply service levels. Finally, the third group depicts the supply chain over time and it contains daily information about some metrics, such as service level and means of transport.

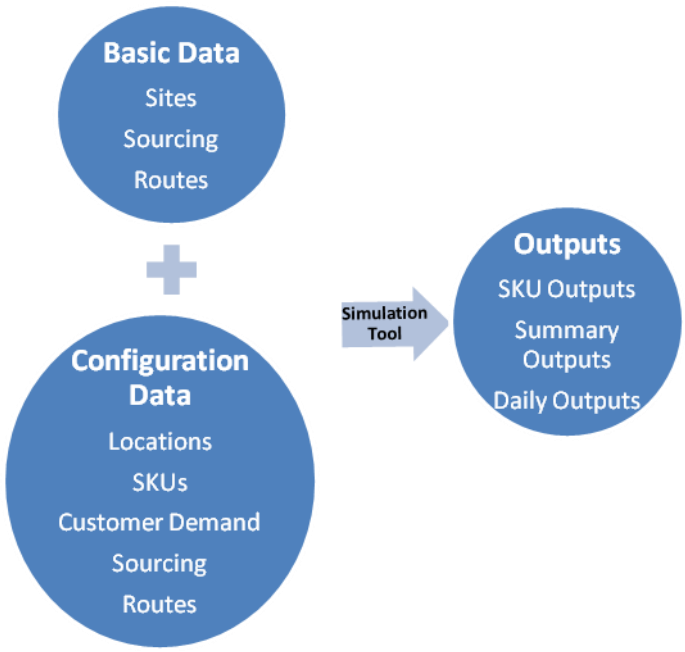


Figure 3: Simulation Data Model

4.3 Design an Experiment

As mentioned above, the Configuration section of the data model allows one to design the scenarios.

The first part of this section consists of three components: Customers, Sites, Hubs and Plain Suppliers, which define the supply chain network. In the Customers' component we describe the retailers acting as customers including its location and the type of calendar they use. In the Sites' component one can define the production sites and the warehouses of the network and some information about the planning and the costs in these sites. In addition, in the Hubs and Plain Suppliers component one can describe the other hubs and the suppliers of the including information about their planning and costs.

The second part describes the products existing in the supply chain. In the SKU (parts) component one can find information about the Stock Keeping Units, their characteristics, their location and the sourcing options. It also depicts production information. It consists of the SKU at Sites component, which contains information about the Stock Keeping Units in certain Sites. This information refers to the location and the usage of these SKUs, the stocks kept and the planning type used.

The third part of the Configuration Setup can provide somebody with information about the demand and consists of two components: Customer Demand and Customer Demand External. Customer Demand contains information about each customer's demand. It includes the SKUs ordered, the quantities, the variation and the distribution followed and the Site that services the certain customer. Moreover, Customer Demand External includes information about the orders each customer has made.

The fourth part consists of the Sourcing SKU component and refers to the central distribution of the products. This gives information about each SKU's distribution. It includes information about the production (e.g.lot size) and the delivery of each one (e.g. minimum order quantity).

Finally, the last part of the Configuration Setup refers to the decentralized customer service and consists of two components. Transport Planning shows the reliability of every option of transport planning (minimal, medium, maximum) and the Routes component includes data about the Routes that can be used for transporting. It also includes the costs and ways of routing and the constraints applied.

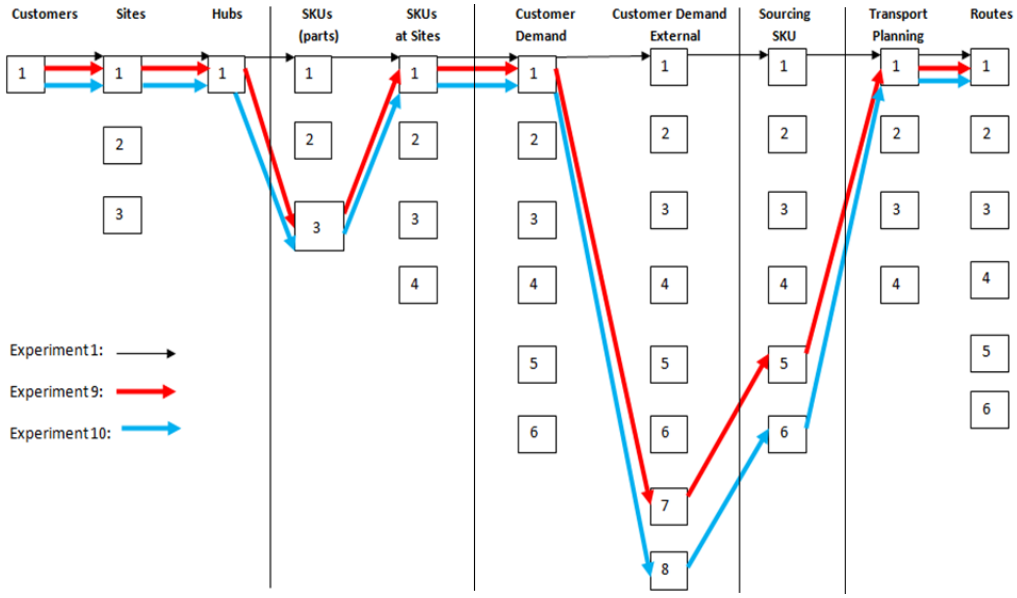


Figure 4: Simulation Model Inputs in the Design of a Scenario

5 Experimental Design

5.1 Experimental Factors

As mentioned above, the method used in order to test the research hypotheses of this paper, is the simulation. Thus, we need to examine some determinant factors that in some way affect the outcomes and analyze their impact. In this phase, we have selected to test two specific variables: the level of minimum order quantity and the level of truck loading. Regarding the first of the two, we mean the minimum order size that is accepted by the supplier. This is applied in an order basis and, thus, all orders must be in multiples of this quantity. Regarding the level of truck loading, we mean the percentage of a truck's capacity that is filled before

the truck starts transport. This factor is used in order to assure that no empty trucks are used across the supply chain. Combining these two variables, this can conclude in various different pairs of factors.

5.2 Performance Indicators

Apart from the experimental factors, performance indicators play a significant role. Within this paper, the indicators that we are going to examine are the transport costs and the CO_2 emissions. Transport costs are defined as the expenses involved in moving the products across the supply chain and they are computed as the product of the pallets transported in each route multiplied with the freight cost of this route. CO_2 emissions include the carbon dioxide emissions that accrue from the products' transportation. CO2 emissions' computation is based on the type of the means of transport used and is taking place for each pallet transported.

5.3 Conceptual Model

The Conceptual Model designed as a part of this paper depicts the business decisions that need to be taken as a function of the experimental factors chosen, which affect supply chain environmental performance.

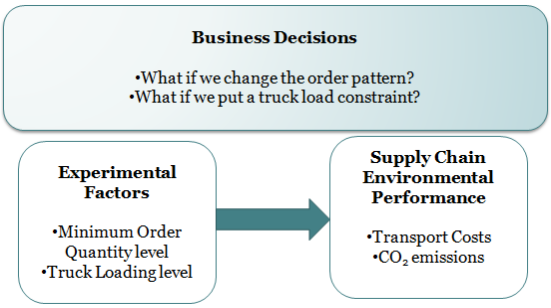


Figure 5: Conceptual Model of this paper

5.4 Experimental Design

A designed factorial experiment is carried out to indicate the relative importance of the two experimental factors. As mentioned above, the performance measures examined are transport costs and CO_2 emissions and the two factors acting as independent variables are minimum order quantity constraint set and level of truck loading.

Having many possible experiments to test the research hypotheses, we had to decide on a specific experiment setting. Regarding the level of Minimum Order Quantity constraint, this paper examines three different levels: the no MOQ constraint set, the MOQ set to 2 pallets and the MOQ set to 6 pallets per order. The first level is chosen as the basis scenario (it is adopted in the AS-IS situation) and the others are chosen after the detailed examination of the data.

The current practice used in our simulation model is that no minimum truck load is needed in order for a transport to start. It is possible that trucks begin even with the load of a carton.

This happens because the relevant parameter of "minimum quantity to start transport" constraint is not currently used. However, the fact is that the orders are ordinarily done in a way that ensures the truck saturation to a significant level. This paper incorporates two different levels: the setting of no full truck constraint and its setting to 90% of the truck's capacity. These two cases were also selected based on this detailed data examination.

Combining all the levels of the two factors, this leads to a total of 2X3 factorial experiments as shown in Table 1. This table provides the design matrix of our experiments.

	No MOQ needed	***MOQ=2***	***MOQ=6***
No need of minimum truck load to start transportation	Experiment 1 (AS-IS)	Experiment 3	Experiment 5
90% minimum truck load to start transportation	Experiment 2	Experiment 4	Experiment 6

Table 1 – Experiments to be tested

5.4.1 Transformation Process

For these experiments, the order data have been transformed in order to give the three different input datasets.

The first dataset, which depicts the AS-IS situation, was not been transformed at all. However, the two other datasets have been under transformation. The order lines and their quantities have been changed in a way to ensure that all orders are under the Minimum Order Quantity Constraint. This means that the total quantity of all the ordered SKUs is in an order is in multiples of the MOQ.

In order to achieve this, the following rules have been pursued:

1. Add products that have been removed from a previous order (in order to maintain the balance)
2. Add pallets in the most "fast-selling" product
3. Add fast-selling products that do not exist in this order

5.5 Description of the Scenarios

AS-IS scenario: In the AS-IS scenario, no changes in the order dataset are made. All orders made by the two model's Customers remain as they are and no other parameters are tested.

AS-IS scenario with truck saturation constraint: In this case, all the configuration data remain as in the AS-IS scenario, but a minimum quantity to start transport is set up to 90%.

MOQ = 2 scenario: In this scenario, the configuration data remain as in the AS-IS situation and the order dataset has been transformed in order to ensure the set of the minimum order quantity constraint to two pallets per order. The total of X orders for the first and Y orders for the second customer are restructured to C and F respectively.

MOQ = 2 scenario with full truck constraint: This scenario does not have any differences from the above one, except from the truck saturation constraint that is set up to 90%.

MOQ = 6 scenario: The order dataset has been transformed in order to ensure the set of the minimum order quantity constraint to six pallets per order.

MOQ = 6 scenario with full truck constraint: Same as the above, but the truck saturation constraint is set up to 90%.

6 Simulation Outputs

6.1 Basic statistics

The differences existing among the scenarios have given plenty differentiations among the results. The two selected local warehouses give two different eligible routes for the deliveries: either PS → local R's warehouse, or PS → DC → local R's warehouse.

In any case, we have decided to focus on two basic result groups: transport costs and CO_2 emissions. These results are presented below.

6.2 Results Regarding Transport Costs

The six experiments have given different results regarding the transport costs. Figure 6 depicts the transport costs results graphically.

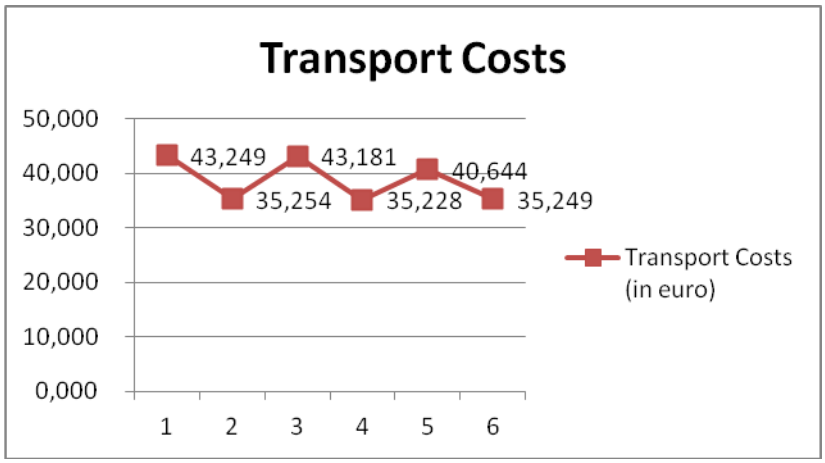


Figure 6: Transport costs

As it seems from the Figure 9, in the case of the Truck Saturation Constraint the transport costs are decreased by about 18.5%. This percentage becomes bigger, if one takes under consideration the limitations of the simulation as described in the next section. On the one hand, this experimental factor cannot be implemented in the whole supply chain (but only in the PS→DC part). On the other, although this was not used before as a parameter of the supply chain, order were put in a way that somehow ensured truck saturation largely. Thus, the impact of this factor on the transport costs is extremely high.

The MOQ constraints seems also to affect the transport costs, but in a small percentage (about 6% decrease comparing the AS-IS and the MOQ = 6 situations). However, this decrease comes only from the small customer and, thus, it is quite significant. This is because the orders of the bigger customer were much bigger and already place in a way that diminishes this effect.

6.3 Results Regarding CO_2 Emissions

Figure 7 gives a graphical depiction of the CO2 emissions results.

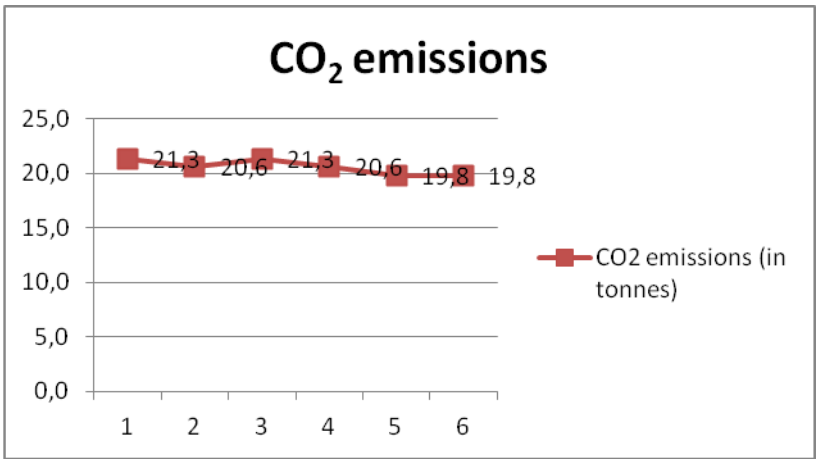


Figure 7: CO2 emissions

As in the case of the transport costs, CO_2 emissions are subject to the same simulation and model limitations. The decrease seems to be only about 4%, but in fact this is quite bigger. Both the MOQ and the truck saturation constraints affect significantly the model.

6.4 Concluding Remarks

Having reporting the abovementioned findings from the simulation experimentation, in this section we are going to add some concluding remarks.

As mentioned above, one of the selected customers is serviced via DC and the other directly from PS. However, due to a limitation of the simulation model, the truck saturation constraint is only applied to the PS → DC part of the supply chain. Thus, the results presented in the previous section are subject to these constraints. Nevertheless, if we take into account only this part of the supply chain, or, even better, if it was possible for this constraint to be applied to the whole supply chain the differences will be huge.

7 Conclusions

As it may have been obvious, the data manipulated and the simulation model provides some limitations, which may give ground to future research. Orders were already made in a way that diminishes the impact of the full truck constraint and this was only applied into the PS →DC part of the supply chain. As a consequence the differences in the outputs are given only by this part and are much more important than they seem to be. In addition, that's the reason why the truck saturation constraints in experiments 2, 4 and 6 do not give any significant differences no matter what the dataset is. Moreover, the small R's customer is a small one and its demand does not exceed the MOQ set as the limit for deliveries between PS and DC.

In addition, no outbound inventory and output service level were measured in our model's customers, so the impact of the MOQ and truck saturation constraint to the final customer was not easy to be seen. Furthermore, two levels of the vertical supply chain were missing. We only have information from the plant to the local retailer warehouses. However, if we had the data about the local retailer's stores and the final customer demand, we would have been able to have many important metrics, such as the inventory and the service level. Finally, only two warehouses have been used in the experiments, so no statistical analysis of the results has been possible.

These limitations urge us to continue to this research field and try to run more experiments within and out of this project. This future research could not only take into consideration the absence of the data from the experiments tested, but also try to design more business scenarios to be tried out.

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Unleashing the IT potential in the complex digital business ecosystem of international trade: *The case of fresh fruit import to European Union*

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Abstract

The digital ecosystem for import of goods in international trade is analyzed, in-efficiencies are identified and their possible causes are revealed. The business ecosystem is rather complex and interlocked with many actors and various rules and regulations. It is supported by a digital business infrastructure, which however is very disjointed. The communication of information among the actors involves many disconnected information systems and manual processes, which introduce delays and lower data quality. This has severe consequences in the shape and form of increased lead-time, which our case analysis of import of fresh fruit reveals is critical for the quality of the fruit. However, the coordination is difficult since information is stored in isolated information systems and only shared among few actors. The IT potential in the digital business ecosystem could be unleashed by using a state of the art integrated information infrastructure to exchange information between the actors and their information systems in real time. This potentially could ameliorate the complexity of business ecosystem and thereby be a foundation for improvements of the business processes for all import to EU including of course fruit.

Keywords: Digital business ecosystem, International trade, Information infrastructure

1 Introduction

The business ecosystem for import of goods into the EU should be quite simple with importer, exporter, authorities and service providers but in reality, the ecosystem is extremely complex. The more one explore about it, the more surprised one gets that it works, or at least works to some extent. This research contributes to identifying and understanding the complex business ecosystem especially through focusing on IT systems and digital infrastructures. The paper proposes digital strategies for potential improvements.

The case selected for this research is import of fresh fruit in containers by sea to European Union via the port of Rotterdam. A majority of the containerized international trade to the EU is via the port of Rotterdam, which is the largest port in Europe measured in volume. The case study focuses on the crossing of the border to the importing country. More specifically it focuses on that part of the supply chain from the time, when the refrigerated container with fresh fruit is unloaded from the container ship into customs territory ship and until it's allowed to leave the customs territory and be transported e.g. to the warehouse of the importer. Importers in general see the border as a huge barrier for the trade and their challenge is to lower the barriers for their goods.

As a consequence of the complexity, the lead time from the container is at the quay and until it arrives in the warehouse of the importer is often very long. Additional there is a large unpredictable variation in the lead-time. For importers of fresh goods the lead-time and its unpredictable variation add to the importers risk, and it can easily result in a reduced profit or even end in loss. This uncertainty and the related risk make it difficult especially for small and medium sized importers to maintain a stable and profitable business (WEF 2013).

It is estimated that 40% of the delays in the lead-time of supply chains for international trade in the large ports is caused by administrative burden imposed by authorities. The cost of crossing borders is relatively high adding 0.53% on the importers purchase price of the goods (Anderson and Van Wincoop 2004). In total the annual world-wide extra costs due to administrative burdens of crossing borders are estimated in the range 100-500 Billion US$.

The question addressed in this research is twofold:
1. What is the situation of the current digital business ecosystem for import to EU of fresh fruit and what are the critical issues?
2. Which digital strategies might be pursued to increase the efficiency and effectiveness of the business ecosystem?

The rest of the paper is structured with a theoretical framing, a description of the methodology applied, an analysis of the business ecosystem for fruit, and finally suggestions for possible digital strategies for unleashing the potential and thereby improving the efficiency and effectiveness of the ecosystem importing fresh fruit into the EU.

2 Theoretical Framing

The business ecosystem of international trade, where companies have to send approx. 10 documents per container to various border inspection agencies for import, has been transformed in the last two decades from being almost exclusively paper based to becoming more and more a digital business ecosystem.

Since the early 90's the collaboration in the digital business ecosystem among organizations using electronic communication has primarily been and is still based on electronic data interchange (EDI). This was originally researched and referred to as Inter-Organizational Systems (IOS) e.g. (Krcmar, Barent et al. 1995) and more recently as Information Infrastructure (II) e.g. (Hanseth and Lyytinen 2010). In most cases, IOS have a positive effect on organizational performance, since IOS is shifting transactions from condition of organizational hierarchies to condition of markets by lowering external coordination or transaction costs (Robey, Im et al. 2008). Many early IOS were characterized by high asset specificity; more recently IOS are starting to use open standards lowering the asset investment. Some IOS research shifts the focus away from proprietary investments in technology and toward dimensions like social and procedural interdependence (Wareham 2003). In any case, the power balance and the trust between the partners involved in IOS seem to be critical factors in the adaption and use of EDI (Hart and Saunders 1997). There seems to be a duality between evolution of infrastructures and the standards by which they influence each other providing a potential to evolve both (Hanseth and Braa 1999). Relationships characterized by thrust and joint problem solving result in high degree of EDI use (Robey, Im et al. 2008). Accordingly, the traditional view based on the simple assumption that firms choose between hierarchical governance and market governance, has been criticized based on the arguments that they rather employ coordination strategies encompassing multi-layer relationships with multiple partners (Klein 1995). The traditional view on design of IS and IOS is not well suited for the II area, e.g. architectural design is not applicable since II is never built from scratch but always evolve based on existing infrastructure (Henningsson and Hanseth 2011).

Improving collaboration for international trade and the implementation of eCustoms solutions have been analyzed e.g. regarding (1) the e-customs solution TradeNet, which was successfully introduced in Singapore in the late 1980s (King and Konsynski 1990), (2) the less successful TradeLink in Hong Kong (King and Konsynski 1990), (3) the benefits of increased use of EDI for collaboration (Damsgaard and Lyytinen 1998), (4) the streamlining of the Danish eExport for the cross-border taxation (Bjørn-Andersen et al., 2007), (5) the ITAIDE research program recommending an implementation framework for e-Customs addressing trade facilitation (Henningsson, Budel et al. 2011), and (6) the costly and mixed experience of the ever evolving European e-Customs (Henningsson and Henriksen 2011).

The research regarding information systems traditionally focuses on IT in well-bounded organizational contexts in a single organization (Sidorova, Evangelopoulos et al. 2008). As companies evolve and become more digitalized, new generative dynamics emerge, affecting the ecosystem (Brynjolfsson and Saunders 2009). Most organizations have optimized their own dataflow, a few have integrated and attempted optimization with their immediate network

partners / actors, but there have only been very rudimentary attempts at optimizing the full dataflow in the total value network through digitalization. A review of state-of-the-art research revealed that there is limited research regarding how to manage and govern the information in infrastructures outside the well-bounded organizational contexts (Robey, Im et al. 2008) & (Tilson, Lyytinen et al. 2010).

This case study builds on the above contributions and adds knowledge to these in two ways. Firstly, it reveals and extends current insights into how digital business ecosystem consisting of non-integrated information systems and the use of multiple communication channels cause costly delays and increased security risks in the containerized supply chain for international trade import to the European Union. Secondly, the paper provides a number of suggestions for improvements in the digital business ecosystem of international trade.

3 Research Methods

The main reason for choosing case study as the method is that the supply chain for international trade is extremely complex and largely unexplored. There are simply very few detailed studies of what really happens. With a case study method it is possible to investigate a contemporary phenomenon in depth and within its real-life context (Yin 2009). An in-depth understanding of the details is needed in order to understand the complexity and the issues causing the costly long lead times and the variations in lead times. The case study it here defined as an empirical inquiry that potentially can help to explain presumed causal links in real-life interventions that are too complex for the survey or experimental research methods (Flyvbjerg 2006).

Even just the limited part of the eco-system investigated here from quay to warehouse is rather complex and have many more important variables than the possible data points. Nevertheless, it provides insight into the complexity, which must be addressed in order to bring down the costs of international trade. The part of the eco-system with the highest variation in lead time (and accordingly the part that causes the highest risks/costs) is from the moment where the container arrives in the port of Rotterdam and until it is stored at the warehouse of the importer inside the EU.

Data collection was predicated on the principle of relying on multiple sources of evidence with an additional data converge (Yin 2009). It was done in Rotterdam collecting data from five different types of stakeholders as described in detail in Appendix. One focus group was conducted with three government representatives and three representatives of the shipping line. Furthermore, separate interviews with two importers and three representatives of the harbor terminal were conducted. Even though there are several hundred importers of fruit and vegetables in the Netherlands, we believe that the ten importers selected for focus group sessions, interviews and visits are representative for the fruit importers. The triangulation was deemed successful, since about half way through the data collection, we found that the same issues kept coming up from the respondents. This strongly suggests that the selection was representative as regards the situation for small medium sized enterprises (SME) importing fresh fruit in refrigerated containers from other continents to the European Union (EU) via the port of Rotterdam.

In the sections following, we have added in parentheses the name of the informants who have supported the analysis in interviews and/or focus groups.

We suggest that the overall results of the case study are rather robust meeting the guidelines suggested in literature (Herriott and Firestone 1983). Accordingly, we believe that the research results will be rather generally applicable, but this will need to be verified in a later follow up of the research in other ports

Previous research focuses primarily on the perspective of one actor (e.g. one authority like customs agency, exporters, or freight forwarders,) and its communication with the other actors. However, there is almost no research, which explicit incorporates the point of view of importers. This is surprising since the importers are the ones who drive the import, run the risks, and cover the trade cost including cost of getting acceptance from the authorities like custom and evoking the efforts of the service providers involved in moving the containers. Importers are the ultimate customers of the process we are looking at. This case study complements the existing research by focusing on (1) the importers of fruit to EU via the port of Rotterdam rather than any of the other actors and (2) by applying a multi-actor perspective.

4 Analysis of business ecosystem

The importers of fruit report three set of problems hampering effective supply chains, long lead times, substantial variation in lead times, and unpredictability lead times. Interviews with the importers of fruit indicate that lead times may vary from 1 day to 3 days and even increasing up to 5 days over weekends.

In order to understand the possible causes for long, unpredictable and variable lead times, we will in the following first explore the business ecosystem with the roles of the actors and the flow in the supply chain. Secondly the digital business ecosystem will be explored using the data collected as well as the available documents, information, systems and the related communication. Finally the issues and possible causes will be listed.

4.1 Actors in the business ecosystem

The business ecosystem for international trade involves up to 30 different actors, which might be classified as importer, exporter, authorities and service providers. The main activities are: buy, transport and pay for the goods. We will only focus on the transport and only the part from quay at destination to the warehouse of the importer.

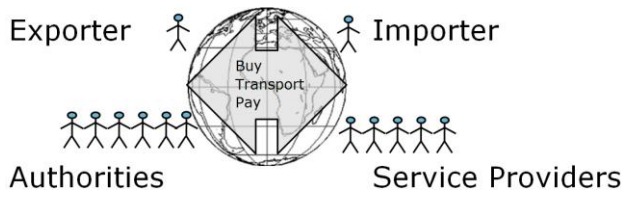


Figure 1: The main roles of the actors in the ecosystem for international trade[1]

[1] Adapted from UN/CEFACT, 2001

The importers are typical international traders that buy goods from vendors in other countries and enter into agreements with different service providers on how the goods are transported safe and secure between the countries from the exporter' to the importer' warehouse. The number of service providers varies but typically includes freight forwarders, shipping line, terminal operators, inland transporters (road, barge or rail), banks, and specialized agents for declaration and inspections.

Countries protect their territory at the border through different types of regulations, inspections (e.g. food and product safety) and control of the imported goods. Seen from the point of view of importers, these represent a number of barriers (focus group of importers). Additional barriers are related to currency, communication, language, etc. Passing the barriers takes time and even worse, the time it takes vary substantially (Frugiventa).

In the case of fresh fruit import to EU via the port of Rotterdam at least the following authorities are typically involved: the customs (collection of tariffs, etc. and security), the phytosanitary authorities (plant inspection), the health authorities (human health),the veterinary authorities (disease prevention), and the scanning inspection (detect smuggling). Of course the authorities are more suspicious on some imports than other e.g. when import is fruit from countries known for growing narcotics, e.g. Colombia. The authorities demand certain documentation e.g. certificates and specific information in predefined forms, demand certain inspections including physical inspection of container and / or goods and in some cases taking samples of the goods.

To handle the requests by authorities, the importer use specialized service providers to move the container with special equipment like straddle carrier and truck, to coordinate and arrange the logistics, to assist with fulfilling the requirements from the authorities in an efficient manner, and to authorize inspection on behalf of the authorities. The service providers charge a fee to the importer for the service. In total the number of actors can easily exceed 15, and in some instances, there are up to 30 actors (Frugiventa) . Obviously, the ecosystem for international trade gets more complex.

4.2 The digital business ecosystem

For the importer there is certain information that is crucial in order to have the goods pass the border and to coordinate the logistic activities. There are about ten key chunks of information per container (interviews with fruit importers) that the importer typically keeps track of e.g. filled declaration, certificates, expected arrival time, promised deliveries to customers, etc. The importer often keeps this information in a spread sheet or in various information systems. The following analysis is primarily based on the interviews with two importers and the focus group in FrugiVenta.

Among the actors involved in the eco-system, different types of information are communicated to coordinate and plan the activities. There are some formal documents e.g. Bill of Lading (B/L), declarations, certificates, movement forms. The B/L is issued by the sea carrier, and formally handed over to the shipper (often it is in practice received by the shipper' logistic service provider or freight forwarder on behalf of the shipper). The B/L primarily specifies the

receiver of the goods and / or the goods in the container(s). Subsequently the B/L is then send to the receiver of the goods, who will present the B/L to the sea carrier in the port of destination to receive the goods (often this is done by the receiver' logistic service provider). There are various alternative ways for the operation e.g. where the shipper allow the goods to be received or picked up by an appointed person (often the logistic service provider on behalf of the receiver) without presenting the B/L, but instead identifying themselves as representative for the receiver. The declarations and certificates are specialized documents stating for the authorities the goods intended to cross the border.

Important information for the logistic planning is the estimated time of arrival (ETA) which is communicated publicly by the shipping line along with estimated time of departure (ETD) when the container ship is leaving port again. Once this is known, the terminal operator will typically set the ETA of the individual container as the estimated time of departure for the vessel since then all containers are unloaded, and therefore neither the shipping line or the terminal operator do know when the individual container will be unloaded. When the container is stacked for storage within the terminal area this is used as the actual time of arrival (ATA) for the container by the terminal operator and communicated to the authorities and the logistic service provider via the port Information system for the community of operators in the port of Rotterdam. The importers want to get the fresh fruit to their warehouse, and they do not use the given ETA per container since they know the container will be unloaded long before the given ETA. The importers report that they, when the vessel is reported to be at the quay in the port, will constantly check if the ATA has been updated and immediately after they register the arrival of the container, they will order the trucking company to pick up the container.

Prior to arrival the ship will file an advance manifest about intended unloads, based on this information matched with declarations from importers and potential other information. The authorities in the port of destination will decide which containers are selected for certain types of inspection and for scanning. This is also communicated via the port Information system. Some importers have access to the port Information system, but for other importers the logistic service provider will inform them via e-mail. This is done by copy from the port Information system in a spread sheet, which is e-mailed to a service provider in India that will generate the relevant e-mails to the shippers. If that is an importer, this process typically takes one day. If the container is not selected for inspection or scan, then the importers can order a trucking company to pick up the specific container. The actor that filled the declaration to the authorities are the declarant and it can be the importer or on his behalf a logistic service provider or a specialized service provider who perform the handling of declarations. The declarant will receive "permission to remove" the declared goods from the authorities with an associated IMA number. This message needs to be forwarded / communicated to the terminal operator prior to picking up the container, if the logistic service provider can be perform this task on behalf of the declarant / importer[2]. Frequently the declarant / the importer for is not

[2] The port information system offers the service to forward this message to the terminal on behalf of the declarant

informed directly about some inspections and the scanning, and therefore the importer relies on the logistic service provider or access to the port Information system of the port community for getting this information. Following this, typically within an hour, the scan or inspection is arranged by phone by the logistic service provider. The truck can then either wait for the container or might be redirected in order to handle another container. Typically the agreements with the trucking company include up to 3 hours of waiting time, while additional waiting time is charged separately. Having such agreements is a clear indication that waiting time is quite normal, and reducing the number of round trips that a driver can perform within a normal working day.

The number of individual communications of documents or information from one actor to another ripples because e.g. besides the logistic coordination information then the service provider additional has to receive an order and return an invoice etc. Therefore the total number of communication operations counts up and is more than hundred per container

The Dutch are and have for long been very efficient in handling import of goods. The port of Rotterdam is constantly being expanded to cope with the growing demand. There is a close collaboration among the companies and authorities in the port community. The community continuously collaborates with new initiatives meant for improvements. One of the major initiatives resulted in an advanced information system named Portbase.[3] The port information system "enables all the participants to optimize their logistics processes when they import goods via the port of Rotterdam" [4].According to Portbase website[5], nearly all members in the port community are using Portbase to exchange information among each other, but independent sources reports that only 50-60% of the actors are using the port information system[6].

The coordination of the activities is done by communication in various ways among the actors. The communication is typically between two actors (peer to peer). The communication channels are typically a mix of phone, e-mail, ordinary mail, courier, electronic messages as EDI messages, etc. Each actor will often keep the relevant information in a spread sheet, or in one or more information systems. Some information is shared via specific information systems. Some service providers will manually extract information from the information system and then communicate this to another actor. The different actors have various working hours and might even be located in different time zones. This cause some delay and fluctuation in the communication especially over weekends. Additionally the actors might be busy and therefore it takes time before a manual action can be performed and the action might need to be coordinated among several actors e.g. importer, authorities and terminal operator for inspection of goods.

If we look at the different mix of communications channels, the most important way of keeping track of activities is a structured spreadsheet. The importer primarily communicates

[3] www.Portbase.com
[4] According to the Managing Director of Portbase Iwan van der Wolf
[5] About us at www.portbase.com
[6] Professor Yao-Hua Tan

with other actors via e-mail and phone to coordinate the activities and the logistics. On the other hand the authorities and some of the service providers exchange information primarily via the port community' port information system. Only few importers have purchased access to the port community' port information system. Instead they are typically kept updated on the logistic information by the service providers. However, this extra step of transferring the logistic information causes delays and frequent miscommunications.

The reasons for the different communication channels are that they have been available for a long time, and that they are easy and quick to use, and they are relatively inexpensive. When an actor is under time pressure it's very easy to call another actor by mobile phone. Therefore the communication is not captured in any Information system, which makes it difficult to coordinate and to plan activities.

4.3 Findings

The analysis of the import of fresh fruit case shows that the ecosystem in addition to the importer and the exporter includes a huge number of different actors - service providers and of course various authorities. In total, we have learned that up to 30 actors could be involved. The complexity seriously affect the lead time.

The individual physical activity of moving the container from the quay to the importers warehouse including possible 'detours' for scanning and inspections, is in total maximum a few hours. Accordingly, the rest of the lead-time is waiting time before the different types of scans and inspections. The number of controls per see cannot be changed, but in order to improve on the overall effectiveness and reduce the staggering high administrative costs associated with international trade, our attention has to turn to the many instances of waiting time (Focus group with shipping line and the representatives of Dutch customs). These can only be reduced by (1) a possible reduction in the number of physical activities (which is unlikely) (2) a better planning of the physical activities, and (3) by increasing the transparency and currency of the information in a joint repository. By this, we do not mean a central physical repository, but a virtually integrated II following pretty much the principles of the Internet with a large number of independent systems/servers, but based on a jointly shared communication standard and governance.

Currently, the actors in the ecosystem use different means of communication (interviews and observations at fruit importers). Furthermore, the actors generally only communicate with one or maybe two other close actor before or after the in the supply chain. In this way actors are very limited in their possibilities for optimizing processes. Other barriers include that the actors have limited working / opening hours to process manual tasks and that the individual actor keeps information in each their information system. The uncertainty about the inspections, the complexity of the communications among actors, the lack of visibility among actors of the important coordination information (since it resides in the various information systems), the lack of access to precise and updated information all makes it very difficult to plan the activities and thereby reduce lead-time and variation in lead-time.

Typically, at any time, only one actor has the knowledge about the exact location of the container e.g. the terminal operator when the container is within the terminal area and the driver when the container is on the truck. The importer, who owns the goods in the container, has no insight into the actual location or actual time of its activities. They only have a blurred view and are left to guess the activities and location. The importer and other actors specifically lack visibility about the individual container's actual location and updated status regarding clearing by authorities. Finally, the importers lack transparency when their containers are in the customs area. This might be why they blame the authorities for the long lead times, which is correct regarding the number of controls. However, in our analysis, the inspections/controls are not the culprit. They do not take many minutes. The culprit is the high complexity of the ecosystem surrounding the controls, the unpredictability of if and when containers are marked for inspection/control, and the in-efficient logistic coordination primarily due to lack of updated logistic information.

5 Possible strategies for improvement

The analysis has identified some of the main causes for the prolonged lead time and its variation. In this section we shall propose some possibilities for improvements of the effectiveness in the digital business ecosystem. More specifically, we will illustrate how import of fresh fruit via Rotterdam to the EU potentially can obtain a reduction in lead-time and cope with variations in lead-time, which will reduce the trade cost significantly.

Many of the trade documents that are still in paper format could become electronic documents. One example is the required certificates and the B/L, where we believe that an electronic version (possibly with electronic signatures) could fulfill the authorities' requirements. A simple solution could be attaching a link to the filed declaration for a stored electronic version of the original certificates, which could be enhanced with search (based on Optical Character Recognition) and other features. This could potentially reduce the cost associated with preparation of those documents in paper and in original form.

The importers has proposed a set of key information that could improve the coordination and planning:

1. actual time of departure of vessel with containers from port of origin
2. ETA and later ATA at port of destination of the vessel,
3. ETA (in a time interval of ½ day) and ATA of unload of specific container
4. information about selection for inspection(s) and scan
5. possible to reserved time for inspection(s) and scan including opening hours
6. the actual time of exit from terminal area.

The accuracy of the ETA information for the container could be improved if the terminal operator and the shipping line collaborated to estimate which containers are expected to be unloaded within an interval of e.g. three hours. That would on average reduce the lead time with approximately 8 hours if the time in the port is 16 hours for a vessel and therefore the importer can better plan the pickup of the container instead of constantly checking if the container has been unloaded.

Today some key information is only communicated between two actors in a peer to peer communication e.g. authorities' "Permission to remove" and associated IMA number communicated to the declaring actor. Similarly, it is often the importer, and not the logistic service provider or trucking company who has the task to transport the container from the terminal to the warehouse upon its release. Alternative methods to delegate authorization, automatically get a notification via e-mail or sms, and automatically forward (also outside working hours) key updated status information for containers could improve this and reduce the lead-time over weekends.

Another possibility is that the importer could purchase access to the port community' port information system (or another similar software provider) that publishes the most updated data about the containers status. However, the SME importers are reluctant to purchase access to the port community's port information system because they can't see the cost benefit in purchasing access. Alternatively some of the other actors e.g. the logistic service provider could provide the key information in a real time version. Some service providers already offer this but only for a minor part of the key information and other key information e.g. if the container is selected for inspection or scan is processed manually by an outsource partner in India.

The above suggestion would increase the visibility of the container status in near real time, which potentially can improve the possibilities for the importer or his service provider (the logistic coordinator) to plan in a proactively way the activities and the associated logistics. The visibility will also help to the transparency and that the actors including the importers get the same, shared view of the status of a particular container in the supply chain.

The un-integrated information system and communication channels cause delays and security risk in the containerized supply chain for international trade import to the European Union. The lack of visibility of the actual situation for the individual container is a major issue and makes it difficult to coordinate activities in the supply chain. A range of technical suggestions have been proposed e.g. having webcams in the terminal area, use drones to follow the activities, equip the containers with GPS-tracking devices, and enable the actors to share their activities via an application on a mobile device.

Over and above reducing costs and lead-time, visibility can also potentially increase the security for the containers and for the terminal area at port of Rotterdam.

6 Conclusion

This research reveals that importers of fruit experience in-efficiency and long lead time passing the barriers of the customs territory on its route from the quay to the warehouse and with high variation in lead time due to a complex ecosystem with many actors and unknown number of controls; and that they potentially can reduce the costly lead time and its variation by better logistic coordination utilizing a set of few key information from other actors in the digital business ecosystem. The typical importer is struggling with heterogenic information infrastructure to get the key information. A part of the key information is available from the

port community's port information system, and the typical importer is reluctant to purchase them

Can the port information systems be characterized as Information Infrastructure (II)? The emergent properties for the port information system are that it's shared locally, heterogeneous, evolving, and the structured properties are direct composition within one platform and centralized control. To be characterized as an information infrastructure it also need to be open, have a recursive composition as organizational principle, be distributed, and have dynamic control as structured properties. (Hanseth and Lyytinen 2010). Accordingly, the current port information systems cannot be characterized an information infrastructure for international trade as proposed by the ITAIDE research project. This is confirmed by the fact that only approximately 60% of the actors utilize the port information system. Consequently, the recommendations from the ITAIDE project to implement the so-called I3 framework (an II) is clearly not implemented yet.

It's our recommendation to implement a II that conforms with the design guidance for IIs which is accessible, provides open and shared data, enable real time tracking of container movements, and make efficient planning possible. The governance of above shall provide thrust among the actors in a degree that they share their data for the individual container.

Clearly to detail our recommendation is a next task for our research.

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Appendix for data collection and sources for main quotes in the analysis of the business ecosystem

Data collection is primary the below listed interviews, observations and focus groups which took place in late January 2014 in Holland.

Organization	**Person(s)**	**Period**	**Method**	**Documentation**
Shipping Line and Dutch customs authorities	3 representatives from authorities and 3 from private service provider	20140128 14:00-17:00	Focus group	Records, audio taping (partly transcribed) and note
Fruit importer	Logistic Manager (importer)	20140128 08:00-10:00	Interview and observation / site visit	Records, audio-taping, notes, documents and pictures
Fruit importer	Logistic Manager (importer)	20140129 08:00-10:00	Interview and observation / site visit	Records, audio taping, notes, documents and pictures
FrugiVenta, Den Haag	Director and 8 logistic experts from 8 importers	20140129 15:00-18:00	Focus group	Records, audio taping, presentations and notes
Terminal operator, Rotterdam	3 representatives from private service providers company and 3 advisors from special service providers	20140130 08:00-13:00	Interview and observation / site visit	Records, audio taping, notes and pictures

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Interorganisational Information Systems Maturity: Do Supply Chain Integration and Business/IT-Alignment Coincide?

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Abstract

Although interorganisational information systems (IOIS) have existed as study object for a long time, much research into IOIS remains sector-specific. By employing a multi-sector dataset, this paper aims to contribute to the cross-sectoral analysis of IOIS. We formulate four hypotheses on IOIS maturity based on theory concerning supply chain integration and business/IT-alignment, taking both 'IT' and 'organisation', and 'supply' and 'demand' into account. This leads to the twofold research question (i) how IOIS maturity of organisations can be measured in a generic manner, and (ii) if supply chain integration and business/IT-alignment are related as similar determinants of IOIS maturity. We empirically test our hypotheses on survey data collected among a group (n=74) of Dutch organisations, diverse in terms of industry and size. Correlation analysis confirms all four hypotheses. This indicates that business/IT-alignment and supply chain integration are indeed related.

Keywords: Interorganisational information system; IOIS; ICT; Supply chain integration; Business/IT-alignment; Maturity

1 Introduction

Interorganisational information systems (IOIS) have a long history of study (e.g., Kaufman, 1966; Barrett & Konsynski, 1982; Johnston & Vitale, 1988; Meier & Sprague, 1991; Williams, 1997; Agi, Ballot, & Molet, 2005; Reimers, Johnston, & Klein, 2010). The role of IOIS has been studied in the 'traditional' domains of supply chain management (SCM) such as supply chain automation, supply chain integration, and collaborative planning, forecasting, and replenishment (CPFR). Due to globalisation, technological developments, and institutionalisation, interorganisational relations have become more extended and complex. Consequently, IOIS are also studied in a number of new emerging fields such as virtual organisations, value networks, e-collaboration, interoperability and chain-computerisation.

At the same time, we see that studies on IOIS are not only conducted in sectors such as manufacturing, retail, and transport, but also at service-based organisations such as those in the financial, public, and health care sectors. This is specifically illustrated by the emerging field of service management and operations (Fitzsimmons & Fitzsimmons, 2004). Although sector-specific studies of IOIS dominate, some research has been done *across* sectors. For example, the health care sector increasingly adopts enterprise systems from other industries as retail and manufacturing to support patient-oriented care and to improve their purchase function (cf. Meijboom, Schmidt-Bakx, & Westert, 2011).

While the research on IOIS in specific industries can be understood from the need to capture the specific nature of their products, services, and tradition, one can also argue that this hinders the exchange of experiences between sectors – and hence the innovation opportunities that can emerge from sectoral comparison. So far, only a few multi-sectoral analyses of IOIS have been conducted. Obviously, it is a challenge to compare different types of organisations, that have different primary and secondary processes, different intra- and interorganisational structures, and act in different environments. Still, the added value of doing so is to discover what generally drives or hinders the use and development of IOIS in organisations, and generally determines their success and consequences. This is of particular interest as many theories and models on IOIS are actually generic by nature; they aim to describe, explain or prescribe common problems in the adoption, implementation, and use of IOIS within and between organisations.

This paper aims to contribute to the multi-/cross-sectoral analysis of IOIS, in particular to the exploration of IOIS maturity of (different types of) organisations. As an empirical basis for this goal, data are collected among a diverse group of organisations in terms of industry (sector) and size. The theoretical angle of this study is to investigate two common principles behind IOIS maturity: (i) supply chain integration, and (ii) business/IT-alignment. In the next section, we elaborate on both principles and discuss how they are conceptually related in the determination of IOIS use and maturity of organisations. A number of expectations that are formulated on this elaboration are then tested using our multi-sector dataset. This provides an answer to our main research question:

How can IOIS maturity of organisations be measured in a generic manner, and are supply chain integration and business/IT-alignment related as similar determinants of IOIS maturity?

The remainder of this paper is structured as follows. First, we provide the theoretical background and conceptual elaboration, leading to a set of hypotheses. Next, we present the applied research methods, followed by a description of our results. We discuss these results, including the limitations of our work and some opportunities for future research. We finish with a summary of our main conclusions.

2 Theory

2.1 Supply chain integration

A first central principle relevant to define IOIS maturity, is supply chain integration (e.g., Frohlich & Westbrook, 2001; Simatupang, Wright, & Sridharan, 2002; Rai, Patnayakuni, & Seth, 2006). Realising "inter-firm coordination and cooperation within supply chains are not easy" (Rokkan & Buvik, 2003, p. 247). From a supply chain integration perspective, it is not only important to optimise the links and collaborations that organisations have with their suppliers and buyers, but to align both cross-functionally (Ellinger, 2000; Jüttner, Christopher, & Baker, 2007) as well. The procurement and marketing/sales domain of organisations each have significantly matured. Organisations have standardised their management of suppliers and customers, adopted specific procurement and marketing strategies, allocated professional procurement and marketing departments, and so on. The basic 'gap' between procurement and marketing still remains existent within many organisations, however (Daft, 2001). This is caused by the different interests and cultures that are ascribed to the two domains, but it also seems that organisations are not able to act on the similarity between the external management of suppliers and customers.

At least from a Resource Based View (RBV) perspective, this is both surprising and interesting. In an early stage, Wernerfelt stated that scholars should be "analysing firms from the resource side rather than from the product side" (Wernerfelt, 1984, p. 171). Barney (1991), one of the founders of RBV, then claimed that focusing on the internal organisation should be done by defining resources as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm" (Barney, 1991, p. 101). In order for resources to be of (strategic) value to a firm, they need to adhere to the VRIN criterion: they should be valuable, rare, inimitable, and non-substitutable. Later, the related Dynamic Capabilities View (DCV) has been developed that claims to offer "a more dynamic version of the RBV by emphasising that possessing a set of resources with VRIN characteristics is not enough to stay competitive in a changing business context" (Den Hertog, 2010, p. 133). Dynamic capabilities are defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, Pisano, & Shuen, 1997, p. 516). Kähkönen and Lintukangas (2012) further develop the value-creation potential for the supply management side of organisations.

When we focus on IOIS maturity of organisations, it is to be expected that supply and demand side maturities should be mutually defined and be aligned (cf. Frohlich & Westbrook, 2001; Plomp & Batenburg, 2010). Hence, the maturity with regard to supply-side functions like (e-)procurement is expected to be related to the maturity of demand-side functions like Customer Relationship Management (CRM). In other words, when we aim to define IOIS maturity from a chain perspective, measurement at both the 'upstream' and 'downstream' side of the focal organisation is required (Plomp, Batenburg, & Van Rooij, 2012).

2.2 Business/IT-alignment

The second principle relevant to define IOIS maturity is business/IT-alignment. Since the 1980s, scholars, analysts, and consultants alike advocated the approach that the adoption and deployment of information systems or information technology (IS/IT) is adjusted to the nature

of the organisation – and vice versa. The fit of IT solutions to business requirements can be considered as a continuous challenge (Luftman, Lewis, & Oldach, 1993). The alignment of business planning and IT planning was the focus of the Information Systems Planning methodologies that arose in the early 1980s (Chan & Reich, 2007). Henderson and Venkatraman's Strategic Alignment Model is to be considered as one of the first models that provides levers for organisations in introducing new IT technologies using business/IT-alignment concepts (Henderson & Venkatraman, 1993). Business strategy, IT strategy, organisational infrastructure and processes, and IT infrastructure and processes should be in balance through strategic fit and functional integration (see also Luftman et al., 1993). Subsequently, several authors applied the Strategic Alignment Model. Despite being well studied in over 150 studies listed, Maes et al. (2000) conclude that the majority of publications are rather vague in terms of how to define or practice alignment. In fact, there is no consensus on a precise definition of business/IT-alignment (Kyobe, 2008). Actually, different words are used to describe or define the word 'alignment' (Silva, Plazaola, & Ekstedt, 2006), such as "fit" (Henderson & Venkatraman, 1993), "harmony" (Luftman et al., 1993), "integration" (Weill & Broadbent, 1998), "linkage" (Reich, 1993), "bridge" (Ciborra, 1997) or "fusion" (Smaczny, 2001).

In his overview study, Silvius (2013) advocates to define business/IT-alignment as "the degree to which IT applications, infrastructure and organization enable and shape the business strategy and processes, as well as the process to develop this" (Silvius, 2013, p. 6). This definition points out that business/IT-alignment not only covers the alignment process to enable IT applications and infrastructures, but also the agreements regarding the management and maintenance of application and infrastructure services. He states that: "The question whether IT aligns to business or the other way around is answered as 'enable and shape'. This defines alignment as a two-way process" (Silvius, 2013, p. 6). This resembles what we conclude in the previous section: just as the alignment of the 'upstream' and 'downstream' side of the focal organisation, so is the alignment of the IT and organisational dimension an essential two-sided concept.

2.3 Conceptual model and hypotheses

Combining the two principles described above results in the following conceptual framework and hypotheses that drive our empirical analyses. The central question what determines the IOIS maturity of (different types of) organisations is hence driven by the two theoretical angles, supply chain integration and business/IT-alignment. Beforehand, we do not assume that supply chain integration is more important to establish IOIS maturity than business/IT-alignment or vice versa, nor do we predict that a certain order in these concepts is to be expected. The hypotheses formulated aim to be tested on their basic validity. I.e., whether it is empirically supported that organisations that align their suppliers and customers in terms of *IT systems* also align their suppliers and customers in terms of *organisational systems* (e.g., contractual/business agreements). And, whether it is empirically supported that organisations that align their *suppliers* in terms of IT systems also align their *customers* in terms of IT systems. To formulate the full conceptual model, we elaborate and hypothesise the following.

First, we expect organisations that align their supplier and customer relations will be more mature in their IOIS, as they invest in internal coordination (or: consistency) of their

boundary processes. Secondly, including the business/IT-alignment principle, this implies that they do so recognising that this supply chain integration has both an organisational and a technological dimension. The combination of the two principles basically has, therefore, four implications.

The first hypothesis considers business and IT maturity at the purchase side of an organisation:

H1: The higher an organisation's IT maturity to support the purchase function, the higher its business maturity to support the purchase function.

The subsequent second hypothesis is, for the customer side of an organisation:

H2: The higher an organisation's IT maturity to support the sales function, the higher its business maturity to support the sales function.

Then, the third hypothesis concerns the IT dimension of IOIS:

H3: The higher an organisation's IT maturity to support the purchase function, the higher its IT maturity to support the sales function.

And subsequently, hypothesis four is on the business dimension of IOIS:

H4: The higher an organisation's business maturity to support the purchase function, the higher its business maturity to support the sales function.

The four hypotheses are depicted in Figure 1.

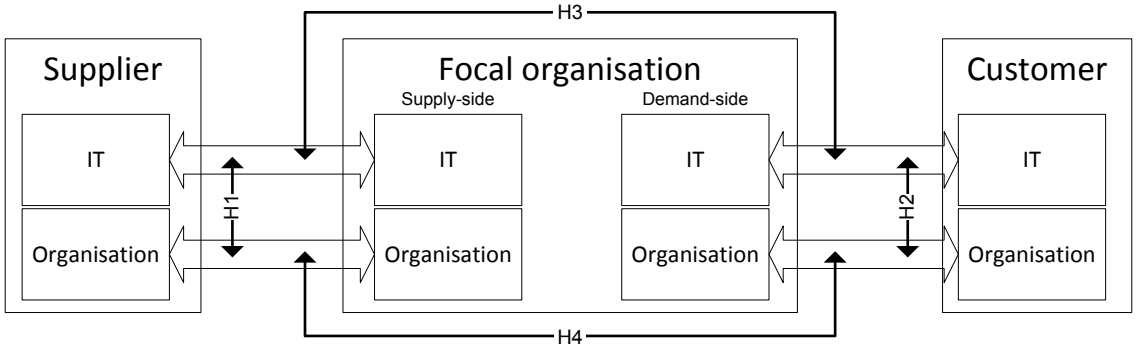


Figure 1: Conceptual representation of the assumed relationships between supplier- and customer-oriented IOIS, and between the IT and organisational domain.

3 Method

To collect data in order to test our hypotheses, we conducted an online questionnaire among Chief Information Officers (CIOs) of Dutch organisations from various industries through professional and personal networks (i.e., through convenience but controlled random sampling). A first subset of data was collected in 2009; a second round of data collection was done in 2011. No requirements were applied in the selection process (e.g., with respect to sector), except that all organisations had to be sized 10 FTEs (full time equivalents) or larger. The CIOs were personally asked and motivated to participate in the research and fill in the online questionnaire. When they agreed to participate, the link of the online questionnaire was sent to them. In the questionnaire, additional instructions and motivation for the CIOs was

given (e.g., they would receive a report of their scores and be able to compare this to their peers). The respondents were free to choose when and where they would complete the questionnaire, as long as the results had been submitted before a clearly stated deadline.

We operationalised chain digitisation maturity in the same way as in the study of Plomp et al. (2012). In total, 32 statements about both technological and organisational maturity on both the supply and demand side of the organisation have been used (see Figure 2). Important to note is that in this operationalisation, again in line with Plomp et al. (2012), the statements for both technology and organisation are 'mirrored' for the supply and demand side, e.g., "managing capacity or inventories of suppliers" versus "managing capacity or inventories of customers", and "evaluate supplier performance on contract parameters" versus "evaluate your performance on contract parameters".

	Supply side	Demand side
IT	*To support the purchase function, does your organisation use specific IT systems/applications for:* - Ordering goods or services online? - Arranging payments online for ordered products or services? - Receiving e-invoices? - Finding suppliers in the market? - Inviting suppliers to quote prices or submit proposals? - Running online auctions? - Collaborating with suppliers to forecast your demand? - Collaborating with suppliers to design new products or services? - Managing capacity or inventories of suppliers?	*To support the sales function, does your organisation use specific IT systems/applications for:* - Receiving online orders? - Enabling payments online for ordered products or services? - Sending e-invoices? - Sending offers? - Answering calls after proposals or tenders? - Launching sales auctions, for example on B2B or B2C marketplaces? - Collaborating with customers to forecast their demand? - Collaborating with customers to design new products or services? - Managing capacity or inventories of customers?
Organization	*To support the purchase function, does your organisation apply specific (i.e. customised and written) organisational arrangements to:* - Document delivery contracts on the operational level? - Settle strategic alliances? - Share strategic information? - Evaluate supplier performance on contract parameters? - Document joint process descriptions with suppliers? - Govern a joint work team with suppliers? - Align your strategy with your suppliers' strategy?	*To support the sales function, does your organisation apply specific (i.e. customised and written) organisational arrangements to:* - Document delivery contracts on the operational level? - Settle strategic alliances with your customers? - Share strategic information with customers? - Evaluate your performance on contract parameters? - Document joint process descriptions with customers? - Govern a joint work team with your customers? - Align your strategy with your customers' strategy?

Figure 2: Maturity dimensions and the survey questions employed to measure them.

The respondents were asked to express how each statement fits their organisation. Four different answer categories were provided, namely:

- 'Yes, for (almost) all of our suppliers/customers',
- 'Yes, for some of our suppliers/customers',
- 'Yes, for only one of our suppliers/customers', and
- 'No'.

In addition a 'Do not know / cannot say' option was provided.

4 Results

In total, we received 74 completed surveys. Before testing our hypotheses, we first present some descriptive statistics. As argued in the introduction of this paper, we aim to study a diverse sample in order to investigate whether generic patterns and relationships between supply chain integration and business/IT-alignment exist across different types of organisations. As a result of our data collection strategy, we see at the left side of Table 1 that our sample is diverse. In our sample, both profit and non-profit organisations are present: 56 (75.7%) are profit organisations while 18 (24.3%) are non-profit (by self-classification). In terms of size (see the right side of Table 1), almost half of the organisations in our sample have more than 250 FTEs, with the median at 185 FTEs. By no means, our sample aims to be representative for the Dutch economy. Still, the variation that is essential for our study is present in this sample.

Sector	**n**	**%**	**Size**	**n**	**%**
Construction	4	5.4%	< 50 FTEs	28	37.8%
Education	6	8.1%	50-250 FTEs	10	13.6%
Government	6	8.1%	> 250 FTEs	36	48.6%
Healthcare	9	12.2%			
Logistics / Utilities	6	8.1%			
Manufacturing/producing	15	20.3%			
Professional services	14	18.9%			
Retail/wholesale	14	18.9%			

Table 1: Sector and size distribution of sample (n=74).

All organisations are based in the Netherlands, but some were also active in other countries. As can be seen on the left side of Table 2, the organisations in our sample have different areas of operation, i.e., there are organisations present that act on local, national, continental as well as global scale. In terms of diversity of our sample, it is also useful to inspect the organisations' age distribution (right side of Table 2). The median organisation in our sample has been active for 40 years.

Area of operation	**n**	**%**	**Age of organisation**	**n**	**%**
Local/regional	16	21.6%	<10 years	5	6.8%
National (i.e., The Netherlands)	30	40.5%	10-50 years	41	55.4%
Continental (i.e., Europe)	15	20.3%	51-100 years	14	18.9%
Global	13	17.6%	>100 years	14	18.9%

Table 2: Area of operation and organisational age of sample (n=74).

To operationalise the dimensions described in the previous section, scales were created. First, four maturity dimensions were constructed based on the questions from Figure 2. To inspect the correlations between all survey items per maturity dimension, we use medians and Spearman correlations as our data are at the ordinal level. The resulting correlation matrices are presented in Tables 3 through 6. Based on inspection of these correlation matrices, it can be concluded that items related to each dimension correlate significantly with each other, with the exception of item number 3 for both IT to support the purchasing function (receiving e-invoices; Table 3) and IT to support the sales function (sending e-invoices; Table 5). Because of this, these items number 3 were eliminated for scale construction.

After scale construction (i.e., taking the median of all item scores of a dimension), reliability analysis was conducted for each maturity dimension, resulting in Cronbach's Alpha scores of 0.84 (technology, supply side), 0.94 (organisation, supply side), 0.85 (technology, demand side), and 0.93 (organisation, demand side). These scores imply a good reliability and therefore the scales can be used (Nunnally & Bernstein, 1994). Furthermore, in order to analyse the potential issue of common method bias as a result of working with one integrated questionnaire, we performed an exploratory factor analysis (EFA), and applied a one factor extraction test (Harman, 1967). An EFA of the 30 remaining items showed 7 factors with eigenvalues above 1.00. In the unrotated solution where the number of factors is limited to one, there is no single factor that explains the majority of the variance. This supports the argument that common method bias does not form a threat here.

Nr	Variable description	N	Median	Min	Max	Spearman's rho correlation (1-tailed)								
						1	2	3	4	5	6	7	8	9
1	Ordering goods or services online	74	3	1	4	1	.56**	.35**	.19+	.22*	.38**	.39**	.37**	.43**
2	Arranging payments online for ordered products or services	72	3	1	4		1	.47**	.41**	.30**	.34**	.31**	.33**	.36**
3	Receiving e-invoices	71	2	1	4			1	.40**	.28*	.05	.42**	.40**	.21*
4	Finding suppliers in the market	70	1	1	4				1	.68**	.34**	.38**	.55**	.41**
5	Inviting suppliers to quote prices or submit proposals	70	1	1	4					1	.56**	.39**	.40**	.37**
6	Running online auctions	72	1	1	4						1	.41**	.37**	.45**
7	Collaborating with suppliers to forecast your demand	72	1	1	4							1	.45**	.65**
8	Collaborating with suppliers to design new products or services	68	1	1	4								1	.44**
9	Managing capacity or inventories of suppliers	71	1	1	4									1

Table 3: Use of specific IT systems to support the purchase function
(+ = p<.10, * = p<.05, and ** = p<.01).

Nr	Variable description	N	Median	Min	Max	Spearman's rho correlation (1-tailed)						
						1	2	3	4	5	6	7
1	Document delivery contracts on the operational level	70	3	1	4	1	.72**	.54**	.55**	.65**	.64**	.46**
2	Settle strategic alliances	70	2	1	4		1	.73**	.61**	.62**	.65**	.59**
3	Share strategic information	70	2	1	4			1	.61**	.67**	.72**	.62**
4	Evaluate supplier performance on contract parameters	72	3	1	4				1	.64**	.51**	.54**
5	Document joint process descriptions with suppliers	65	2	1	4					1	.91**	.75**
6	Govern a joint work team with suppliers	68	1	1	4						1	.82**
7	Align your strategy with your suppliers' strategy	69	1	1	4							1

Table 4: Organisational agreements to support the purchase function (** = p<.01).

Nr	Variable description	N	Median	Min	Max	Spearman's rho correlation (1-tailed)								
						1	2	3	4	5	6	7	8	9
1	Receiving online orders	74	3	1	4	1	.42**	.54**	.45**	.49**	.47**	.42**	.22*	.34**
2	Enabling payments online for ordered products or services	74	1	1	4		1	.57**	.35**	.27*	.46**	.27*	.20*	.32**
3	Sending e-invoices	73	1	1	4			1	.25*	.35**	.31**	.19+	.14	.22*
4	Sending offers	72	1.50	1	4				1	.71**	.42**	.42**	.34**	.43**
5	Answering calls after proposals or tenders	71	1	1	4					1	.43**	.45**	.42**	.33**
6	Launching sales auctions, e.g. on B2B or B2C marketplaces	71	1	1	4						1	.50**	.43**	.34**
7	Collaborating with customers to forecast their demand	73	1	1	4							1	.65**	.62**
8	Collaborating with customers to design new products or services	72	1	1	4								1	.51**
9	Managing capacity or inventories of customers	73	1	1	4									1

Table 5: Use of specific IT systems to support the sales function
(+ = p<.10 * = p<.05, and ** = p<.01).

Nr	Variable description	N	Median	Min	Max	Spearman's rho correlation (1-tailed)						
						1	2	3	4	5	6	7
1	Document delivery contracts on the operational level	72	3	1	4	1	.75**	.66**	.53**	.64**	.50**	.46**
2	Settle strategic alliances with your customers	72	1.50	1	4		1	.71**	.64**	.66**	.56**	.55**
3	Share strategic information with customers	72	1	1	4			1	.62**	.60**	.55**	.65**
4	Evaluate your performance on contract parameters	73	2	1	4				1	.61**	.52**	.65**
5	Document joint process descriptions with customers	70	1	1	4					1	.74**	.68**
6	Govern a joint work team with your customers	73	1	1	4						1	.74**
7	Align your strategy with your customers' strategy	73	1	1	4							1

Table 6: Organisational agreements to support the sales function (** = p<.01).

Figure 3 reproduces our conceptual model (Figure 1), including the Spearman's rho correlations between the four maturity dimensions. As can be seen in the figure, all correlations are positive and significant (p<.01), thereby supporting our hypotheses. The highest correlations are between 'IT, supply-side maturity' and 'organisation, supply-side maturity' (.67), and between 'IT, demand-side maturity' and 'organisation, demand-side maturity' (.61). The correlations between 'IT, supply-side maturity' and 'IT, demand-side maturity' (.41), and 'organisation, supply-side maturity' and 'organisation, demand-side maturity' (.57) are also considerable.

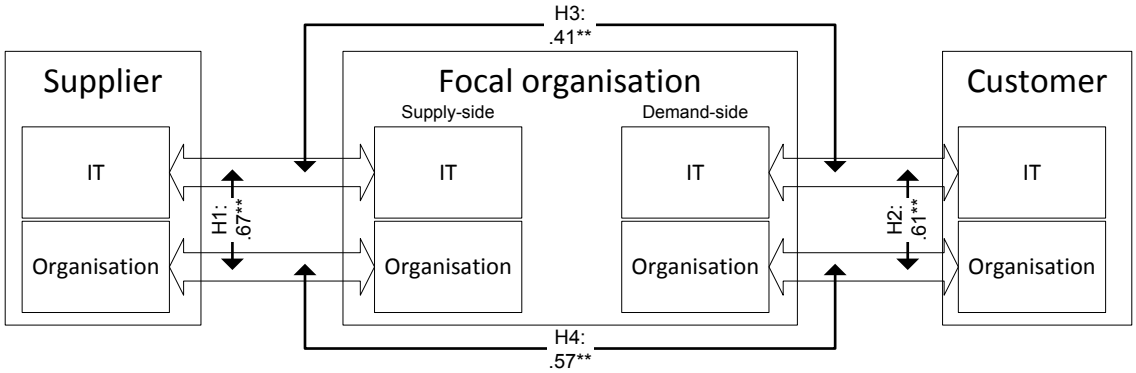


Figure 3: Results of analysis: relations between supplier- and customer-oriented IOIS, and between the IT and organisational domain
(Spearman correlation coefficients; ** = p<.01; 1-tailed testing).

To investigate the robustness of our results, we also performed Pearson correlation tests using the averages of our scales, assuming interval levels for all variables. This leads to the similar conclusion that all four hypotheses are supported as all four Pearson correlations are positive and significant (H1: .67, H2: .66, H3: .47, H4: .68; all with p<.01 using 1-tailed testing).

A final important step in our analysis is to see if diversity in our sample matters for the correlations that we found in the total sample. In order to check for this, we also performed partial correlations controlling for (i) size, (ii) sector, and (iii) size and sector. In terms of size, we split our sample in two equal halves: the 50% smallest and 50% largest organisations based on FTEs. For sector, we looked at production organisations (i.e., construction, logistics/utilities, manufacturing/producing, and retail/wholesale) versus service organisations (i.e., education, government, healthcare, and professional services). This resulted in sub-samples of respectively 39 and 35 organisations. Table 7 shows the results of the initial and partial Pearson correlation analyses. The table shows that our results remain the same when controlled for size, sector, and both. All correlations are still significant and the coefficients are similar in size.

		Controlled for:		
Hypothesis	**Initial**	**Size**	**Sector**	**Size & Sector**
H1	.67**	.61**	.67**	.62**
H2	.66**	.65**	.66**	.65**
H3	.47**	.46**	.45**	.44**
H4	.68**	.69**	.68**	.69**

Table 7: Initial correlations and partial correlations controlling for size, sector, and size & sector.

5 Conclusions

We set out to answer the question whether IOIS maturity of organisations can be measured in a generic way, and how supply chain integration and business/IT-alignment are related as similar determinants of IOIS maturity. With regard to the first part of this question, we applied a questionnaire containing generic items to measure IOIS maturity along four dimensions on a diverse group of organisations. During the fieldwork, it appeared that all respondents were able to complete the questionnaire and answer the questions for their own specific organisation. Still, it would be valuable to cross-validate the answers to investigate the validity of the questionnaire.

With regard to the second part of our research question, we find evidence that business/IT-alignment and supply chain integration are indeed related. We formulated four hypotheses, expecting interrelations between IT and organisational maturity on both the supply and demand side of a focal organisation. All four hypotheses were confirmed by positive and significant correlations, independent of assumptions on the measurement level of variables and controlling for a number of organisational characteristics. Still, even though our results show statistically demonstrated relationships, they do not imply that in practice organisations deliberately align business/IT-alignment on the one hand, and supply chain integration on the other. What we do see however, is that organisations that are mature in their business/IT-alignment are also mature in their supply chain integration and vice versa. This is in support of the idea that resources at the demand and supply side of organisations are of similar importance and actually coincide in their contribution to IOIS maturity. It remains an open question how organisations define and align their procurement and marketing/sales strategies on the one hand, and their IT and organisational strategies on the other.

An interesting next step would be to investigate the precise mechanisms behind these results, including whether there is a causal relation in which business/IT-alignment is a prerequisite for supply chain integration, or vice versa. Qualitative case studies questioning multiple stakeholders on their intentions and motives regarding supply chain integration and/or business/IT-alignment could prove valuable for this aim. Another extension of our study would be following organisations through time applying a longitudinal design. An obvious limitation of our current study is that although our sample is generic in terms of size and sector, it contains organisations based in the Netherlands only. It would be interesting to replicate our research in other countries.

Where Frohlich and Westbrook (2001) also consider the relationship between supply chain integration and organisational performance, we left this out of the scope of our current study. One reason for this is that organisational performance is hard to measure in a generic way (i.e., for organisations stemming from different sizes and sectors). A second reason is that we should be careful in assuming that higher maturity will lead to higher performance by definition, as Frohlich and Westbrook (2001, p. 193) indicate with regard to this point as well. The pitfall might be in the over-emphasis of so-called 'best practices' in supply chain integration and/or business/IT-alignment.

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Data Sharing Issues and Potential Solutions for Adoption of Information Infrastructures: *Evidence from a Data Pipeline Project in the Global Supply Chain over Sea*

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Abstract

Information infrastructures have gained significant momentum in today's information economy. They are defined as shared, open and evolving socio-technical systems providing distinct IT capabilities. The Cassandra EU project aims to enhance visibility of the international flow of goods over sea with an electronic data pipeline as an information infrastructure. This paper presents data sharing issues that could prevent adoption of the Cassandra Pipeline. Potential solutions are provided regarding access restriction and data sharing. In addition solutions are derived from the design theory for dynamic complexity in information infrastructures of Hanseth and Lyytinen (2010), proposing to gain momentum by starting small, focusing on immediate benefits for supply chain partners and obtaining experience using simple prototypes. This paper underlines that designers of the Cassandra Pipeline as an information infrastructure need to think carefully about the implications of restricting access and non-obligatory or obligatory data sharing, both allowing for generativity and trust while preventing potential abuse at the same time.

Keywords: Information Infrastructures, Digital Infrastructures, Digital Eco Systems, Issues, Adoption, Design Science, Design Theory, Supply Chain Management

1 Introduction

In today's information economy the notion of *information infrastructures* has gained significant momentum. An information infrastructure (or digital infrastructure or digital eco system) is defined as "a shared, open, heterogeneous and evolving socio-technical system of Information Technology (IT) capabilities" (Hanseth and Lyytinen, 2010, p1). Information infrastructures vary in scale, functionality and scope as clarified by examples such as the Internet, Electronic Data Interchange (EDI) networks, electronic market places such as eBay, operating systems such as Windows and Linux, Apple's iTunes store, Google's Play store, NetFlix or Spotify (Hanseth and Lyytinen, 2010; Janssen et al., 2009; Tilson et al., 2010). Information infrastructures are built on the notion of generativity which is "an ability or capacity to generate or produce something" (Avital and Te'Eni, 2009, p347). Catering to generativity, information infrastructures are shared and open systems that continuously evolve over time, trusting members to invent and share new uses along the way (Tilson et al., 2010). "An essential characteristic of infrastructures is that they are used by many different users, with the usage evolving over time, as may the type of users" (Janssen et al., 2009, p233). Hence, designers of open, shared and evolving information infrastructures need to trust users to self-organise and invent new capabilities along the way, essentially embracing bottom-up experimental design in a socio-technical context using distributed and loosely-coupled control mechanisms (Hanseth and Lyytinen, 2010).

Effectively designed information infrastructures can be highly beneficial for individuals, organisations and societies as shown by aforementioned infrastructure examples such as the Internet, yet achieving success is easier said than done and many design initiatives fail to deliver expected benefits (Hanseth and Lyytinen, 2010). Achieving generativity within shared, open and evolving information infrastructures seems a complex matter for designers who need to embrace bottom-up change in a socio-technical context and distance themselves from traditional top-down design approaches in which systems could be defined through a distinct set of functional requirements within strict boundaries (Tilson et al., 2010). For example Hanseth and Lyytinen (2010) mention difficulties for designers in persuading users to adopt information infrastructures while the user community is still small (the so-called *bootstrap problem)* as well as difficulties to adapt to increasingly varying needs once growing (the so-called adaptability problem). Hence, overall it seems that effectively designing information infrastructures that evolve over time and in which data is generated and shared by users seems easier said than done.

This paper presents data sharing issues and potential solutions for adoption of information infrastructures that are derived from a European Union (EU) project called Cassandra which aims to enhance supply chain visibility of global sea cargo with an electronic data pipeline. As explained in further detail later, the Cassandra Pipeline concept can be seen as an information infrastructure in the making in that it proposes a shared socio-technical system for enhancement of global supply chain visibility over sea that evolves over time using distributed and loosely-coupled control mechanisms.

The issues presented in this paper revolve around difficulties for designers to persuade groups of users to adopt the Cassandra Pipeline as an information infrastructure in the making. As such this paper is of academic relevance in that it provides confirmatory case study material regarding Hanseth and Lyytinen's (2010) bootstrap problem.

Moreover potential solutions regarding data access and data sharing are discussed, linking back to Hanseth and Lyytinen's (2010) design theory for dynamic complexity in information infrastructures. This paper is of practical relevance for designers of information infrastructures in that it provides examples of data sharing issues as well as potential solutions for adoption.

2 Background

This section provides background information regarding the Cassandra Pipeline project and the design theory for dynamic complexity in information infrastructures.

2.1 The Cassandra Pipeline: an Information Infrastructure

Cassandra stands for "common assessment and analysis of risk in global supply chains" (Cassandra-project.eu)[1]. The EU project is composed of 26 partners ranging from research institutes to global supply chain industry partners to governments. The Cassandra project introduces an electronic data pipeline as a data sharing concept to ensure control and security in the international flow of containerised cargo over sea. The Cassandra Pipeline aims to increase international supply chain data quality by obtaining data from the source enabling both governments and businesses to conduct higher quality risk analyses. The business domain can for example improve its decision-making by predicting "optimal" transport modes based on timely and accurate data (the synchro-modality concept, Klievink et al., 2012) whereas the governmental domain can reap benefits by re-using business source data for customs control purposes (the piggy-backing concept of Tan et al., 2011). Figure 1 provides an overview of the Cassandra Pipeline concept.

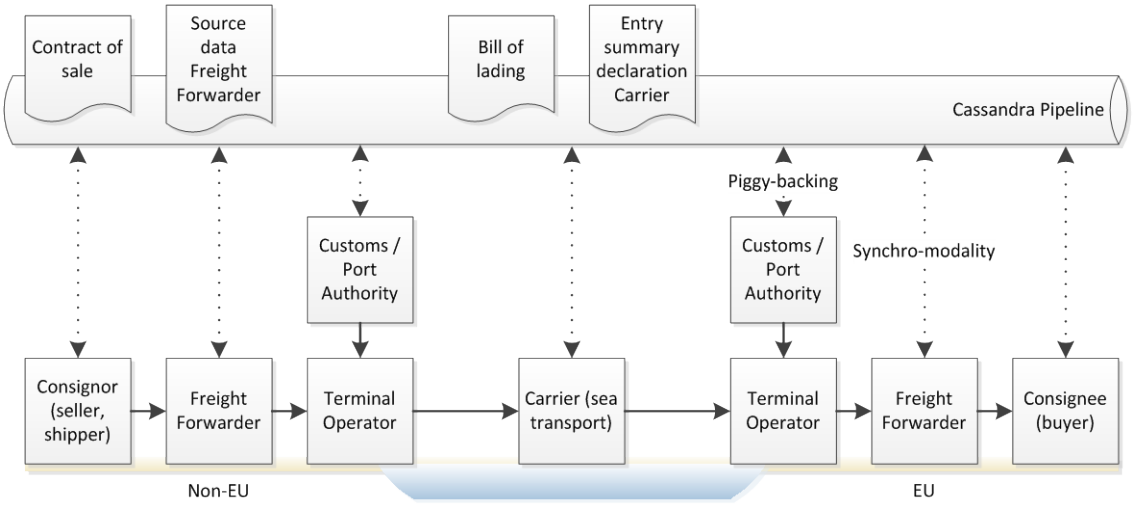


Figure 1: The Cassandra Pipeline concept providing data from the source and connecting key supply chain partners to enhance supply chain visibility of the global supply chain over sea

1 In Greek mythology a woman named Cassandra was given the power to predict the future by the God Apollo who wanted to seduce her. Since she refused his seduction Apollo punished her with a curse of never being believed. The so-called Cassandra syndrome refers to predictions that are not commonly believed at first yet will come true at some point, possibly clarifying the ambitions of the Cassandra Pipeline concept (Wikipedia.org, 2013).

The Cassandra Pipeline concept essentially encompasses the design of an information infrastructure because the concept proposes (Hanseth and Lyytinen, 2010):

- *Sharing* among a growing number of user communities, designers and regulators (generativity);
- *Openness* in that any new IT capability, designer or user community can be added as long as it conforms to the architectural principles regarding data sharing among the pipeline (unboundedness);
- *Heterogeneity* referring to an increase in diversity over time both socially and technically;
- *Evolution* in that it aims to continuously evolve, unlimited by time or user community;
- *Distinct IT capabilities* that are designed, implemented and maintained by designers and users;
- *Distributed and loosely-coupled control mechanisms* among a large set of designers and users.

2.2 Design Theory for Dynamic Complexity in Information Infrastructures

A design theory essentially proposes "how to do something" (Gregor and Jones, 2007, p313). The design theory for dynamic complexity in information infrastructures of Hanseth and Lyytinen (2010) draws upon the Complex Adaptive Systems theory which investigates how self-organising systems adapt and evolve (Benbya and McKelvey, 2006; Holland, 2006). The design theory aims to: "(1) create an attractor that feeds system growth to address the bootstrap problem; and: (2) assure that the emerging system will remain adaptable at 'the edge of chaos' while it grows to address the adaptability problem" (Hanseth and Lyytinen, 2010, p6). In other words, the theory proposes directions in how to achieve momentum and how to allow for adaptability when designing information infrastructures. Three design principles and twelve corresponding design rules for tackling bootstrap problems are provided:

1. Design initially for usefulness:
    - DR1. Target IT capability to a small group;
    - DR2. Make IT capability directly useful without an installed base;
    - DR3. Make IT capability simple to use and implement;
    - DR4. Design for one-to-many IT capabilities in contrast to all-to-all.
2. Build upon existing installed bases:
    - DR5. Design IT capability that does not depend on new support infrastructure;
    - DR6. Deploy existing transport infrastructures;
    - DR7. Build gateways to existing service and application infrastructures;
    - DR8. Use bandwagons associated with other information infrastructures.
3. Expand installed base by persuasive tactics to gain momentum
    - DR9. Users before functionality;
    - DR10. Enhance the IT capability within the information infrastructure only when needed;
    - DR11. Build and align incentives as needed;
    - DR12. Develop support communities.

3 Approach

This research project overall aims to 1) identify issues that could prevent adoption of information infrastructures and 2) design and evaluate corresponding solutions. To achieve this objective this research uses design science of Hevner and Chatterjee (2010) as a research philosophy effectuated with the inductive-hypothetic research strategy of Sol (1982). Accordingly, this research starts with identification of issues from practice that could prevent adoption of information infrastructures and hereafter continues with design and evaluation of corresponding solutions. These solutions are called artefacts that are either constructs, models, methods or instantiations (March and Smith, 1995; Winter, 2008). Four main research phases are identified following an inductive reasoning process:

1. *Exploration:* description of an empirical situation;
2. *Understanding:* abstraction of essential aspects in a conceptual model;
3. *Design:* theory formulation resulting in the creation and implementation of an artefact;
4. *Evaluation:* evaluation (validation) of the artefact.

This paper presents results from the exploration and understanding research phases by presenting issues that are derived from the Cassandra Pipeline project (related to the bootstrap problem of Hanseth and Lyytinen, 2010). The issues are derived from internal project documentation analysis as well as project meetings and project publications. In addition this paper presents potential data sharing solutions linking back to Hanseth and Lyytinen's (2010) design theory for dynamic complexity in information infrastructures[2]. Further identification of issues and design and evaluation of solutions are next steps and therefore recommended for future research.

Hanseth and Lyytinen (2010) applied their design theory to the Internet case study, among others providing a table in which their design principles and design rules are linked to evidence from the Internet design history. In this paper the design theory is applied to the Cassandra Pipeline case study. In terms of openness and control the Cassandra Pipeline information infrastructure differs from the Internet case. The Internet is developed as a loosely-controlled and open information infrastructure whereas the Cassandra Pipeline is developed as a tightly-controlled and restricted open information infrastructure. This acknowledged difference makes investigation whether design principles and rules of Hanseth and Lyytinen (2010) can be applied to the Cassandra Pipeline case an interesting endeavour.

4 Data Sharing Issues

This section provides data sharing issues that can prevent future adoption of the Cassandra Pipeline concept.

4.1 Issue 1: Changing Liability

In the international supply chain goods are sold by sellers (consignors) to buyers (consignees) using a contract of sale. Consignors delegate container transport over sea

2 Hanseth and Lyytinen's (2010) design theory is also applied by Aanestad and Jensen (2011) in the healthcare domain. This paper applies the design theory to the supply chain domain.

to carriers who ensure that goods are delivered to consignees. To acknowledge that the goods have been received for carriage, the carrier issues a transport document to the consignor called the bill of lading for sea cargo. Based on data on the bill of lading carriers also send digital Entry Summary Declarations (ENS) to customs of the destination port where goods enter the European Union (see Figure 2).

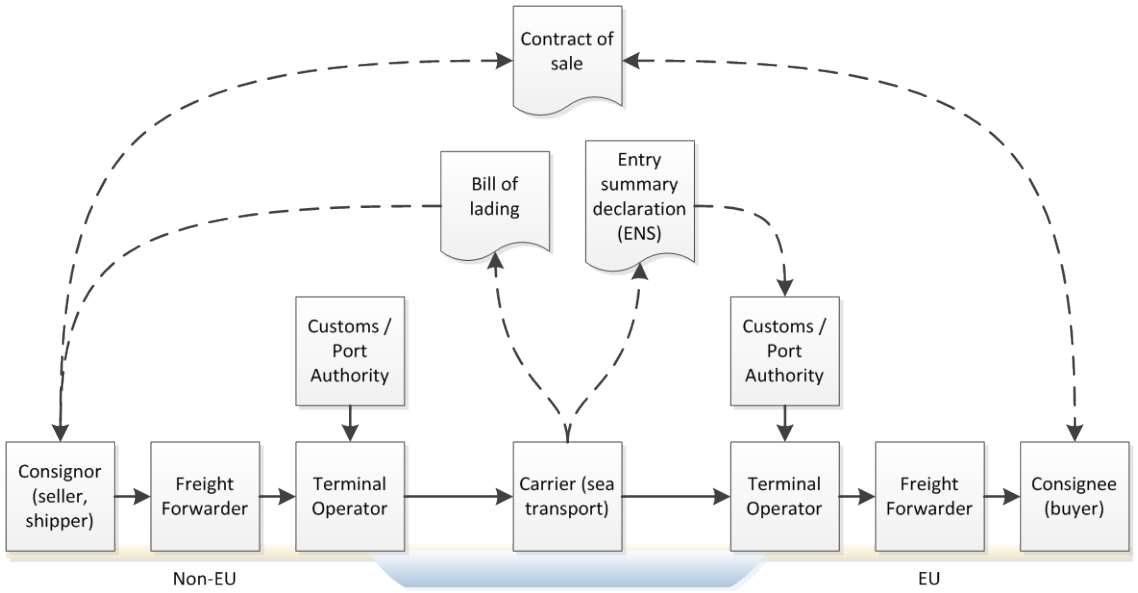


Figure 2: International flow of goods over sea with bills of lading / ENS issued by carriers adding pre-printed clauses to avoid legal responsibility in the current system

From a legal point of view the goods descriptions on the bill of lading and ENS can be used as proof of shipment. As such the ENS can be used for control purposes by customs. In addition the bill of lading can be used for commercial purposes in that it can prove that carriers can be held legally responsible for transportation of the goods on behalf of consignors.

To avoid legal responsibility, carriers often add pre-printed clauses to bills of lading / ENS such as “particulars furnished by shipper”, “quantity, quality, etc. unknown” or “said to contain” (carrier’s “dance” around the description, Hesketh, 2010, p8). This is understandable; carriers are often unable to verify which goods they have received from consignors due to e.g. sealed or locked containers and therefore avoid legal responsibility altogether. Overall the incentive for carriers to avoid legal responsibility is rather large since it poses financial advantages in terms of preventing claims for cargo loss or damage as well as relatively low insurance fees. For example, according to international agreements such as the Hague-Vishby Rules and Rotterdam Rules the maximum liability for carriers with respect to consignors in case of loss or damage of containerised goods is approximately $600 per container. If the carrier would be able to access information that the goods in the containers they are transporting are of higher value (e.g. via the Cassandra Pipeline) their liability in case of loss or damage would increase proportionally. Furthermore, avoiding responsibility ensures that carriers cannot be held accountable by customs when illegal goods are found in containers on their ships. Hence, a key issue that emerged from the Cassandra project revolves around the fear of carriers that the improved supply chain visibility due to the Cassandra Pipeline will increase their exposure to insurance and legal claims regarding the goods they are transporting on behalf of consignors, resulting in potential financial losses.

4.2 Issue 2: Sharing (Commercially Sensitive) Source Data

Many partners in the international supply chain are dependent on the quality of the data they receive. At present supply chain data provided by carriers to customs / port authorities often is of relatively low quality resulting in authorities frequently not knowing which goods are passing by. As mentioned before, a principal objective of the Cassandra Pipeline is to increase international supply chain data quality by obtaining data from the source enabling governments and businesses to conduct higher quality risk analyses. "The best party to provide quality information about the goods being transported is the original seller or another actor that 'packed the box'" (Klievink et al., 2012, p15). In other words, high quality source data for the Cassandra Pipeline should be made available by the consignor or the freight forwarder packing the box. For practical reasons freight forwarders are invited to share source data through the Cassandra Pipeline.

However, freight forwarders are not necessarily inclined to share source data through the Cassandra Pipeline for two reasons. First, the data can be commercially sensitive which could result in freight forwarders potentially being bypassed by partners further up the supply chain once these partners know who originally produced the goods (Klievink et al., 2012). This is supported by Cassandra project documentation in which freight forwarders indicated a moderate lack of trust between supply chain parties as a barrier to data and risk sharing (2012a). The sharing of commercially sensitive source data issue is illustrated by a Cassandra dashboard demonstrator for UK Customs based on source data from China provided by a freight forwarder. The issue expressed by UK Customs was that required source data was not made available to them via the dashboard. The freight forwarder understandably concealed required source data because this data was commercially sensitive and they feared that sharing could result in the data appearing in a Cassandra demo or in public Cassandra project documentation.

Second, commercially sensitive or not, the question remains whether freight forwarders will consistently share high quality source data through the pipeline since sharing is not necessarily beneficial for them. It seems likely that some freight forwarders will put in more effort than others, similar to the current situation in which carriers are providing supply chain data to EU customs (via ENS). Hence, a key adoption issue for designers of the Cassandra Pipeline is that freight forwarders are not necessarily inclined to share source data through the pipeline because 1) the data can be commercially sensitive which could result in being bypassed and 2) data sharing is not necessarily beneficial for them.

4.3 Summary

In short, the aforementioned data sharing issues regarding the Cassandra Pipeline revolve around difficulties for designers to persuade carriers and freight forwarders to adopt the pipeline information infrastructure concept. As such the issues illustrate the bootstrap problem of Hanseth and Lyytinen (2010) which refers to designer difficulties in gaining momentum for information infrastructures when the user community is still small.

5 Potential Data Sharing Solutions

This section first presents two solutions that emerged from the Cassandra project proposing how the aforementioned adoption issues regarding the Cassandra Pipeline can possibly be solved. Hereafter solutions proposed by the design theory for dynamic complexity in information infrastructures of Hanseth and Lyytinen (2010) are included.

5.1 Proposed Solution 1: Restricted Open Access

The Cassandra project clarified that data governance regarding who gets access to which data in the Cassandra Pipeline is required distinguishing between: open access, restricted open access and closed access. As explained in detail in Cassandra project documentation (2012b), the Cassandra Security Framework defines effective ways to securely enable data sharing between supply chain partners through the Cassandra Pipeline, recommending to protect shared data through application of encryption mechanisms, enabling identification and authentication methods as well as security protocols for protection against unauthorised access. Using communities and by distinguishing among data access levels, access to certain data in the Cassandra Pipeline for certain supply chain communities can be restricted, distinguishing for example between commercial data and transport data (Pruksasri et al., 2013). Interestingly, all supply chain data can be transferred through the Cassandra Pipeline using the current IT infrastructure of supply chain partners while certain specific data can still be hidden for certain partners using data encryption methods. For example supply chain data can be transferred through the Cassandra Pipeline using the available IT infrastructure of carriers while access to specific commercial data for carriers can be restricted.

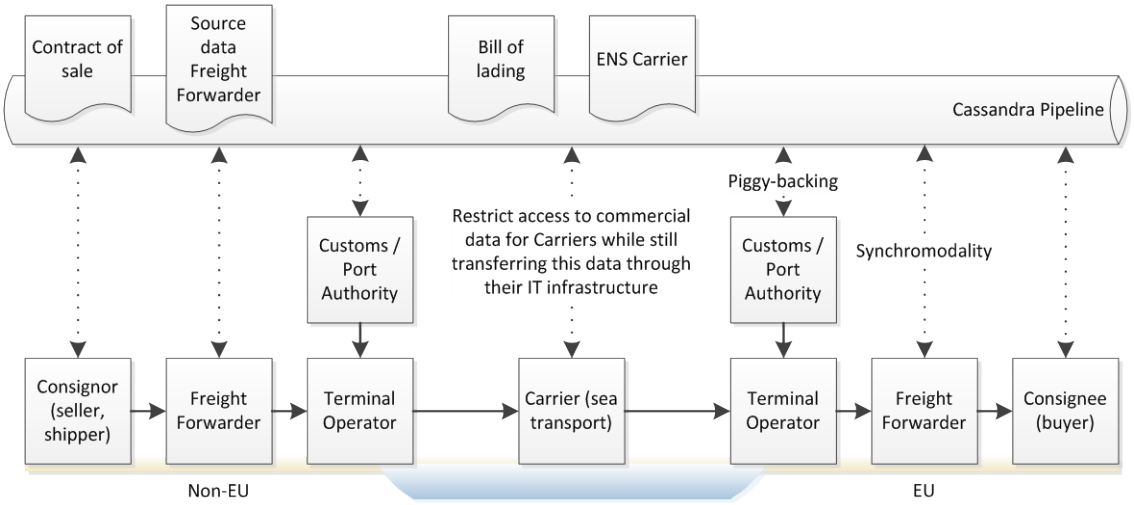


Figure 3: Restricting access to certain data for certain supply chain communities using the Cassandra Pipeline based on the Cassandra Security Framework

Restricting access to certain data for certain supply chain communities to the Cassandra Pipeline could solve several of the aforementioned adoption issues. First, restricting carriers' access to commercial data in the Cassandra Pipeline (e.g. consignor identity or goods descriptions) while still transferring this data through their systems using encryption methods could solve the issue revolving around carriers' increased legal responsibility in that they can continue to avoid liability when they cannot access the commercial data. Carriers are not exposed to increased claims of cargo loss or damage because they can legally demonstrate they do not know what is inside a container when

their access to commercial data in the Cassandra Pipeline is restricted. Second, the issue revolving around freight forwarders' reluctance to share commercially sensitive source data can be solved by restricting access to commercial data in the Cassandra Pipeline for carriers or other partners further up the supply chain. Freight forwarders do not longer have to fear they will be bypassed by carriers or other partners further up the supply chain in case access to their commercially sensitive source data is restricted for these partners, even if this encrypted data is transferred through their IT infrastructure.

It is key, however, to think carefully about the implications of restricting access to the Cassandra pipeline for certain supply chain partners. Restricting access seems to be in contradiction with the aforementioned central characteristics of information infrastructures being sharing, openness, heterogeneity, evolution, distinct IT capabilities and distributed and loosely-coupled control mechanisms (Hanseth and Lyytinen, 2010). Decreasing openness and sharing in the Cassandra Pipeline through a tightly-coupled centralised access control mechanism could reduce generativity, diminishing the potential benefits of the Cassandra Pipeline as an information infrastructure. However, completely open public access to the Cassandra Pipeline is not desirable as well, for example thinking about criminals accessing the pipeline to identify which containers on ships contain valuable goods.

The contradiction between open access and restricted access to the Cassandra Pipeline refers to the *paradox of control* of Tilson, Lyytinen and Sørensen (2010) explained by "opposing logics around centralized and distributed control [resulting in a] paradox of both more and less control" (p754). On the one hand generativity and trust in users is required for an information infrastructure to become successful, yet on the other hand practice often dictates some form of control is necessary as well to prevent potential abuse. Hence, designers of information infrastructures often need to achieve a balance of control between both extremes allowing for generativity on the one hand and preventing abuse on the other. "Apple's iTunes platform […] represents a "different" balance of controls, enabling on one hand a generative platform supporting millions of users and hundreds of thousands of applications, while on the other hand exercising strict control over application approval, payment terms, architectural rules, and many aspects of the internal operations of applications" (Tilson et al., 2010, p755).

For the Cassandra Pipeline the required balance of control suggests a form of restricted open access allowing trusted supply chain partners to access the pipeline if they wish for their own benefits while disallowing partners who will potentially abuse the information retrieved from the pipeline. Overall it is key for designers of the Cassandra Pipeline as an information infrastructure to think carefully about the implications of restricting access, maintaining a balance to allow for generativity while preventing potential abuse at the same time.

5.2 Proposed Solution 2: Non-obligatory Sharing

A complementary way to potentially solve the issue of freight forwarders' reluctance to share data through the Cassandra Pipeline is to make agreements regarding which data they will share. In essence there are two options for data sharing. On the one hand freight forwarders could be invited to decide for themselves which data to share (non-obligatory, bottom-up). On the other hand freight forwarders could be forced to share specific data with EU authorities through the pipeline (obligatory, top-down).

Again it is key for designers to think carefully about the implications of non-obligatory or obligatory data sharing through the Cassandra Pipeline, referring to the aforementioned paradox of control (Tilson et al., 2010). Sharing, (restricted) openness and distributed loosely-coupled control mechanisms seem necessary to allow for generativity and reap benefits from the Cassandra Pipeline as an information infrastructure. This is why non-obligatory sharing seems to fit best.

Combining both proposed solutions regarding data access and data sharing results in four scenarios as shown in Figure 4. The fifth restricted open and non-obligatory scenario seems to be most suitable to pursue for the Cassandra Pipeline, achieving a balance between allowing for generativity and preventing potential abuse.

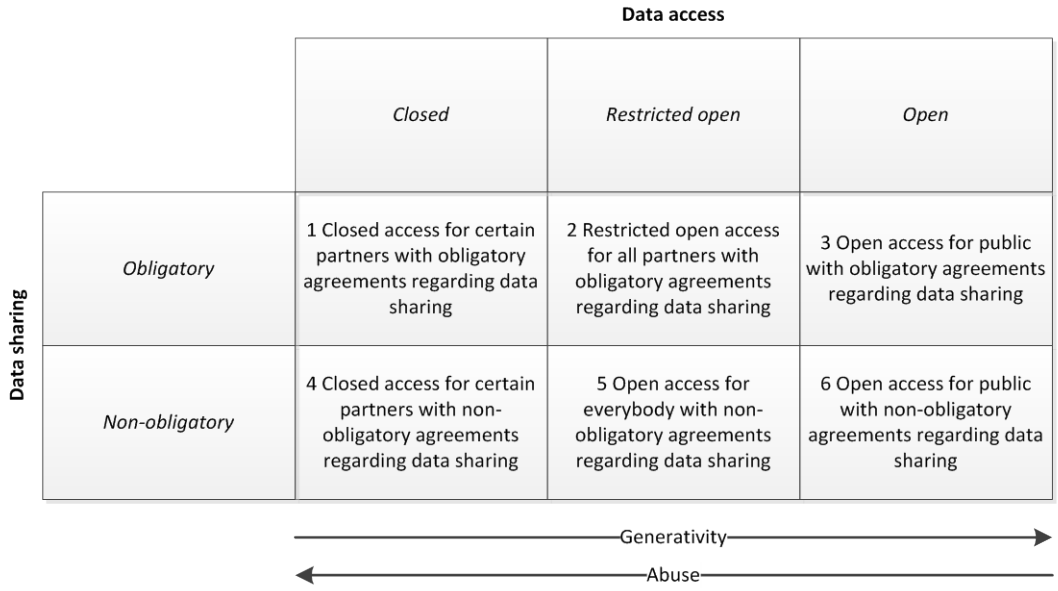


Figure 4: Data access and data sharing scenarios influencing adoption of the Cassandra Pipeline as an information infrastructure

5.3 Directions Proposed by the Design Theory for Dynamic Complexity in Information Infrastructures

Table 1 provides an overview of how three design rules of Hanseth and Lyytinen (2010) that relate to their "design initially for usefulness" principle could prove beneficial to tackle the aforementioned Cassandra Pipeline issues.

Design principle / design rule	**Cassandra directions**
1. Design initially for usefulness	
DR1. Target IT capability to a small group	Implement the pipeline for a small group of partners at start (e.g. freight forwarders and customs)
DR2. Make IT capability directly useful without an installed base	Focus on immediate and direct benefits for the small group of partners (e.g. freight forwarders and customs)
DR3. Make IT capability simple to use and implement	Obtain experience based on the use of simple prototypes and capabilities (e.g. prototype dashboards)

Table 1: Design rules proposed by the design theory for dynamic complexity in information infrastructures linked to the identified Cassandra Pipeline data sharing issues

The issue regarding carrier's increased legal responsibility can be tackled by implementing the pipeline for a small group of supply chain partners at start (DR1) without carriers who will possibly join later on. The issue regarding freight forwarder's reluctance to share commercially sensitive data can also be tackled by implementing the pipeline for a small group at start (DR1) leaving partners further up the supply chain that could bypass freight forwarders initially out of the loop.

The issue regarding freight forwarder's overall reluctance to share source data through the pipeline (commercially sensitive or not) can be tackled by creating immediate benefits for freight forwarders to start using the pipeline (DR2). As explained by Klievink et al. (2012), freight forwarders could for example benefit from their source data when they are able to use this data to decide which mode of transport to use when goods arrive in a port (e.g. rail, road or barge). This is called the synchro-modality concept. When freight forwarders can access source data via the Cassandra Pipeline they know which goods will arrive in a port and when. They can use this source data to choose suitable transport modes based on criteria such as timeliness, costs and CO2 emission. Bananas, for example, need to ripen and therefore can be shipped by slower yet cheaper and lower emission barge transportation whereas strawberries need to be transported by quicker yet more expensive and higher emission road transport. A simple prototype decision support system (DR3) that uses source data for synchro-modality purposes could convince non-EU freight forwarders to share source data through the pipeline for their EU counterparts.

6 Conclusions

The aforementioned data sharing issues regarding the Cassandra Pipeline that revolve around carrier's changing liability and freight forwarder's reluctance to share source data can be potentially solved through restricted open access and non-obligatory data sharing. In addition design rules of Hanseth and Lyytinen (2010) can be applied, clarifying that the recommended way for designers of the Cassandra Pipeline to gain momentum is by starting small, persuading supply chain partners to join using simple prototypes and gradually expand in correspondence with the partners.

It is key, however, that designers of the Cassandra Pipeline as an information infrastructure think carefully about the implications of restricting access and non-obligatory or obligatory data sharing. A balance of control is required both allowing for generativity and trust in the pipeline line while preventing potential abuse of the pipeline at the same time. Designers of information infrastructures need to achieve a careful balance between traditional top-down design approaches to prevent abuse and bottom-up experimental design approach to allow for generativity.

Future research will focus on further identification of issues in the international supply chain over sea and air that could prevent adoption of information infrastructures. The issues will be derived from new case study material and included in a framework. In addition, similar to Aanestad and Jensen (2011) for the healthcare domain, future design efforts will focus on creating and evaluating supply chain solutions based on the identified issues to complement the work of Hanseth and Lyytinen (2010) and formulate a comprehensive design theory for information infrastructures that will be validated through instantiated solutions.

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Design Requirements for Collaboration Processes to Increase Customer Trust in Mobile Banking Platforms

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Abstract

Banks expect the mobile channel to become more important for collaborating with customers. However, a lack of trust continues to prevent a faster dissemination of such mobile banking services, especially for the private banking customer segment. Hence, this paper discusses various determinants of trust and follows a theory-driven approach rooted in the collaboration engineering methodology. Grounded in the calculative-based, relational-based and institution-based views of trust, we derive the following design requirements for collaboration processes on mobile banking platforms: security, privacy, transparency, familiarity, social presence and normality. By validating these requirements with expert interviews, we contribute to existing theory by adding transparency as a design requirement for a collaboration process that fosters trust. Moreover, contrary to existing theory, we did not confirm familiarity as a requirement in this study.

Keywords: Mobile Banking, Collaboration, Trust, Collaboration Engineering

1 Introduction

Recently, one can observe more customers interacting with banks on mobile platforms such as mobile banking apps or mobile websites instead of visiting a physical branch. For example, JPMorgan Chase & Co reported a 30% increase in new mobile customers in 2013, and Wells Fargo & Co published similar numbers (Ryan, 2013). Moreover, banks expect the mobile channel to become even more important and to account for 40% of client interactions by 2015 (PwC, 2013). Despite this trend, mobile banking services are perceived as less trustworthy than online banking or ATMs (Camhi, 2013). A study reveals that the private banking segment is accordingly concerned with perceptions of mobile banking and new IT tools (Finews, 2013). Many banks, thus, currently focus on increasing trust in digital channels in order to deal with rising security concerns, particularly for the private banking segment (PwC, 2013). Within this study, we choose a theory-driven approach based on collaboration engineering methodology to derive requirements for designing collaboration processes between a relationship manager (RM) and a customer on mobile banking platforms. The

objective of this collaboration process is to foster trust from private banking customers with respect to this digital interaction. Thus, we pose the following research question:

What are the design requirements for collaboration processes that increase trust between a relationship manager (RM) and a customer on mobile banking platforms?

First, we consider the related work with regard to trust and the determinants of trusting relationships. Second, we discuss the collaboration engineering method, a theory-driven approach to identifying the design requirements that facilitate high-value and recurring collaborative interactions. Third, the validation of design requirements with expert interviews is proposed. Following the validation, we present and discuss the results, as well as the implications for practitioners and scholars.

2 Related work

2.1 Definition of trust

Customer collaboration with an organization, especially through digital channels, entails a considerable risk. Researchers argue that a trustor and trustee who communicate through such digital channels must rely on fewer social cues, resulting in an increased perceived risk, compared to traditional face-to-face interactions (Cascio, 2000; Jarvenpaa et al., 1998; Zack, 1993). This also applies to private banking customers interacting with a relationship manager (RM) on mobile platforms, e.g. mobile apps or mobile websites. According to the literature, such an interdependent and risky environment requires trust in order to facilitate sustainable relationships (Coleman, 1994; Kanawattanachai & Yoo, 2002; Lewis & Weigert, 1985; Rousseau et al., 1998), effective collaboration as well as information exchange (Gambetta, 1988; Larzelere & Huston, 1980). Accordingly, Rousseau et al. (1998) define trust as follows: "Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another."

2.2 Determinants of trust

Scholars have widely discussed trust and trust-building processes, and recently in the context of digital platforms such as e-commerce (Hoffman et al., 1999). While some authors see trust as a static construct, such as the initial state of trust (Meyerson et al., 1996), others regard trust as dynamic and being developed over time (McKnight et al., 2002; Rousseau et al., 1998). Private banking customers engaging with an RM on mobile platforms generally have an established relationship with their bank. Thus, banks should strive to reassure and confirm these positive associations based on existing relationships. However, the literature on trust in the context of online banking or mobile banking is rather limited, with only few exceptions (Kim et al., 2009; Yousafzai et al., 2003). Moreover, the specific context of building trust through a collaboration process between an RM and a private banking customer on mobile platforms has not been addressed by the research community. Hence, we consider the work of authors who examine various views of trust-building on digital platforms such as e-commerce and apply this knowledge base to our specific context. These views include (1) cognition-

based, (2) personality-based, (3) calculative-based, (4) relational-based and (5) institution-based trust.

Starting with (1) *cognition-based trust,* this view studies the state of initial trust based on impressions prior to an established relationships (Crisp & Jarvenpaa, 2013; Jarvenpaa et al., 1998; McKnight, Cummings, & Chervany, 1998; Meyerson et al., 1996). As we do not focus on banking customers who have no previous relationships with their banks, this cognition-based view of trust is not relevant in this paper.

Furthermore, (2) *personality-based trust* refers to the trusting beliefs of a person (McKnight et al., 1998). Research has shown that this disposition to trust is based on beliefs that other people are trustworthy, reliable and well-meaning (Wrightsman, 1991). Within this paper, we focus on established relationships rather than on initial trust (McKnight et al., 1998; Meyerson et al., 1996). Thus, we consider the view of personality-based trust as irrelevant to this study.

However, we include the construct of (3) *calculative-based trust*. Parties within a relationship weigh the benefits of the relationship against the costs of opportunistic behavior (Coleman, 1994; Williamson, 1993). A conviction that the benefits of engaging in opportunistic actions exceed the costs builds trust among the parties. Hence, it is in the best interest of the trustor and trustee to maintain and foster such a trusting relationship (Gefen et al., 2003). In this study, if the customer realizes that it is in the best interest of the RM and the bank to give good advice, customer trust will be increased.

Relational-based trust (4) refers to an existing relationship. Previous risk-taking actions and the successful fulfilment of positive expectations foster trust among the parties (McAllister, 1995; Rousseau et al., 1998). Contrary to calculative-based trust, this view is characterized by a sense of shared identity. While relationships that depend only on calculative-based trust are more fragile and more exposed to violations, relational-based trust relationships are more resilient (Rousseau et al., 1998). Given that we focus on established relationships between banks and customers, we include this view of trust.

Finally, (5) *institution-based trust* also entails determinants. This view elaborates the causes with regard to the overall system that encompasses the trustor and the trustee. Characteristics of such a system are structural assurance and situational normality (McKnight et al., 1998). We consider these characteristics relevant in fostering the trust-building process within this paper.

3 Method

Collaboration processes between customers and financial advisors on mobile banking platforms are high-value interactions and recur constantly. The facilitation, design and deployment of such collaborative interactions is the aim of a collaboration engineering approach (de Vreede, Briggs, & Massey, 2009). We apply the methodology of collaboration engineering in order to facilitate high value and recurring collaboration processes (Kolfschoten & de Vreede, 2007). The collaboration engineering approach consists of five phases. In this paper, we begin with the initial step to specifying the design requirements or goals for such collaboration processes on mobile banking platforms between an RM and a

private banking customer. We commence with an iteration round validating our findings with expert interviews.

In order to identify the design requirements, the collaboration engineering approach suggests referring to the existing literature and established theory (Briggs, 2006). We focus on theories from the e-commerce literature that explain the determinants of trust and use them in the context of building trust through a collaboration process on mobile banking platforms between an RM and a private banking customer. Moreover, we introduce the construct of transparency to serve as a design requirement for the collaboration process. The next section sheds some light on the theoretical model and the derived requirements.

4 Theoretical model and design requirements

The three views of trust (1) calculative-based, (2) relational-based and (3) institution-based guide us in developing a theoretical model and in deriving the design requirements. Following Rousseau et al. (1998), who state that the trust-building process depends on the specific context, we specify each view in relation to collaboration processes on mobile banking platforms.

The (1) *calculative-based* view of trust is dependent on the customer perception that the bank does not gain from pursuing short-lived and individual goals such as increasing its own profits to the detriments of clients. Rather, the economic opportunities of engaging in a relationship with the bank outweigh the potential risks. Nussbaumer et al. (2012) as well as Schwabe et al. (2008) evaluated the effect of transparency in advisory services for financial institutions and travel agencies. They conclude that transparent information exchange and decision-making processes increase the perceived customer trust by reducing information asymmetries between the customer and the organization (Schmidt-Rauch, Schaer, & Schwabe, 2010). Accordingly to their argumentation, increased transparency should reduce the risk of the bank not acting in the best interest of the customer. Thus, in the light of calculative-based trust, we introduce transparency as a design requirement for the collaboration process. With regard to minimizing the risks, we also value security as an important design requirement. This is even more important when it comes to exchanging personal financial information through digital channels (Featherman & Pavlou, 2003). In order for a customer to trust such a web platform and to feel comfortable exchanging sensitive financial information, a secure environment is of the highest priority. The customer should positively assess the company's ability to securely execute his requests (Zhou, Dai, & Zhang, 2007). Hence, for a start, a traditional secure login is required. Biometric features, such as fingerprints or iris scanning, may further increase customer perceptions of security and thus lead to an increase in trust (Mukherjee & Nath, 2003). Besides minimizing security risks, the customer is also concerned with privacy issues. Revealing personal financial information makes the customer vulnerable in various respects (Wang, Lee, & Wang, 1998). Thus, collaboration processes that involve the customer exchanging personal information should reduce the perceived risk that privacy is jeopardized.

When it comes to (2) *relational-based trust,* we focus on established relationships between an RM and a private banking customer. One element that fosters trust in established relationships is perceived familiarity. Gefen et al. (2003, p. 63) define the concept as follows: "Familiarity

is the experience of the what, who, how and when of what is happening." Furthermore, familiarity is defined as a consistent customer experience with previous organizational touch-points (Gefen et al., 2003). This accumulation of previous experiences with that particular organization is said to foster customer trust (Gefen, 2000). With regard to the design requirements for collaboration processes, we argue that the customer experience through all different channels, e.g. online banking, mobile banking as well as the bricks-and-mortar banking, should allow for a consistent customer experience. The literature states that trust spreads across various communication channels, e.g. from online to mobile or vice versa (Kang et al., 2011; Lin et al., 2011).

With respect to relational-based trust, we also consider social presence as fostering the trust-building process. Social presence means that the customer is not only able to interact with the organization or a relationship manager personally, but is able to exchange information and opinions among his or her peers (Gefen & Straub, 2004). In the context of a banking platform, we derive the following requirements: the customer should be able to interact with the RM through rich media. Furthermore, we also find that a customer can build financial communities within his family and friends and share documents and personal information. The validation of expert interviews should confirm that such measures support the perceived social presence and therefore, foster trust in collaboration processes.

Determinants		**Design Requirements**
(1) Calculative-based trust	• The ability of a website to securely execute customer requests (Zhou et al., 2007). • Transparent information exchange and decision-making process (Nussbaumer et al., 2012)	• **Security, Privacy**: Use secure login procedure, biometrics logins might further increase the customer's perception of security. • **Transparency**: Transparent information exchange.
(2) Relational-based trust	• Familiarity of the customer when, how, who and what is happening (Gefen et al., 2003).	• **Familiarity**: Consistent customer experience across different channels.
	• Possibility to personally or socially engage with the organizations or to exchange information among peers (Gefen & Straub, 2004).	• **Social Presence**: Instant messaging, live-chat or other ways to interact with a financial advisor, customer representative through rich media. • **Social Presence**: Possibility for customers to build financial circles among family members and friends, to share and exchange information.

(3) Institution-based trust	• Similar customer experience to other platforms (Gefen et al., 2003). • Customer is not required to learn new ways of interacting with the platform.	• **Normality**: Accessing information should be consistent with social media and mobile platforms the customer already knows. The same applies to communication features such as chat and messaging.

Table 1: Design Requirements for Building Customer Trust

The view of (3) *institution-based trust* considers aspects of the environment and system that should facilitate the trust-building process (McKnight et al., 1998). Related to the institution-based view of trust, one of the aspects discussed in the literature is perceived normality. Gefen et al. (2003) refer to normality as the consistency with previous experiences on websites in general, meaning that the communication possibilities, such as chat features and messaging clients are structured and designed in the same way as other services. Thus, it is important for the collaboration patterns and interactions with the bank to remind the customer of other familiar platforms, e.g. social media websites and messaging services on mobile devices. This will reduce the necessary customer effort and time to learn new ways of accessing information or collaborating with organizations and thus increases the trustworthiness of the platform (Li, Rong, & Thatcher, 2009).

Table 1 provides an overview of the derived requirements of our theoretical model. In the next section, we will describe the validation of the proposed model and the derived design requirements.

5 Validation

Expert interviews are among the most relevant research methods for gathering rich qualitative data (Myers & Newman, 2007). By conducting expert interviews, we evaluate the usefulness (Sonnenberg & vom Brocke, 2012) of the proposed artifact. The interviews were pre-tested and adjusted continuously. We chose a semi-structured approach with a predefined script that ensured all relevant questions were covered. This approach also allowed for open discussions during the interviews. The interviews started with open-ended questions (how could we increase customer trust in collaboration processes on mobile banking platforms?). We continued by introducing each design requirement that we had derived from theory and asked the experts for their opinions (how do you think the design requirement “normality” can build trust in a collaboration process between a RM on a mobile banking platform?). We interviewed 5 experts from banks as well as from consulting firms. The interviewees have extensive industry experience and are knowledgeable about the perceptions of RM and customers. Therefore, we consider the 5 experts to qualify for evaluating the proposed design requirements in this study. Table 2 reveals the position of the interviewees. The interviews lasted for about 40 to 55 minutes and each was transcribed according to common research

standards. The results were entered into a database[1]. We coded the transcripts based on the design requirements that we had derived in a theory-driven approach.

Interviewee	Position
INT01	Responsible for projects and infrastructure at a Swiss private bank
INT02	Senior consultant at a technology company with a focus on the financial service industry
INT03	Banker at an international private bank
INT04	Community manager for investment advisors at a Swiss bank
INT05	Investment advisors at a Swiss bank

Table 2: Interviewees and Positions

6 Results and discussion

We now present and discuss each of the derived design requirements for building trust through collaboration processes on mobile banking platforms. Table 3 summarizes the results from the expert interviews.

The first design requirement, (1) security and privacy, was acknowledged and confirmed by all the experts (5 of 5). The security standards of such a platform should meet the expectations that the customer experiences from a typical online banking or mobile banking login. Moreover, the experts mentioned customer concern with regard to privacy, particularly in the light of the current NSA discussion (INT01):

"Does the customer really trust the bank that the security and privacy standards are sufficient? The customer needs to know that communication with the relationship manager cannot be intercepted by third parties."

Another expert confirms this statement and emphasizes that discretion is vital for customer trust, especially through digital channels such as videoconferencing (INT03):

"The client appreciates the discretion in a face to face call because they know who is around. In a videoconferencing call they do not know who is behind or next to you or listening to the conversation, the environment in which you make this call."

Among the second design requirement (2) of transparency, there was consensus (5 of 5) that this a vital prerequisite for building customer trust. One way to achieve this is to provide the customer with the same information and tools as the relationship manager. This should signal to the client that the bank has nothing to hide and that the investment advice is unbiased (INT04):

1 We used ATLAS.ti Software to store and code our transcripts.

"I propose that the bank should provide the customer with the same tools as the relationship manager. The customer needs to know that the bank has no interest in biased financial advice that maximizes its own revenues."

Moreover, the customer always needs to be aware of what data is transmitted on the mobile banking platform and of what he agrees to (INT01):

"You probably would also not trust an app that uses your location data without asking you for permission."

Design Requirement	Representative Quotation	Count[2]
(1) Security, Privacy	*"Does the customer really trust the bank that the security and privacy standards are sufficient?"* INT01	**5**
(2) Transparency	*"I propose that the bank should provide the customer with the same tools as the relationship manager. The customer needs to know that the bank has no interest in biased financial advice that maximizes its own revenues."* INT04	**5**
(3) Familiarity	*"As a bank you have a lot of channels and you need to make sure that the customer experience is somewhat similar across these channels."* INT02	**1**
(4) Social Presence	*"Personal financial advice is not bound to the medium. For example, a richer medium does not necessarily result in a more personal interaction. The specific content makes the interaction between a relationship manager and the customer personal."* INT04	**4**
(5) Normality	*"We have looked at extraordinary financial portals in order to get some ideas on how to design a mobile banking platform for our customers."* INT05	**4**

Table 3: Validation of the Design Requirements

Another expert mentions the potential benefits of digital channels when it comes to giving financial advice. He refers to screen sharing and visualization tools that help the customer to follow the decision-making process (INT03):

"…I think by using the tools available that you actually highlight and simulate the investment product or the advice on the mobile platform that you give. That would be the value added."

2 The count refers to the number of interviewees (out of 5) that mention the requirement as relevant for designing collaboration processes on mobile banking platforms.

With respect to the design requirement (3) of familiarity, we only found limited support from the experts (1 of 5). This requirement was not mentioned by 4 of 5 experts with regard to building trust. However, one person mentioned a different experience across various communication channels (INT02):

"As a bank you have a lot of channels and you need to make sure that the customer experience is somewhat similar across these channels."

However, the experts agreed on the fourth design requirement (4) of social presence (4 of 5). With regard to social presence, the expert moreover agreed that social presence and personal interaction are not dependent on the richness of the communication channel (INT04):

"Personal financial advice is not bound to the medium. For example, a richer medium does not necessarily result in a more personal interaction. The specific content makes the interaction between a relationship manager and the customer personal."

According to the literature, social presence also refers to interacting with peers and with a community. This aspect was not confirmed throughout the interviews. One expert specifically voted against such a community approach (INT01):

"Something that we are not considering is to build a community for our customers. That is not our focus."

The fifth design requirement (5) normality was also confirmed by most of the experts (4 of 5). Interviewees mentioned that other financial portals or social media platforms serve as a proxy for developing the mobile banking platform (INT05).

"We have looked at extraordinary financial portals in order to get some ideas on how to design a mobile banking platform for our customers."

The same view is represented by another expert (INT02):

"When we implement a new feature, we often look at what Apple does or Facebook or other Apps that are highly successful…"

Only one of the experts did confirm the importance of normality as a design requirement for building trust.

7 Conclusions

Following the collaboration engineering methodology, we chose a theory-driven approach to derive design requirements for building customer trust through collaborating with customers on mobile banking platforms. The proposed requirements of security, privacy, transparency, familiarity, social presence and normality have been validated by conducting 5 expert interviews. This evaluation reveals several specific findings and implications for scholars.

First, with the exception of familiarity, all other design requirements were mentioned by the majority of the experts (4 or more), to be relevant for designing collaboration processes between an RM and a private banking customer on mobile banking platforms. The main contribution of the present study is the introduction of transparency, which should be valued

as a construct for fostering trust. Moreover, only one of the experts explicitly stated that the cross-channel experience and familiar collaboration processes (familiarity) across different platforms are important. Thus, future research should further evaluate the construct of familiarity and its effect on building customer trust in collaboration processes.

Second, although social presence was among the design requirements that were widely acknowledged by the experts, social presence in terms of customers being able to interact with other customers was not confirmed throughout the interviews. This might be because the private banking customers segment has no interest in collaborating with other peers. One of the experts mentioned that a community might be beneficial for retail, but not for private banking customers. Future research should therefore evaluate whether the proposed findings can be generalized to different customer segments.

Not only scholars, but also practitioners can draw some useful conclusions from this study. A lack of customer trust is among the top concerns in offering mobile banking services. The proposed design requirements help banks in deciding on how to build collaboration processes between an RM and a private banking customer on mobile devices. Banks should especially focus on the aspects of privacy and security of such mobile banking platforms. One of the elements that practitioners might still need to discuss and consider is whether to implement biometrics and more advanced authentication processes. This present study did not reveal specifically that such advanced authentication approaches increase trust. Moreover, in the light of social presence, providing personalized content and services might have a greater impact in building customer trust than the richness of the communication channel itself, e.g. videoconferencing. Thus, banks should focus on identifying customer needs individually and adjusting the collaboration processes on mobile banking platforms accordingly.

The validation of the proposed requirements was conducted by 5 expert interviews, although, these interviewees did not include RM or private banking customers. Thus, the findings of this study are limited to this first iteration and need to be further validated, for instance, with case studies or experiments testing a collaboration process in a real-life context with RM and customers. Moreover, we explicitly focused on the private banking customer segment. Hence, the findings might not apply equally to retail and private banking customers and might thus not be transferable.

Despite these limitations, we answered the research question and proposed a theoretical model and design requirements that should foster trust, which in turn promotes collaboration with customers on mobile banking platforms.

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Realizing Value From Tablet-Supported Customer Advisory: *Cases From the Banking Industry*

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Abstract

Tablet computers (tablets) have gained much attention in research, the application in a banking industry context remains somewhat unexplored. In particular, tablets could enhance customer-facing business processes, such as face-to-face advisory processes in the banking industry. This paper analyses the potentials of tablet-supported customer advisory and the impact on the advisory process based on expert interviews with three financial institutes. The study provides evidence that tablets promise to add value in a face-to-face advisory situation and may have an impact to the traditional advisory process.

Keywords: Advisory process, tablets, banking, mobile, value creation, case study

1 Introduction

Since the introduction of the iPad in 2010, tablet computers ("tablets") have led to a significant change of the whole personal computer (PC) market. In 2010 they counted for 5.1% of the total PC sales volume. This rose to 20.9% in 2012 and is predicted to reach at least 35.9% in 2015 (Computer Industry Almanac Inc., 2012).

Tablets have become a new class of devices that enable an intuitive way to obtain, browse and share information as well as to easily interact with tablet-based applications (apps) (e.g. Willis, 2011). Regarding the use of tablets in business, McIntyre (2011) suggest that the salesperson-customer-interaction seems to have a potential for tablet use since salespersons often still work with paper or use multiple systems in customer interaction. Also, they are positioned as professional solutions for salespersons and customers often have difficulty in understanding the system dialogues (Ahearne & Rapp, 2010).

Tablets could be a solution for solving these challenges because they integrate all customer relevant data and information on a single device and thus offer the possibility to provide automated support during the advisory processes. This development is driven by the improved visualization of complex data, the user adoption enabled by the ease of use and the enhanced sales content presentation for proposals, which together provide an improved collaboration context in customer-facing situations, or in Gartner's language a so called "interactive selling" (Desisto, 2011).

Tablets have thus the potential to change sales organizations' way of how conduct customer advisory in the future. Shegda and Chin (2012) for example outlined the future relevance of tablet solutions in their research but comparatively few research has focused on the use of tablets in different settings. The state-of-the-art-field covers areas such as the business workspace (e.g. Harris, Ives & Junglas, 2012), the educational situation of CIOs (Bonig, 2011) or the dialogue setting between a doctor and the patient (e.g. Weiss, 2011). Only little research was available regarding the use and the potentials of tablets in customer-facing advisory situations and their impact on the advisory process. As such, there is a lack of understanding on the potentials that could be generated through tablet-supported advisory in banks and the impact on the entire advisory process. This paper analyses tablet-supported customer advisory in the context of a case study research and addresses the following research questions:

- *RQ 1:* What are the potentials of tablet-supported face-to-face advisory in the banking industry?
- *RQ 2:* What are the implications of a tablet-supported face-to-face advisory on the advisory process?

These questions are answered by the results of three case studies that were conducted through semi-structured expert interviews with three major banks. Section two of this paper introduces the theoretical concepts, followed by a section that describes the research methodology and the results from the three case studies. The final section summarizes the results, discusses the limitations and provides an outlook on future research.

2 Theoretical Background

2.1 Customer Advisory at Banks

This paper defines customer advisory at banks as "one interactive, collaborative information channel, available to an individual seeking assistance in reaching investment

decisions" (Nussbaumer et al., 2009). Based on the literature (see Lippitt & Lippitt, 1986; Sadler, 2001; Stryker, 2011) the advisory process may be classified in six major phases: *Initiation* (preparation of the customer meeting), *profiling* (determination of the target situation based on customer's needs), *concept* (developing a solution based on the customer's situation and requirements), *offer* (presentation and discussion of the specific offer), *implementation* (implementing strategies into product portfolios) and *maintenance* (monitoring and updating the customer's requirements and optimizing strategies).

Ahearne and Rapp (2010) suggest a salesperson-customer IT continuum, representing five types of IT that vary from focusing solely on the salesperson's use to focusing entirely on the customer's use, with several other intermediate forms (see Figure 2). They define the role of IT as "any type of IT that can help to enable or facilitate the performance of sales tasks on behalf of the salesperson or the customer" (Ahearne & Rapp, 2010). According to their research, the largest potential for future research is in the middle of the continuum; i.e. in the salesperson-customer-shared technologies, when both the customer and the salesperson actively use the technology. Hence the focus of this paper analyses the use of tablets in salesperson-centric and salesperson-customer shared situations and applies those to the generic advisory process. To answer RQ2, the impact of a tablet-support advisory was analysed along the advisory process in a salesperson-centric and salesperson-customer shared situation.

2.2 Potentials of IT Innovations

The analysis of potentials of IT-based innovations has a long tradition in information systems research (e.g. Brynjolfsson & Yang, 1996). Three elements have been found relevant for user adoption of IT-based innovations: Technical compatibility (does the technology fit in the context?), technical complexity (is the technology easy to use?), and relative advantage (is the technology perceived as useful?) (Bradford & Florin, 2003; Crum, Premkumar & Ramamurthy, 1996). The relative advantages describe the potential of a technology. As this paper focuses on the potentials of tablets, the relative advantage is the major element used in the following (see Figure 1). Consequently, other factors, such as technical compatibility and technical complexity, were not analysed in this paper. To differentiate the elements of relative advantages, the model of Markus and Silver (2008) was applied, which describes the determination of IT-related potentials. This model will be used to identify potentials of tablet use in face-to-face customer advisory processes (see Table 2) and to answer RQ1. The model from Markus and Silver (2008) distinguishes between three factors that are relevant for the determination of IT-related potentials:

- *Technical objects* such as tablets are IT artefacts including specific components, among them material and immaterial aspects. The properties (e.g. touchscreen) are necessary conditions for user perception and to use them with particular implications. Thus, mobility, presentation and navigation/interaction are technical objects (see Table 2)
- *Functional affordances* refer to characteristics of the IT artefacts such as mobility that may be analysed in the context of specific business processes. For exam-

ple, the touchscreen of a tablet allows an easy profiling of a customer's investment needs.

- *Symbolic expressions* are defined as the "communicative possibilities of a technical object for a specified user group" (Markus & Silver, 2008, p. 623). The message from the designer of a tablet solution is the ease of use and the support of an understandable advice.

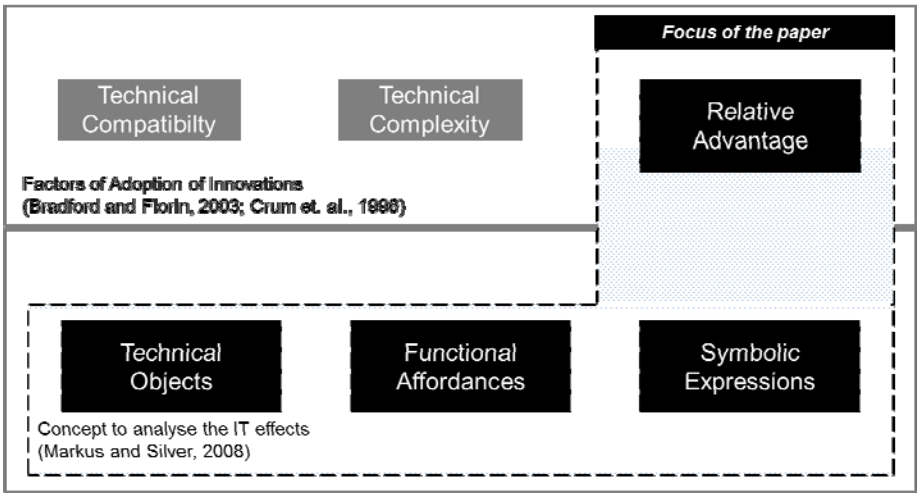


Figure 1: Theoretical framework

3 Research Methodology

In order to determine the relative advantage and implications of tablet-supported advisory a multiple exploratory case study design was chosen (Yin, 2003). Three different cases were selected by a pre-study according to several distinguishing aspects such as the number of advisors using the tablet, the advisory focus and the customer segments. The "advisory focus" covers the different application areas of tablet solutions such as financing, payment and investment. The "customer segment" points out the different target groups such as retail/affluent (using standardized banking solutions), private (using individualized banking solutions) or corporate clients. The study focuses on both universal and retail banks. All names of the participating institutions were anonymized. Table 1 provides an overview of the case characteristics.

The data was collected between 2012 and 2013 through interviews with experts of each case, which hold senior positions in their respective organizations. Semi-structured questioning techniques were used, followed by an iterative evaluation process. The interviewees received the interview guidelines prior the contact via e-mail, together with some information concerning the goal of the research study, and the use of data (Myers & Newman, 2007). The interviews were led by two interviewers to ensure comprehensiveness and increase validity and objectivity of the field notes.

The data was iteratively analysed in two steps regarding to Eisenhardt (1989). First a within-case analysis was done with detailed case study write-ups for each case (Eisenhardt, 1989). Later the data was structured according to the IT-related potentials of Markus and Silver (2008) (see Table 2). The structure of functional affordances and

technical objects helped to look at the data in a divergent way to identify within-group similarities coupled with intergroup differences (Eisenhardt, 1989) as well as potentials along the process.

	# of advisors using the tablet	Year of implementation	Duration of the project (in years)	Advisory focus	Customer segment	Operation System	Interviewees	Interview Duration (in minutes)
Case 1 (Universal Bank)	45	2011	< 0.5	Financing	Retail/ Affluent	iOS	Head of sales application and alliance	90
Case 2 (Retail Bank)	125	2010	0.5	Payment, Financing and Investment	Retail/ Affluent and Corporate	iOS	Head of Business Intelligence	120
Case 3 (Universal Bank)	200	2011	<1	Financing and Investment	Retail/ Affluent, Private, Corporate	iOS and Windows	Director of Innovation Factory	90

Table 1: Case study characteristics

4 Research Results

4.1 Relative Advantages of a Tablet-Supported Advisory Process

Tablets have many functions in common with desktop and laptop computers (send e-mails, etc.), but they have decisive features that are different from those or even smartphones (Pitt, Berthon & Robson, 2011). According to the salesperson-customer interface technology continuum of Ahearne and Rapp (2010), tablets can theoretically be used in all phases of the advisory process (see Figure 2). The focus of this paper specifically analyses the use of tablets in salesperson-centric and salesperson-customer shared used situation and applies those to the generic advisory process:

- *Initiation:* The advisor prepares the customer meeting by analysing customer data, goals, etc. The tablet supports him by an integrated view of all relevant data that is available not only in the branch, but also for home visits. The possibility to access all data mobile allows the advisor to flexibly change locations. Another benefit of tablets is the enhanced visualization possibilities of complex data through a simple user interface.
- *Profiling:* Profiling covers customer's profile and the generation of finance-specific profiles (e.g. investment profiles). The tablet is able to simplify this profiling and even make it more attractive through touchscreen-based graphical tools. Often, profiling at banks is still based on paper sheets that customers are required to complete during the meeting. For profiling, tablets can provide added value because all notes are directly recorded in a digital format.

- *Concept:* The customer and the advisor jointly develop individual financial solutions according to the customer needs. The tablet can support this process by simplifying complex scenarios through enhanced visualisation capabilities. Tablets offer new ways of solution creation (e.g. a time line that displays the individual customer life cycle) and enable scenario development by adding and changing life events through touchscreen. Thus tablets offer a good compromise of adequate simplicity and transparency of the developed solution.
- *Offer:* This phase includes the preparation of a product offering. In this process step tablets can provide functionalities to link specific products to the customer life cycle. The advisor and the customer can customize the products to the customer's individual needs (e.g. a fund product for which the asset allocation may be adapted by rotating a wheel-based graphical representation). The use of tablets for accepting and signing the offer is not enabled in most cases.
- *Implementation and Maintenance:* In the analysed cases, the implementation and maintenance phases were not supported by tablets.

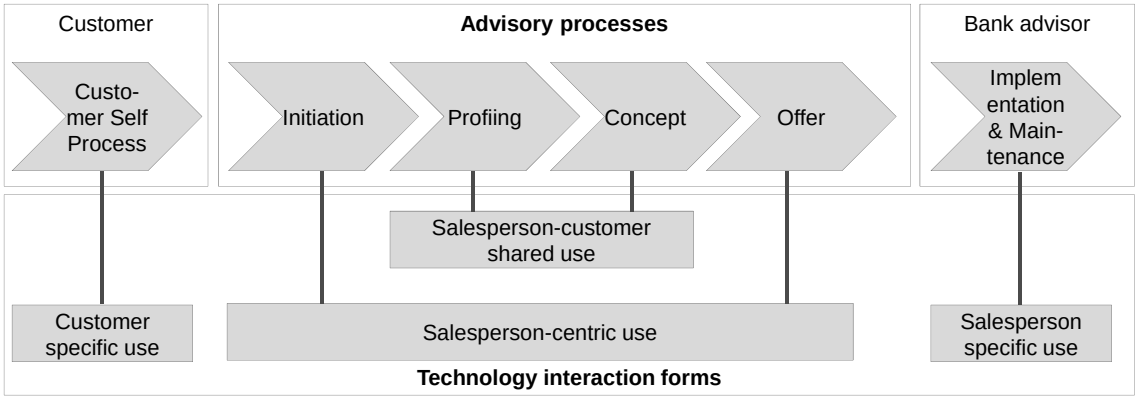


Figure 2: Advisory processes and technology interaction forms (Ahearne & Rapp, 2010)

In the context of our case study research we were able to identify a lot of relative advantages. The detailed relative advantages for each of the cases are outlined in Table 2. Each solution supports specific process steps mapped to the six generic advisory process steps. As described above, functional affordances depend on material properties and generate potentials (Markus & Silver, 2008). According to the research results, we were able to identify functional affordances and potentials along each process step (see Table 2). We have seen that the use of a tablet in customer advisory inherently bears potential due to the specific functionalities of a tablet in comparison with other technologies such as a „dumb laptop", and thus provide new levels of interaction possibilities. Laptops create a physical barrier between the customer and his advisor besides being impedimental to a certain extent through size and noise of typing. Additionally the customer advisors are mostly printing the documents for their customer and storing them physically. An overall view on the analysed cases yields further insight about relative advantages of tablets:

- *Advisory guidance and process recording:* With the tablet the advisor is able to guide the customer through the whole process and coach the customer about cer-

tain products. The touchpad ensures a personal interaction and a structured dialogue (Desisto, 2011). Through the use of one integrated interface, the whole process is completely and automatically recorded in the background.

- *Active customer involvement*: The tablet fosters the active involvement of customers by engaging them ("with his own fingers") in the design of concepts and product solutions. Thus tablets offer a new way of discussing and exploring different alternative solutions and products. In contrast to this, still many advisors send their solutions to the customer days or weeks later after the meeting where the customer already forgot the major discussion points or does not feel comfortable that his/her wishes have been properly captured or interpreted.
- *Visualization and transparency*: Tablets may visualize solutions in a more comprehensive way and ensure an adequate advisory with a high level of transparency. One business analyst from the cases argues, "We were able to sell more units because the client sees each step of the solution development". Therefore the tablet is also used for up-selling services, because the impact of a higher-value service may be transparently simulated.

Technical Objects of Tablets *		Functional Affordances *				Symbolic Expressions *	Relative Advantage
		Initiation	Profiling	Concept	Offer		
Case 1	***Mobility: Portable, individual device and always on****	An electronic discussion map helps to check customer's turnovers and advisory potential. The tablet is used as a mobile and stationary solution in the office.	-	-	-	Tablet was used in the context of the whole functionalities of such a mobile solution	•Transparency about the entire information •Holistic view on the customer's actual situation •Every document is always and everywhere available (e.g. customer documents).
	Presentation: Optimal screen size, retina display***	The display allows to click on rich content: Overview of actual customer's financial status, family's profile, internal and external asset/liabilities, assurance etc.	The advisor presents the dashboard (including asset, income, etc.) to the customer. All elements (income, assets etc.) are visualized with graphics. Pop-ups (including information about saving deposit) support the navigation.	-	-		•Improved understanding of complex, integrated view on data and analytics •Individual analysis per customer •Rich, graphic-oriented presentation of customer-relevant data and information
	Interaction & Navigation: Touchpad*****	Advisors may switch between the different views and persons. For example, the advisor may choose one element for details (e.g. turnover).	The presentation of the actual customer's status, based on the navigation elements, happens interactive. The advisor and the customer scroll jointly through the information.	-	-		•Creates emotions by an interactive design of navigation elements; not only presentation of static information. •The interaction possibilities allow to involve the customer in the navigation process (Co-creation).

Case 2	***Mobility: Portable, individual device and always on****	-	The advisor has electronic access to all relevant information about services every time and everywhere (fact-sheets, notes about set-offers etc.). The tablet provides automatically generated information about cross-and-upselling potentials due to notifications.	All information is saved directly during the advisory situation. The offering is created based on real-time market data and may be discussed with the customer in terms of an automatic workout of adequate solutions.	Tablets assure a real-time documentation of all information during the advisory and therefore avoid that advisors needs to document afterwards. The advisor can click on the different elements which are part of the solution; the tablet "prints" the solution.	See case 1: used in the context of the functionalities of a mobile solution (multi-media, sound, etc.)	• Cross- and up-selling possibilities • Customer may view the developed solution immediately during and after advisory situation. • The tablet allows access to real-time information and data (e.g. videos, etc.) during the advisory situation. • The advisory process is completely and automatically recorded in the background (e.g. all activities, notes and drafts are summarized in a report).
	Presentation: Optimal screen size, retina display***	Advisor has an initial overview with a schedule of appointments and contact data extracted from an electronic customer book. They have a holistic overview of customer's and partner's profile (assets/liabilities) and may switch between the different views.	-	Advisors present solutions in an adequate, graphic-oriented format. Additionally customers may be served with individual, personalized content. Without a tablet advisors would need to identify the presented content upfront and bring these to the meeting.	-		• Immediate overview of different customer appointments helps to coordinate meetings. • Customers understand financial developments due to a more personalized presentation of the solution.
	Interaction & Navigation: Touchpad****	The touchpad allows updating existing client's and partner's profile together with the customer (currently used services, latest contacts and activities).	The customer may enter some information (hobby, etc.) himself. The advisor serves as moderator and in his role enables the customer in the creation of the solution. Hence the customer structures his content and wishes.	The workout of the portfolio solution is generated automatically. It is possible to create market simulations to demonstrate possible scenarios with real- time market data.	The application counts the click rates, which are used for internal trainings. It allows the analysis for more sales arguments, in order to be able to provide more specific services.		• Better overview of customer's situation. • Less material costs due to electronic availability of information. • Solution is better understandable and more individualized for the customer. • Creates emotions due to interactive elements and scenario-based simulation. • Click rates will be used to educate advisor for selling specific services more efficiently. • Process is completely and automatically recorded in the background (e.g. all activities, notes and drafts are summarized in a report).

Case 3	***Mobility: Portable, individual device and always on****	-	-	The offer is created based on real-time market data and an advanced customer's profile and can be discussed with the customer in terms of an automatic workout of the portfolio which also are aligned with legal and regulatory requirements.	-	See case 1 & 2: used in the context of the functionalities of a mobile solution (multimedia, sound, etc.)	• Products are better comparable. • Customer understands financial developments better due to simulations. • Advisors automatically consider legal and regulatory requirements.
	Presentation: Optimal screen size, retina display**	-	The advisor presents the financial dashboard with key information (overview of investment, selected portfolio solution, risk profile) to the customer.	Customer may be visually served with individual content, such as alternative investments, expected volatility etc. The composed solution is visualized in diagrams.	-		• Customers better understand their financial situation. • Full transparency about the composed solution. • Better understanding of complex data and analytics due to enhanced visualization.
	Interaction & Navigation: Touchpad******	Tablets allow an analysis of soft factors such as a basic profile with address, actual portfolio solution, and further advisory potential without any inquiry-response cycles as this would be the case in paper-based advisory situation	The solution has an intuitive navigation at the lower end via a touchpad. Advisors serve as moderators and enable the customers in creating the solution. Hence customers interactively structure their content (knowledge & experience in financial solutions).	The design of the concept includes simulations based on real-time market data.	Position details (asset details, currency and scenarios) allow a presentation of the solution in an intuitive way.		• Tablets create emotions due to interactive elements that actively involves the customer in the profiling and solution concept process • An automatic completeness monitoring ensures that all needed data are entered

* *Categories:* Categories according to Markus and Silver (2008).

** *Mobility:* Tablet is easy to carry, fits into a bag or a purse (Pitt et al., 2011) and may be turned on and off quickly (Pitt et al., 2011).

*** *Presentation:* Tablet screens are smaller than the one of common laptops and devices are lighter. In comparison with smartphones, the screen is essentially larger but not too heavy (Pitt et al., 2011). Due to technologies, such as the retina display, tablets feature more pixels and the colors appear warmer. Hence e.g. reading, using apps and looking at pictures is more user-friendly (Perenson, 2012). The optimal screen size enables e.g. rich content (e.g. analytics, reports) to be used more efficiently during a specific process (Desisto, 2011).

**** *Interaction & Navigation:* Users may navigate by touching with their fingers on the tablet (Pitt et al., 2011).

Table 2: Relative advantage of tablets for business value in the advisory process

4.2 Implications on the Advisory Process

In the previous section the relative advantages of using tablets in bank advisory (RQ1) were discussed. We now turn to the consequences such adoption would have on the underlying processes (RQ2). Table 3 lists the main insights from the interviews and clusters them into three major implications on the advisory process: sequence, number and the automatism of process steps.

Implications on the advisory process		Case 1	Case 2	Case 3
Sequence of the process steps	Active engagement throughout advisory meeting	✓	✓	✓
	Advisor may adapt the process to customer's specific needs		✓	✓
	Stronger interactive collaboration of the solution between the advisor and the customer	✓	✓	✓
	Support of the advisor's goal to identify customer's needs and to design customized financial strategies	✓	✓	✓
	Support the investor during investment decisions with interactive graphical media	✓	✓	✓
Number of process steps	Taking digital notes allows the immediate documentation of the advisory report	✓	✓	✓
	After the meeting all activities, notes and drafts are recorded	✓	✓	✓
	Digital solution design allows an automatic development of the financial solution and implies that the steps initiation, profiling and concept phase are merged			✓
Automatism of process steps	Automation of currently paper-based advisory process steps due to electronically integrated information	✓	✓	✓
	Immediate availability of financial information due to different app integration possibilities (Google Maps, etc.)	✓	✓	✓

Table 3: Implications on the advisory process

Consolidating these results we can identify the following mutations on the advisory process through a tablet-based solution (RQ2):

- *The chronology of process steps is no longer sequential*. Tablets imply an active engagement throughout advisory meetings due to the functionality of the touchpad. Without a tablet, the advisory is more an inquiry-response process. With tablets, the advisor may adapt the process to customer's specific needs, because electronic information is always available. The tablet enables a stronger interactive collaboration towards the solution. The provided tools should primarily support the advisor's goal to identify needs and to design customized strategies. More or less advisors simply "assist" the investor during investment decisions, although customers could grant the full authority to their advisor during the process.

- *Merging of process steps*. Tablets allow taking notes in a digital format. Each result is immediately documented during the advisory and time is gained to prepare the meeting report (e.g. all activities, notes/drafts are summarized in a single report). Traditionally, the advisor takes paper-based notes and completes the report after the meeting. With the tablet, the process step of documenting the meeting during the offer phase merges with the process steps in the initiation, profiling and concept phases. Furthermore case 3 outlines an automatic development of the portfolio due to the automatic storage of information.
- *Process automation and app integration*. The tablet enables the automation of currently paper-based advisory processes through electronically integrated information and data. This not only leads to a reduction of manual tasks and paper usage but also the consideration of all relevant legal and regulatory requirements that occur in a specific advisory situation. Furthermore, tablets allow an app-oriented integration of different tasks and applications that are relevant for all advisor-related and customer-advisor-shared processes.

Regarding RQ1 "advisory guidance and process recording", "active customer involvement" and "visualization and transparency" were the most recognized relative advantages. The changes to the chronology of the process, the merger of process steps and the abilities to automate and integrate the process are the main impacts on the advisory process, answering RQ2.

5 Outlook

This research has investigated the application of tablets in the salesperson-customer context in the banking industry. In particular, the relative advantages of using tablets and the impact on the banking advisory processes were analysed. The theoretical contribution lies in the specific domain industry, face-to-face advisory using tablet technology, and the banking area as the application domain. The results contribute to the discussion on IT-based potentials based on the concepts of Markus and Sliver (2008) and Ahearne and Rapp (2010).

As with many studies, there are limitations to the scope and findings of this study in the first place. This paper focused on the process dimension, thus ignoring other dimensions such as strategy (including questions about customer- and advisor-related aspects as well as financial and organizational topics) and applications (focused on functional and technical aspects) (see Legner and Vogel, 2008). Furthermore, we have conducted an early exploration of a technological innovation that, at the time of our research, was not widely spread in practice. It is evident that a more sizeable dataset, both in terms of scope and depth, will be needed to verify these initial results. Also, the geographical scope would need to be expanded to cover cultural aspects, as there are distinct differences in technology adoption and proliferation of electronic banking in different markets. Finally, only the banking advisory process was investigated. In other (services) industries, similar processes exist and our research might provide useful insights for them as well. Future research should address these shortcomings, for instance by analys-

ing the changes in the advisory process of one of the banks that was an early adopter of the technology.

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Mobile contactless payments adoption challenge in the complex network actor ecosystem

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Abstract

Mobile contactless payments (MCP) technology brings an important dual use dilemma where consumer adoption can be halted if consumer is not fully persuaded that the security risk behind the technology use is very low. Currently, although many projects on the implementation of MCP solutions have commenced, MCP is still not picking up. Why? To fill this research gap and better understand how security is affecting MCP implementation, we employ triangulation approach to understand if security is the main obstacle to further adoption and extension of MCP solution. The results reveal that consumer security is the crucial factor in a successful MCP implementation. Our result offers important and new insights for practitioners as it provides a security dimension to consider in the entire contactless payment ecosystem.

Keywords: NFC; contactless payment; information security; mobile; MCP

Prelude

Yves is one of 4 million people that have smart phone equipped with NFC technology and can use contactless mobile services in France through Cityzi France project. Yves is also a frequent user of public transport in Nice where he can pay his ticket using contactless mobile service. But he is never using it. Why? Is he afraid of doing so or is it simply because he does not know how to do it?

On the other side of the planet, in San Francisco, two researchers, Corey Benninger and Max Sobell, from the Intrepidus Group have developed an app called UltraReset which takes advantage of NFC vulnerabilities in the systems used by many public transit systems, including the New Jersey Path and San Francisco Muni trains where it was tested effectively.

Using any Android phone with NFC capabilities the UltraReset app can take a train card with zero rides, and refill it repeatedly, for free.

...Maybe Yves is aware of the above...maybe not...nevertheless, question remains: is security responsible for the NFC mobile payments failure?

1 Introduction

Smartphones and other mobile devices become more and more powerful and achieved a substantial market penetration coupled with a decreasing price for such devices. A comparable development is also evident for wireless network technology; transfer rates and network coverage are increasing and prices for wireless data transfer contracts and other services decrease constantly. This has led to a situation in which a large majority of the population owns high-end mobile devices with the capabilities to access the Internet independently of their location. Other technologies, which extend the functionality of mobile devices, such as Near Field Communication (NFC), have also reached a substantial maturity level (Ming 2011; Ondrus and Pigneur 2007). Through combining these technologies, smartphones and NFC, novel mobile services, such as mobile contactless payment (MCP), can be realized. Several studies (Au and Zafar 2008; Dahlberg, Mallat, et al. 2008a; Hu 2008; Ondrus and Pigneur 2006, 2008; Pousttchi 2003) conclude that the benefits of MCP are far-reaching. On the one hand, MCP allows a faster and more convenient payment process at the point-of-sale, and on the other hand, it is capable of supporting additional customer services, such as digital membership cards. However, while the technology has made great advances and is capable of a nation-wide MCP service (Ondrus and Pigneur 2007), the industry is still caught in a series of more or less successful trials.

This inefficient series of trials in the implementation of MCP services has motivated information systems researchers (ISR) to identify the specific obstacles to MCP. Several studies conclude that the success of MCP implementation does not depend primarily on technological aspects, but on the complexity of the necessary collaboration between different organizations (Dahlberg, Huurros, et al. 2008a; Ondrus et al. 2009; Sammer et al. 2012). A study by (Ondrus et al., 2009) summarized the current state of the art and analyzed three failed MCP projects in Switzerland, concluding that the first necessary step for a successful MCP implementation is to develop interorganizational relationships (IOR). The important role of IORs is also confirmed by another study (Sammer et al. 2012), which reports evidence that some market actors, which are necessary for the implementation of mobile contactless payment services, are even actively hindering the development of MCP services. Research further suggests that the organizational culture of the concerned organizations is an important factor (Cadden et al. 2010; Steensma et al. 2000).

However, none of the above factors do really explain why MCP solutions are not picking up. There is currently a knowledge gap in understanding the very slow advance of the technology. On the one side number of technology vendors such as Nokia, Blackberry, Samsung, Microsoft and Google have been supporting the technology in their operating systems. On the other side the biggest players in the credit card business such as Mastercard, VISA or American Express and some of the largest banks (Bank of America, Citibank, Wells Fargo) have also rolled out some version of technology across their infrastructure. Also, mobile

network operators followed the wave where AT&T, Verizon and T-mobile have all started to offer the service. Still, question remains: why MCP solutions are not progressing? Recent report from Gartner confirms that MCP solutions are not following the growth trend: "Near Field Communications' (NFC's) transaction value has been reduced by more 40 percent throughout the forecast period due to disappointing adoption of NFC technology in all markets in 2012 and the fact that some high-profile services, such as Google Wallet and Isis, are struggling to gain traction" Gartner (2013). We believe that initial issues identified by researchers which showed the importance of interorganizational relationships are today, well tackled by market players and as such do not represent important challenge anymore. Instead, we argue that the problem behind MCP struggle relates to the security aspects. Thus, our research question is:

What is the importance of the IT security risk in the MCP consumer adoption?

As there is currently an ongoing debate on the future of MCP solutions, we believe this study contribution brings important insights on the current MCP implementation challenges. In the next sections, we explore past literature and explain the research methodology.

2 Literature review

2.1 Mobile contactless payments

MCP displays several characteristics that relate it to interorganizational (IOR) theory. First, the implementation requires the combination of different services (payment, transactions, identification, etc.), which are usually provided by different organizations or even industries (Dahlberg, Mallat, et al. 2008a; Ondrus et al. 2009; Sammer et al. 2012). Second, most MCP services require the adaption of existing, or the implementation of a new IT infrastructure (for example, NFC-enabled terminals at the point-of-sale (Ondrus and Pigneur 2008)). Third, MCP requires acceptance by end-customers and merchants in terms of usability and trust (Dahlberg, Mallat, et al. 2008a). Fourth, MCP is a substitute for existing payment methods (common credit card payment), which, therefore, challenges existing networks (for example, the four-party system of the credit card payment process (Sammer et al. 2012)).

Based on these characteristics of common MCP solutions, the involved organizations have many IORs among them. Therefore, they resemble networks in which organizations share resources to provide the MCP service. Based on the categorization of IORs by Parmigiani and Rivera-Santos (2011), we thus categorize MCP as a network.

Concerning the broader scope of IORs, several papers have presented research on specific types of IORs to explain the nature of these relationships. One type of IOR is the vertical relationship (i.e. buyer-supplier) and the supply chain, respectively.

2.2 Dual-Use Technology and Information Security

The term dual-use has its origins in military history. It is now primarily used to describe technology which can be used for two different and opposing aims. One example is the Global Positioning System (GPS) which originally was used for military use. It is now widely utilized in different end user applications for civilian purposes. Information

governance reflects the dual-use dangers when combined with the mobile technology (Silic and Back, 2013a).

Another example of this duality dilemma relates to open source security software where on the one side, open source security software such as nmap can be very beneficial, but at the same it time it can be used by hackers to do negative actions against organizational system (Silic & Back, 2013b).

NFC technology has also important dual use side. Consumers may use it to transact, perform payments – thus, positive aims. But it can also be used by malicious users to exploit its vulnerabilities and conduct illegal actions against these same users.

Regarding security aspects of MCP technology, user privacy (Stephen et al. 2004) and main-in-the-middle attacks (Hancke, 2005) are major concerns. User privacy concerns are about collecting potentially sensitive consumer data without its prior consent. In man-in-the-middle attacks two parties are tricked into thinking their communication is secured when they talk to each other, while the attacker is actually in between them, communicating with both (Van Damme et al. 2009). Research regarding security aspects of the NFC payment ecosystem was mostly dealing with very technical aspects proposing methods or tools how to break the security measures but not really offering any insights on the security success or failure factor in the MCP implementation.

3 Method

For this study we use triangulation approach which includes three different sources. Using three different methods will help to strengthen and improve accuracy of our results. Firstly, we analyse practitioner surveys which will help to get more consumer view on the current challenges. Secondly, case study was conducted in French NFC project (Cityzi). Thirdly, we explored secondary sources where mainly online data was collected to better understand the current status of the contactless payments landscape.

3.1 Practitioner Survey Review

We analysed practitioner surveys in an attempt to understand how practitioners see the security topic relationship to MCP. All of the selected interviews addressed directly our research question. In order to address a possible bias from surveys due to different interests of the sponsoring organizations (generally all surveys are financed by 3rd party companies to promote their interests), we highlight the sponsoring organizations. Finally, we believe practitioner surveys may be very interesting source of information when combined with other more scientific methods as they offer useful insights from consumer perspective. The relevant surveys were identified using Google search, EBSCO and ISI Web of Knowledge databases, and are outlined in Table 1.

Survey name	Country	Sample size	Sponsor
2013: Mobile Payment Index study	Global	2,006	eDigitalResearch
2013: The year of the Mobile Wallet?	UK	2,000	ICM Group
2012: MCP – are you ready?	France	2,582	Les Numériques.fr
2013: MCP quarterly survey	Global	2,085	YouGov (Firstsource Solutions)
2013: NFC survey	UK	2,000	Zapp

Table 1: Practitioner surveys

3.2 Interviews

After reviewing secondary data about different MCP services and conducting expert interviews, we decided to assess the MCP service provided in France: Cityzi – case study.

Cityzi is a NFC-based multi-service that includes three end-customer applications, including payment, on which we focused our research:

- Payment, including services for public transport (purchase of tickets for the public transport) and retailers (payment, mobile loyalty and coupon programs).
- Cityzi tags, including the e-campus project with the aim of accessing various pieces of information using Cityzi tags.
- Third party applications, including tourist information.

Today, Cityzi is available in five cities (Nice, Strasbourg, Caen, Marseille, and Paris) and further expansion is planned. Technically, Cityzi is based on a state-of-the-art NFC-based solution integrated in to the subscriber identity module (SIM) cards, which is compatible with most modern smartphones. Due to the market penetration (more than 1.5 million terminals, support for over 30 different smartphones, more than 4 million registered users) of the solution, it can be considered as one of the most mature and successful solutions in Europe.

Cityzi is organized by the Association Française du Sans Contact Mobile (AFSCM). A summary of seven different interviewees we conducted, including information about their position and organization, is given in Table 2. Important to note is that seven interviewees represented well all different organizations members of AFSCM.

Organization	**Org. Size**	**Department**	**Position of Interview Partner**
AFSCM	Small (<50)	Top Management	CEO
Technology vendor 1 (TV1)	Small (<50)	Top Management	CEO
Technology vendor 2 (TV2)	Large (>250)	NFC Business Development	Director NFC products
Technology vendor 3 (TV3)	Large (>250)	Sub-division eDocuments	Senior Manager (Director NFC products)
Mobile network operator 1 (MNO1)	Medium (50-250)	NFC Business Development	Director NFC products
Mobile network operator 2 (MNO2)	Large (>250)	NFC Business Development	Senior Manager (Business Development)
Service Provider 1 (SP1)	Small (<50)	Top Management	CEO

Table 2: Interviewees and Information about their Position and Organization.

The data collection approach included primary data derived from interviews and questionnaires, as well as secondary data derived from press releases, and organizational websites. All interviews were conducted as semi-structured telephone interviews, which were audio recorded and transcribed. The interviews lasted an average of 60 minutes. The qualitative interview followed a guideline, which included the following sections: Information about the organization and interviewee, description of the activities within Cityzi, description of the interorganizational relationships concerning Cityzi, and an outlook. All interviews were conducted between October 2012 and November 2013 and included only executives from the stated organizations. To assess the MCP services in a case study, we define a case study protocol to ensure the comparability of the data collected from each company. The case study protocol represents a generic structure of a MCP ecosystem and is applicable for western markets. The case study protocol is displayed and described in Table 3.

Concept	Description
Company	Companies that are involved in the MCP service. Companies are associated and aggregated to actors of the network.
Actor	Actors represent different companies categorized by a classification adapted from (Au and Zafar 2008) and (Sammer et al. 2012). The classification includes the following actors: (1) Regulation agencies: This categorization includes government agencies, which are concerned with financial or technological issues related to MCP. (2) Financial Service Provider: Companies that facilitate the process of clearing payments. (3) Merchants: Companies at the point-of-sale. For example retailers. (4) Technology vendors: Companies that provide or manufacture technologies such as cell phones, NFC-transactions modules or terminals at the point-of-sale. (5) Mobile network operators (MNO): Are wireless service providers and handle issues concerning the secure element (SIM). (6) MCP Associations: These are associations that coordinate the implementation of MCP services and represent a forum for the attending companies.
IOR	To identify IORs we define them as any relation that either is a transaction (transaction cost theory view) of real or virtual commodities (knowledge, money, information…) or the option for a company to obtain access to complementary resources (resources based view).

Table 3: Actors in the NFC ecosystem

All transcribed interviews were coded using a predefined categorization and the software NVivo 10. Two of the authors independently coded the interview data. Cohen's kappa, which measures interrater-reliability, was statistically significant within a range between 0.83 and 1 for each coded category. In a second round, discrepancies were discussed and resolved. By following the approach recommended by (Miles and Huberman, 1994).

3.3 Secondary data

We use Romano et al. (2003) research methodology to analyze web based qualitative data. This approach helped us to follow a structured approach in assessing and analyzing data. We collected different data from online (web based) sources including technical forums, online news and industry articles, interviews from information professionals and NFC dedicated websites. Further, we searched through technology and industry online magazines, search engines, forums by providing certain keywords: NFC challenges, NFC payments, MCP, mobile contactless payments, MCP security, and MCP future. We limited our search from September 2013 to December 2013. Secondary data sources were particularly useful as we could receive views from various channels such as online and industry magazines which

provided an independent view on the NFC technology challenges, current status and future developments. Secondary data sources are summarized in Table 4.

Data source	Description
Interviews	In total ten online interviews were analyzed
Online articles	Fifteen online articles from nfctimes.com, nfcworld.com, techcrunch.com, mbweek.com, bankingtech.com, lesnumeriques.com
Press releases	Four press releases from orange.com, afscm.org, gemalto.com
Forums	Seven articles were analyzed from nfc-forum.org, nfcworld.com, forum.xda-developers.com/general/nfc

Table 4: Secondary data sources

4 Results

In the next sections we will present the results of three distinct methodological approaches. The results reveal that security dimension is an important obstacle in the MCP expansion. This also demonstrates the fragility of the MCP network structure where the absence of support from a single actor can lead to a decreased network performance.

4.1 Practitioner survey results

From the five surveys we analyzed security was highlighted as the most important factor in the current MCP projects. One survey found that security and fraud are the biggest barriers to mobile payment adoption which is an even quite worrying fact as 73% of respondents are aware of the technology (eDigitalResearch, 2013). In other words despite progress in the awareness, the usage does not follow. Similar was confirmed by another survey (ICM research, 2013) which found that 80% of consumers are aware, but only 8% do actually use the technology. Survey also stresses the importance of consumer security concerns which are not properly addressed. French survey done by Les Numériques (2012) showed that 44% of respondents are ready to adopt the new technology but only if strong security guarantees are provided. In UK, survey performed by YouGov (2013) revealed that consumers don't trust mobile payments. It strongly pointed out consumer fears over security which is very consistent with previous survey findings (Zap, 2013).

4.2 Cityzi - case study results

All interviewees confirmed that security is a very important aspect going together with inter-operability. For example, one interviewee highlighted the high level of the security risk when purchasing services and further explained that it represented high barrier for the service expansion: "*...as there is no sufficient guarantee to do mobile payment or buy tickets and having guarantee of a safe transaction related to Fraud, hacking,etc...*".. For another interviewee security is clearly stopping the service expansion as infrastructure is in place, all

main actors formed a good alliance between them but confidence in the security measures is not yet there: "*...reason why we did not get any significant numbers is because banks were blocking the numbers as they were afraid to open the security flow. It is mainly because security aspect was a bit missing*". There was a clear consensus among all interviewees that the security aspect is the missing piece where one actor (banks) was not fully satisfied with the existing security requirements of the current NFC version in use and in that context did not want to push for the solution too much not to create security holes which could bring important financial risks. This aspect was clearly pointed out by one interviewee who commented: "*it is needed to go step further to satisfy all constraints: for banks it is security aspect*". Despite the fact that all interviewees pointed out at security as the main road blocker in the current setup, most of them were seeing the next version of NFC as the right solution which will solve the current financial limits imposed by the financial players (banks, card issuers). For example for one interviewee: "*the security aspect will be enforced and Mastercard and VISA will not add any limits anymore*", which clearly shows that when one actor in the entire network chain is not fully supporting the solution, the challenge arises and entire network chain may break down. Finally, when we questioned interviewees about the type of security which is currently slowing down the implementation, they said that it is mainly the "consumer security" where consumers do not feel confident in transacting as they heard that it is insecure and some illegal activities can be easily performed on their behalf.

4.3 Secondary data results

From the secondary data results we got a strong confirmation that MCP is not progressing mainly due to consumer security barriers. It seems that further expansion is strongly influenced by consumers' fear of conducting insecure transactions and in that context despite high awareness; they refuse to adopt the new technology. The analyzed data from different sources (e.g. mbweek.com) showed that mobile payments are held back by security and complexity. In one interview it was explained that the need is there but adoption is still far behind: "*People want to pay with mobiles, but they need to be convinced that payment is secure, and it has to work everywhere and be totally hassle free. History shows us that mass adoption always follows trust and convenience, which in turn is enabled by cooperation*". Another one also added: "*With banks routinely issuing contactless payment cards to customers, there is a need to raise awareness of the potential security threats*". Overall, all sources did mention consumer security to be one of the main factors in the current contactless payments adoption challenges. Few websites and forums, that are more vendor dependent and as such can have some financial benefits, did not clearly point security as being an issue but were rather speaking of sporadic incidents that are following any new technology introduction.

5 Triangulation, Discussion and Conclusion

We triangulate our findings by combining the results from three methodological sources. Practitioner survey results revealed that consumer security is top concern for further adoption of MCP technology. Furthermore, it seems that current security measures are not enough to convince consumers to use MCP despite very high existing consumer awareness and knowledge about the technology. All surveys were very consistent saying that over 75% of consumers are aware about the new mobile payment technology, but majority of consumers

are not willing to adopt it for security reasons. Case study from the French NFC project, Cityzi, provided overview of the actor network where clearly, security was highlighted as a top barrier in further service expansion and adoption. Moreover, it was found that the current implementation is slowed down by network actors which are not confident in the current security countermeasures. Secondary data source provided valuable insights as an independent source which revealed that security is a barrier to further MCP adoption.

Based on the triangulation of these three methodological approaches, we can see that security aspect was the major show stopper for a successful MCP project. Clearly, strong information security safeguards are mandatory to bring confidence and security in the entire transaction flow. While there are some other examples such as Osaifu keita (launched in Japan by NTT Docomo) which was very successful with over 30 million users, it is important to highlight that generally, MCP implementation was successful in all countries where there were no prior similar existing card payment systems (Andren and Lagstrom, 2011). This finding is in line with previous studies which confirmed that any complication associated to m-payments solutions will not be tolerated or waited by the customers (Stoughton et al., 2011).

Furthermore, to establish such a complex system as MCP, different organizations have to cooperate and form interorganizational relationships. Previous studies (i.e. Ondrus et al. 2009; Sammer et al. 2012) did confirm that interorganizational relationships are a success factor and as such do have an important role in the entire MCP ecosystem. Also, competition and rivalry between organizations were previously identified as a major obstacle to the implementation of MCP (e.g. Andren et al. 2011).

Finally, we believe that this dual use side of MCP technology needs further and deeper understanding and analysis. As positive aims behind the MCP solutions are rather evident; however, the negative context needs to be approached more from consumer standpoint with the objective to better understand consumer behaviours and the entire complex trust process.

Our study has some limitations. Our study focus was mainly on the MCP technology while the same conclusion may not be applicable to the entire NFC technology. In this context, our results could not be generalizable to the entire NFC ecosystem and further studies can eventually explore the role of security on other parts of the NFC ecosystem.

Finally, we believe this study offers important contribution for practitioners as it provides novel insights on the failure factor regarding MCP implementation. From a theoretical point of view, our results contribute to our understanding of the problems and solutions associated with the implementation of such complex technological systems. The results further contribute to the existing knowledge on MCP implementation and provide evidence of the security component as being the most critical element in the entire MCP chain.

Based on this conclusion, we propose that research concerning the implementation of MCP systems or other comparable systems explores the influence of security component on the entire solution ecosystem.

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From Disaster Response Planning to e-Resilience: A Literature Review

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Abstract

Natural and man-made crises as well as IT-security issues foster the interest in robust and resilient business information systems. Information and Communication Technologies (ICT) are essential for successful e-business. If ICT technologies interrupt, the whole (e-) business continuity is threatened. ICT interruptions causing serious loss in organization's reputation, trust and revenues. This circumstance should increase manager's interest in the concepts of disaster recovery planning (DRP), business continuity management (BCM) and, the emerging imperative, resilience. This paper at hand presents the results of a database driven literature review on these concepts and its interrelation.

Keywords: ICT-security, disaster response planning, business continuity management, resilience

1 Introduction

Information and Communication Technologies (ICT) are considered as the most vulnerable components in delivering uninterrupted services. When disruptions affect ICT operations, whole (e-) business ecosystems suffer from the interruption and its cascading effects. Statistics undermine that once affected organizations have serious problems in future and many do not survive[1].

[1] e. g. 40 % of companies that were shut down by a disaster for three days failed within 36 months (Zheng et al., 2013); 93 % of the companies after five years after a major and unexpected system shutdown (Nelson, 2006); 80 % of businesses affected by a major incident close within 18 months. 90 % of businesses that loose data from a disaster are forced to shut down within two years (Tjoa et al., 2008).

This paper at hand presents the results of a literature review in the electronic database IEEExplore on disaster response planning (DRP), business continuity management (BCM) and resilience. It explores these concepts and the role of DRP and BCM in creating resilience. This literature review also reflects the perception of the concepts in technology-oriented literature.

The aim of this paper is to examine the origin and status quo of above mentioned concepts and to give an outline and extended view. Further aims are to highlight the overlapping and interrelations of these concepts.

The paper is organized as follows: In section 2 the research design is presented. Section 3 presents the literature review. Section 4 presents the findings and contains a brief conclusion.

2 Research Design

Used methodology for this paper is the literature review. Hart (2003) defines a literature review as the "selection of available documents […] on topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed". The paper at hand uses quantitative and qualitative methods of the frequency and document analysis. These methods are appropriate to categorize the content and to structure the evaluation and interpretation of data. The literature review follows the structure proposed by Lamnek (1995), which is also visualized in Figure 2.

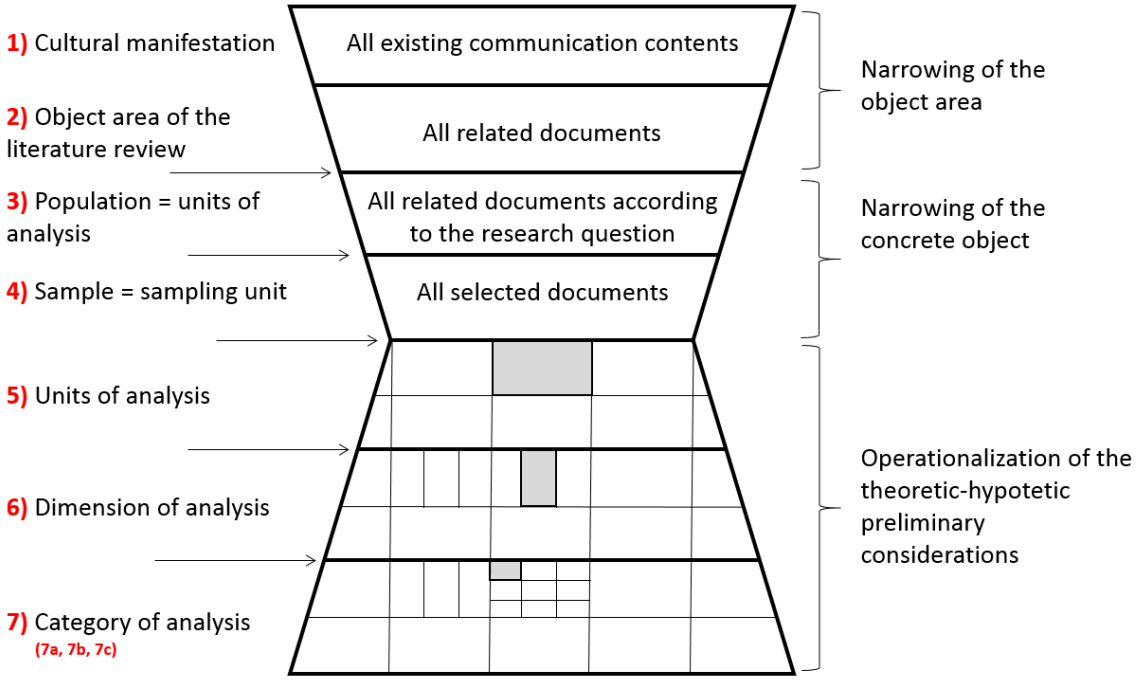


Figure 1: Schematic visualization of the approach of the literature review (Lamnek, 1995)

Cultural manifestation & object area of the literature review: The literature research bases on the electronic database IEEExplore (ieeexplore.ieee.org). This database offers

a good coverage of scholarly and practice-oriented publications and gives access to the latest research of the world's largest community of IT-technology professionals.

The literature search was conducted on the 15th of January 2014 and the 06th of March 2014 with full-text terms "Disaster Recovery Planning", "IT Disaster Recovery", "Business Continuity Planning" "Business Continuity Management" and "Business-Continuity-Management". The search was designed to include publications from year 2005 to 2013. The results of each search are listed in Table 1.

Data-base	Search Term	Re-ductions	Result	Useable + Wildcards	Not down-load-able	Non-Useable
IEEE Explore	Disaster Recovery Planning	Papers from 2005 - 2013	26	15	1	10
	IT Disaster Recovery		1	1		
	Business Continuity Planning		22	12	1	9
	Business Continuity Management		29	13	2	14
	Business-Continuity-Management		28	15		13
		Sum	106	56	4	46
		- doubles		-6		
		Total		50		

Table 1: Literature research statistics

Population & Sample: The database search resulted in a total of 106 papers. Four search results turned out because they were table of contents or not downloadable. Papers that the authors consider are papers with nine or more citations in google.scholar.com. The amount of nine marks the average of all citations of found papers. 67 papers had less than nine quotations. These 67 underwent an individual review for relevance. Nevertheless, 21 of these 67 papers got included. Thus, the sample consists of a total of 50 reviewed publications.

As the following tables show, six papers were submitted and presented at symposiums or workshops, 25 papers were submitted at conferences and 19 papers were published in journals.

Workshops	Year
Business-driven IT Management, 2008. BDIM 2008. 3rd IEEE/IFIP International Workshop on	2008
Electronic Commerce and Security, 2009. ISECS '09. Second International Symposium on	2009
Enterprise Distributed Object Computing Conference Workshops, 2009. EDOCW 2009. 13th	2009
Database and Expert Systems Applications (DEXA), 2011 22nd International Workshop on	2011
Software Reliability Engineering Workshops (ISSREW), 2012 IEEE 23rd International Symposium on	2012
Reliability and Maintainability Symposium (RAMS), 2013 Proceedings - Annual	2013

Table 2: Symposiums and workshops

Conferences	Year
Systems Sciences, 1999. HICSS-32. Proceedings of the 32nd Annual Hawaii International Conference on	1999
Parallel and Distributed Computing, Applications and Technologies, 2005. PDCAT 2005. Sixth International Conference on	2005
Semantics, Knowledge and Grid, 2005. SKG '05. First International Conference on	2005
System Sciences, 2006. HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on	2006
Military Communications Conference, 2006. MILCOM 2006. IEEE	2006
International Professional Communication Conference, 2006 IEEE	2006
Internet Monitoring and Protection, 2007. ICIMP 2007. Second International Conference on	2007
Systems Conference, 2007 1st Annual IEEE	2007
Availability, Reliability and Security, 2008. ARES 08. Third International Conference on	2008
Rural Electric Power Conference, 2008 IEEE	2008
Networking, Sensing and Control, 2008. ICNSC 2008. IEEE International Conference on	2008
Intelligence and Security Informatics, 2008. ISI 2008. IEEE International Conference on	2008
Emerging Security Information, Systems and Technologies, 2009. SECURWARE '09. Third International Conference on	2009
Science and Technology for Humanity (TIC-STH), 2009 IEEE Toronto International Conference	2009
Security Technology (ICCST), 2010 IEEE International Carnahan Conference on	2010
Quality of Information and Communications Technology (QUATIC), 2010 Seventh International Conference on the	2010
Management and Service Science (MASS), 2010 International Conference on	2010
Networked Computing and Advanced Information Management (NCM), 2010 Sixth International Conference on	2010
Research and Innovation in Information Systems (ICRIIS), 2011 International Conference on	2011
GCC Conference and Exhibition (GCC), 2011 IEEE	2011
Availability, Reliability and Security (ARES), 2011 Sixth International Conference on	2011
Service Operations and Logistics, and Informatics (SOLI), 2012 IEEE International Conference on	2012
Digital Ecosystems Technologies (DEST), 2012 6th IEEE International Conference on	2012
Technology Management for Emerging Technologies (PICMET), 2012 Proceedings of PICMET '12:	2012
Complex, Intelligent, and Software Intensive Systems (CISIS), 2013 Seventh International Conference on	2013

Table 3: Conferences

Amount	Journals	Year
	Engineering Management, IEEE Transactions on	1998
	Potentials, IEEE	2003
	Security & Privacy, IEEE	2004
	Dependable and Secure Computing, IEEE Transactions on	2005
	Manufacturing Engineer	2005
	Software, IEEE	2005
	IT Professional	2006
	Computer	2007
	Technology and Society Magazine, IEEE	2007
2 x	IT Professional	2008
	Systems Journal, IEEE	2009
	IT Professional	2009
	Security & Privacy, IEEE	2010
	Services Computing, IEEE Transactions on	2011
	IT Professional	2012
	Network and Service Management, IEEE Transactions on	2013
	Industry Applications Magazine, IEEE	2013
	Human-Machine Systems, IEEE Transactions on	2013

Table 4: Journals

Table 5 provides an overview, when the papers got published.

	All		Syposium / Workshops		Conferences		Journal Publications	
	Amount	Year	Amount	Year	Amount	Year	Amount	Year
	1 x	1998				1998	1 x	1998
	1 x	1999			1 x	1999		1999
	1 x	2003				2003	1 x	2003
	1 x	2004				2004	1 x	2004
	5 x	2005			2 x	2005	3 x	2005
	4 x	2006			3 x	2006	1 x	2006
	4 x	2007			2 x	2007	2 x	2007
	7 x	2008	1 x	2008	4 x	2008	2 x	2008
	6 x	2009	2 x	2009	2 x	2009	2 x	2009
	5 x	2010			4 x	2010	1 x	2010
	5 x	2011	1 x	2011	3 x	2011	1 x	2011
	5 x	2012	1 x	2012	3 x	2012	1 x	2012
	5 x	2013	1 x	2013	1 x	2013	3 x	2013
Total	50		6		25		19	

Table 5: Overview paper presentation / publication

Operationalization: After the scan- and skim-reading process of the samples, in total, 733 quotations ***(Category of analysis 3)*** got marked and clustered to 78 codes ***(Category of analysis 2)***. A quotation is an important rated text passage in a sample. A code is the aggregation of similar quotations found in different samples. The codes got clustered to 21 families ***(Category of analysis 1)***, which are the generic term of all quotations and the lowest level of analysis. Again, the families got clustered to eight super-families. Super-families symbolize the ***dimension of analysis*** and are comparable with a subset of the whole (unit). The super-families are summarized to five categories. These categories symbolize the ***units of analysis***. Table 6 visualizes the built categories and the amount of assigned super-families, families, codes and quotations.

	assigned ...			
Categories / Chapters	Super-families	Families	Codes	Quotations
= Units of Analysis	*= Dimension of Analysis*	*= Category of Analysis 1*	*= Category of Analysis 2*	*= Category of Analysis 3*
1) Introduction & definition DRP & BCM	2	10	52	590
2) BCM / DRP in theory & practice	1	2	11	149
3) Standards and related concepts	3	6	15	160
4) Resilience	1	1	6	162
5) Future Outlook	1	3	3	54

Table 6: Units of analysis *(and its clustering results)*

Figure 3 visualizes the clustering process. As this figure shows, it was possible to assign one quotation *(, code)* to "n" codes *(, families)*. "n" families *(, super-families)* were summarized in one super-family *(, category)*. Data management was handled with Microsoft Excel and Atlas.ti.

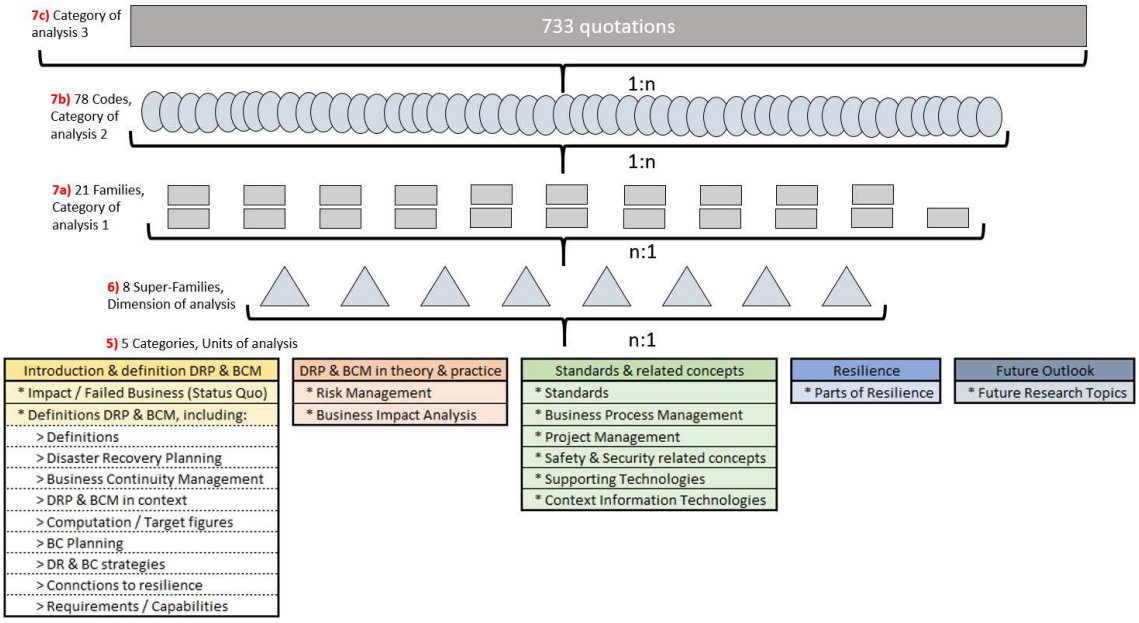


Figure 2: Clustering process

A first realization is that organizational security and continuity is well discussed in analysed literature. The concepts of DRP and BCM are well explored *(according to the quotations; see table 6)* and experience continuous and sustaining consideration *(according to table 5)*. Also, a larger amount of standards and related concepts could be identified. In comparison, the concept of resilience is underrepresented *(according to the quotations; see table 6)* and it seems to be an emerging approach in this field of research.

3 Literature Review

In the following chapters, the results of the categories "**Introduction & definition DRP & BCM**", "**DRP & BCM in theory & practice**" and "**Resilience**" get presented. Because of the limited results of the categories "**Standards & related concepts**" and "**Future Outlook**", their outputs are integrated in above chapters.

3.1 Disaster Response Planning & Business Continuity Management

This chapter is presented in five subchapters: the first subchapter is about the definition of DRP and BCM. The next chapters aim to present the various notions of DRP and BCM and the interrelation to resilience.

3.1.1 Introduction, Definition and Target Figures of DRP & BCM

Roberts (2006) and Fallara (2004) highlight that 86 % of IT- and business disruption are planned occurrences (e. g. by IT backups). ~13 % are caused by unplanned events (e. g human error, database corruption, etc.) and only less than 1 % is caused by "high impact low probability" (HILP) events. Alhazmi & Malaiya (2012), Winkler et al. (2010) and O'Callaghan & Mariappanadar (2008) state out that continuity planning is a vital requirement. Several authors as Nelson (2006), Tjoa et al. (2008), Lawler et al. (2007), Zheng et al. (2013) highlight that organizations which experience a disruption and do not have DRP and BCM in use eventually will fail. Also, they refer to the direct impacts

of disruptions on revenues, stock price, customer loyalty and satisfaction, business reputation and loss of market share as the reasons. Jorden (1999), Iyer & Sarkis (1998), Cousins (2007) and Dey (2011) summarize that DRP and BCM experience low commitment and most organizations have any or only little experience. These authors also argue, while some organizations realize that the lack of proper DRP and/or BCM can make them out of business at any time, others still try to protect themselves with business interruption services as e. g. insurances.

As Nelson (2006), Kolb (2008), Ncemane & Weeks (2012) and Draheim & Pirinen (2011) argue: Some consider the context of DRP and BCM as synonymous, others view DRP as more tightly focused on areas around IT systems. Nelson (2006), Winkler et al. (2010) and Tsai & Sang (2010) argue that nowadays information continuity equals business continuity. Therefore BCM must integrate IT security into its comprehensive planning process. Nelson (2006) highlights that organizations with BCM typically have a DRP either integrated or maintained as separate. Lawler et al. (2007), Ncemane & Weeks (2012), Draheim & Pirinen (2011), Shao (2005) and Wan & Chan (2008) define BCM as an umbrella concept, which encompassing a range of operational elements, including DRP. Wan & Chan (2008) and Elliott et al. (2010) highlight that BCM has its origin in DRP – but with an extended scope to the whole organization. Both concepts incorporate "acts of anticipating disruptions, ensuring prevention or less chance of occurrences and responding to any such incident in a planned and rehearsed manner so as to recover the losses and bring the business back into operation" (Shao, 2005). DRP and BCM can be considered as IT- and (e-) business continuity concepts with the following scope:

- DRP normally takes care of the continuity of ICT services and is mostly technical in nature (Dey, 2011). DRP focuses on restoring critical business processes and related ICT systems (Cha, Juo, Liu, & Chen, 2008). As Hoong & Marthandan (2011) note, DRP contains adequate details for technical recovery, but it takes less interest on people and communication issues.
- BCM does not address information technology outage as the only threat (Shao, 2005). BCM is about as many organizational threats and vulnerabilities as possible. BCM helps preparing the organization to handle them as well as possible (Draheim & Pirinen, 2011) in a way that prevents the organization from fulfilling its mission (Draheim & Pirinen, 2011). BCM defines how to establish alternative processes and information systems if critical parts cannot be restored within the scheduled deadline for recovery (Cha et al., 2008).

The following table summarizes operational targets of DRP and BCM.

Code	Definition	Literature
Fault, risk and disaster tolerance & criticality	Risk and disaster tolerance is a superset of fault tolerance; tolerance is the ability for a business to cope with the interruption. Criticality is related to the cost entailed for a process to be out for a period of time.	Fallara (2004), Lawler et al. (2007), Wan & Chan (2008) & criticality Fallara (2004)
Recovery time objective (RTO)	RTO is defined as the duration in which business functions is unavailable and must be restored (maximum time of permissible interrupt, time need / taken to restore; defines the "target time for resumption of product, service or activity delivery after an incident.	Alhazmi & Malaiya (2012), Hoong & Marthandan (2011), Wang et al. (2005), [12]
Recovery point objective (RPO)	RPO defines the limits / maximum amount of (data) loss an organization can sustain during an event.	Alhazmi & Malaiya (2012), Wang et al. (2005), Winkler et al. (2010)
Maximum tolerable period of disruption (MTPD) / Maximum Tolerable Downtime (MTD)	MTPD expresses the maximum acceptable downtime to guarantee the business continuity.	Zambon et al. (2007), Grimaila (2004), Rejeb et al. (2012), McDonald (2008), Dey (2011)
Availability	Is the ratio of time a system is functional to the total time availability and get computed by MTBF / (MTBF + MTTR)	Tsai & Sang (2010), [32]
Mean Time to Recovery (MTTR)	MTTR is the mean / average time to repair the failure and get back into business / service	Dey (2011), Tsai & Sang (2010), Costello (2012)

Table 7: Code, Definitions and Literature on Evaluation and Quantification of DRP and BCM

3.1.2 Planning for Continuity

According to Nelson (2006), a DR or BC plan documents various aspects of disaster preparations. A main task is to provide organization-wide policies and guidelines in case a disruption hit (Dey, 2011), (Wang et al., 2005), (Wang, Yin, Yuan, & Zhou, 2005) *(guaranteeing that incidents do not affect critical core processes and the availability of (IT) services (Wan & Chan, 2008), (Zambon et al., 2007))*. According to Grimaila (2004), further tasks of DR and BC planning include risk management, evaluation, incident and scenario planning, ethics, communication, security awareness education and training, etc. As Rejeb et al. (2012), Hoong & Marthandan (2011) and McDonald (2008) highlight, most BC plans are textual template documents and could be made up of many smaller plans. However, these documents need to have a good requirement definition (Roberts, 2006) and consist of:

- Owner structure (Costello, 2012)
- Formal BCM coordinators and BC team (Nelson, 2006), (Costello, 2012), (Xiang et al., 2008)
- Disaster management plan including incident and scenario plan (Jorden, 1999), (Dey, 2011), (Cha et al., 2008), (Hoong & Marthandan, 2011), (Wang, Zhou, et al., 2005), (Hayhoe, 2006)
- Prioritization of recovery objects (Costello, 2012) including backup and recovery procedures, system and work area recovery plan (Hoong & Marthandan, 2011), (Wan & Chan, 2008)
- Communication and corresponding plan (Hoong & Marthandan, 2011), (Wang, Zhou, et al., 2005), (Grimaila, 2004), (Costello, 2012)
- Specification of system and network infrastructure (Wan & Chan, 2008)
- Knowledge management practices (Nelson, 2006), (Hayhoe, 2006).

A vital requirement to continuity planning is the commitment of the strategic management level and the integration of DR & BC within the current operations (Roberts, 2006). DR & BC plans *(as result of DR & BC planning process)* do not mark the end of continuity efforts: As Nelson (2006), Dey (2011), Wan & Chan (2008) highlight, plans must be updated and tested frequently.

3.1.3 Continuity Strategies

The observed literature suggest following strategies to maintain IT- and (e-) business continuity:

- Strategic management commitment and adequate financial support (Hoong & Marthandan, 2011), (Nelson, 2006), (Tjoa et al., 2008), (Jorden, 1999), (McDonald, 2008)
- Investments in technology (Fallara, 2004), (Liu & Ormaner, 2009)
- Redundancy (Nelson, 2006), (Fallara, 2004), (Shao, 2005), (Hoong & Marthandan, 2011), (McDonald, 2008), (Alhazmi & Malaiya, 2013)
- Backup strategies (Nelson, 2006), (Fallara, 2004), (Alhazmi & Malaiya, 2012), (Tsai & Sang, 2010), (Hoong & Marthandan, 2011), (Wang, Zhou, et al., 2005), (Garlick, 2011)
- Active planning and testing (Fallara, 2004), (Alhazmi & Malaiya, 2012), (Hoong & Marthandan, 2011), (McDonald, 2008), (Gang, 2009)

  DRP and BCM must be executable, testable, scalable and maintainable (Alhazmi & Malaiya, 2012); include planning, scheduling, facilitation, communications, auditing and view documentation
- Flexibility and equipment replacement (Nelson, 2006), (Fallara, 2004), (Gang, 2009)

  e. g. by establishing of procedures and policies for coordinating continuity and restoration activities with external agencies (vendor agreements, equipment inventories, etc.)
- Optimization, incident management and scenario planning (O'Callaghan & Mariappanadar, 2008), (Hoong & Marthandan, 2011)
- Training and education (Liu & Ormaner, 2009)

  e. g. to create employee awareness of organizational security policies and practices
- Information sharing and communication (Zheng et al., 2013)

  e. g. to build a culture in which employees are willing and able to follow policies and practices

3.1.4 Continuity requirements and capabilities

Active and successful continuity planning requires a subset of organizational capabilities. Summarized, these capabilities are:

- Serious management commitment

  According to Nelson (2006), Tjoa et al. (2008), Jorden (1999), Hoong & Marthandan (2011) and McDonald (2008), to develop and maintain a common sense, the commitment of all business levels *(incl. the board of managers)* is necessary. Further requirements are an adequate management infrastructure (Nelson, 2006), (Hoong & Marthandan, 2011), formal coordinators (leaders,

leading team), documented and communicated roles and responsibilities (teams and awareness programs) as well as adequate financial support (Hoong & Marthandan, 2011).

- Continuity strategy

  DRP and BCM needs a clear strategy (incl. technology strategy (Nelson, 2006)) which has to be embedded in the organization's culture (Tjoa et al., 2011). It is important to integrate all employees from all operations (Roberts, 2006), (Fallara, 2004). Also business management practices, information resources, staff (life, safety and availability) and telecommunications (McDonald, 2008), (Dey, 2011) needs to be considered.

- Plan development and execution

  Existing plans needs to be audited, exercised, and re-worked regularly (Nelson, 2006), (Fallara, 2004), (Alhazmi & Malaiya, 2012), (Wang, Zhou, et al., 2005), (Gang, 2009).

- Training and counselling

  Managers and employees needs to be educated continously (Hoong & Marthandan, 2011), (Liu & Ormaner, 2009), (Gang, 2009).

- Periodic reporting

3.1.5 DRP's and BCM's interrelation with the concept of Resilience

As Madni & Jackson (2009) argue, resilience is a multi-faceted capability that encompasses avoiding, absorbing, adapting to, and recovering from disruptions. Nelson (2006), Tjoa et al. (2008) and Ncemane & Weeks (2012) identify DRP and BCM as cornerstones in the concept of resilience. For example, Nelson (2006) argues that DRP also represent a critical component of IT resilience. Tjoa et al. (2008) highlights that BCM is a prerequisite to strengthen the organization's resilience. They argue that BCM is a management process to improve resilience. Also the British Standard 25999 attributes BCM to build a framework for building resilience. Characteristics of resilience in context with DRP and BCM are:

- Flexibility *(continuous, flexible services)*: According to Nelson (2006), Garlick (2011) and Senda et al. (2013), resilience *(as well as BCM & DRP)* includes providing active services by ensuring the continued existence of critical data and systems, also after disastrous events.

- Redundancy: Hoong & Marthandan (2011) argue, resilience focus on critical assets which support key business processes, including building, equipment, technology, human resources and third party relationships.

- Risk Management: According to Garlick (2011) and Madni & Jackson (2009), *(equal to BCM and DRP)* resilience includes the reduction of exposure to cascading catastrophic events. Resilience is a proactive approach that looks for ways to enhance the ability of organizations to explicitly monitor risks.

3.2 Risk management (and BIA)

Object of examination were the concepts of "Risk Management" and "Business Impact Analysis" (BIA). As the literature review shows, these concepts are main-pillars of DRP and BCM. Risk management and BIA are sufficiently described in several national and international standards and guidelines. Due to this fact, the authors present a meaningful summary.

Tjoa et al. (2008) argue that risk management and BIA enable efficient and effective BCM as they deliver information about the impact of resources' disruption on business. Both are important components of BC planning (Dey, 2011). According to British Standard 25999 *(in Zambon et al. (2007))*, in the centre are the identification of activities and processes supporting the core services used by the organization, the identification of relationships and dependencies between activities and processes as well as the evaluation of the impact of a disruption to core services and processes. Risk management is the previous tasks of a successful BIA. According to Fallara (2004), risk management identifies the business processes, internal and external threats and vulnerabilities and classifies them by how critical they are to the overall business. Wang, Zhou, et al. (2005) quote, BIA basically analyses how a terminated resource affects other resources. BIA is to determine the impact for the organization a particular process has if it is out for a period of time.

Supporting standards and guidelines identified are BS25999, CIP, HB 221, IEEE P1700, ISO 13335, ISO 17799, ISO 22399, ISO 24762, ISO 27001, etc.

3.3 Resilience

Ncemane & Weeks (2012) see resilience as an umbrella concept which encompasses BCM and DRP. Tjoa et al. (2011) understand BCM as a management process to improve resilience in an organization.

3.3.1 Origin & Definition of Resilience

Senda et al. (2013) highlight, resilience is originally a term used and physics. It means the property of a material that enables it to resume its original position after being bent, stretched, or compressed. After the September 11th attacks resilience also became popular in social and business science. In 2004, the term became popular in psychology. The central idea is that failure is not necessarily a consequence of malfunction or poor design – it is a result of ongoing interactions and adaptions (Madni & Jackson, 2009). Westrum *(in Madni & Jackson (2009))* highlights that resilience is a term determined by at least two of the following: avoidance, survival, and recovery. The opposite of resilience is brittleness (Madni & Jackson, 2009).

3.3.2 Capabilities of resilient organizations

Resilience is a measure of the persistence of an organization and its ability to absorb change and disturbance (Ncemane & Weeks, 2012). Madni & Jackson (2009) distinguishes between two types of resilience: reaction and adaptation. Reaction implies *(for Madni & Jackson (2009))* immediate or short-term action while adaptation implies long-term learning. Adaption is underpinned by situational awareness and understanding key vulnerabilities. According to Ncemane & Weeks (2012) a resilient

framework is achieved, when the organization is able to bounce back. This includes the organizational abilities to …

- avoid, survive and recover from unpredicted disruptions (Ncemane & Weeks, 2012), (Madni & Jackson, 2009); *(resilience looks for ways to enhance the ability of organizations to explicitly monitor risks)*;
    - avoid: reduce the exposure to cascading catastrophic events (Garlick, 2011).
    - survive: provide and maintain an acceptable level of service in the face of various faults and challenges to normal operation *(Sterbenz et al. in Madni & Jackson (2009))*; recover and stabilize following unexpected and unknown disrupt occurrences *(Oldfield in Ncemane & Weeks (2012))*.
    - recover: quickly return to normal operations; maintain effective operational level with minimal disruption to its performance (Ncemane & Weeks, 2012) if hit by a disruption.
- continue flexible and continuous services; ensuring the continued existence of critical data and systems (Garlick, 2011).
- circulate bad news and deal with the root causes quickly (Sheffi, 2005).

To be resilient means to maintain a strong sense of relationship, cooperation shared values, beliefs, and trust between employees, management, suppliers, partners and entities (Ncemane & Weeks, 2012). Strong leadership *(rather than management)* is essential which includes to interact with and empower its people, diversity in the workplace (Ncemane & Weeks, 2012), forward thinking and the development of survival instincts *(Sundstrom and Hollnagel in Ncemane & Weeks (2012))*. Well planned communication and change management *(agility to changed circumstances)* is essential to effectively adapt to turbulent changes. Resilience incorporates learning and knowledge sharing, adaption and experimentation (Ncemane & Weeks, 2012), (Madni & Jackson, 2009).

3.3.3 Resilience in context and its interrelation to safety, reliability & survivability

Resilience can be seen and argued from different viewpoints. Views are:

- Informatics: resilience is seen as the availability of computer systems which offer uninterrupted system access and services (Nelson, 2006). To maintain uninterrupted services, redundancy, data backup strategies, flexibility etc. need to be developed.
- Organization theory: resilience is achieved when the individuals and organizations continually adjust its performance to the prevailing conditions (Madni & Jackson, 2009).
- Supply chain management: resilience can be achieved either through redundancy or building in flexibility (Sheffi, 2005).

According to Madni & Jackson (2009) resilience is highly related to safety, reliability and survivability:

- Safety: ability of a system understanding how it can proactively ensure things stay under control (safety as a property, defined in terms of adherence to standards, policies, and error typology).
- Reliability: ability of a system to perform required functions under stated conditions.
- Survivability: ability to withstand attacks or countermeasures; ability to minimize the impact of a disruption achieved through (1) providing a minimal acceptable level of value delivery during and after a disruption or (2) the reduction of the likelihood or magnitude of disruption.

4 Findings & Conclusion

This paper presents a literature review on the perception of the concepts of DRP, BCM and resilience. A realization is that the database IEEE is a mainly (IT-) technical database. The findings are mainly technically nature and underlined with technical aspects. It is not a surprise that the concept of resilience is underrepresented. The concept of resilience include soft as e. g. the strong sense of *(internal and external)* relationships, shared values, cooperation, trust, etc.

The literature review shows, that DRP and BCM are concepts to establish, maintain and enhance ICT- and (e-) business continuity – also in face of organizational adversity. Both are related to security. While DRP is a specialized approach to ICT, BCM is related to the whole organization. BCM has its roots in DRP and includes ICT. On the one hand, DRP and BCM are seen as framework to develop resilience. On the other hand, resilience supports and enhances DRP and BCM. However, resilience extends the security views and adds safety, reliability and survivability. The concept of resilience is more interdisciplinary and is known, for example in the field of physics, psychology, emergency response, etc.

As some authors highlighted, once hit by a disruption, organizations have serious problems to keep business ongoing. As the literature review shows, reasons installing DRP, BCM and resilience are because of this internal and external, planned as well as unplanned risks and threats. With these concepts, managers try to avoid HILP events and improve the response options if a disruption hit.

4.1 Representation of DRP, BCM and resilience in literature

Table 6 shows that 590 quotations are in direct *(or indirect)* relation to the concepts of DRP and BCM. 168 *(or 28 %)* of these, found in 40 samples, are used for the literature review. According to the quotations, the concept of resilience is underrepresented in DRP and BCM. During the literature research, 162 quotations were coded *(see table 6)*. 41 *(or 25 %)* of these quotations were used for the literature review. The used quotations refer to a total of eight samples. These confirm the authors assumption that resilience in the field of DRP and BCM is an emerging topic.

Risk management and BIA are highly supported by several international standards. The most frequently mentioned standards are BS 25999, NIST SP-800, NFPA 1600 and ISO 22399. Although, 149 quotations were coded, only four authors were used for this subsection.

The following table visualizes a summary about the used samples, used quotations, average quotations and the authors above and below the average:

Section	Topic	Used Papers for the literature review	Used quotations	Average quotations	Authors above the average	Authors under the average
3.1	DRP & BCM	40	168	4,2	Nelson (2006), Hoong & Marthandan (2011), Fallara (2004), Dey (2011), Alhazmi & Malaiya (2012), Wang et al. (2005), McDonald (2008), Wan & Chan (2008)	Costello (2012), Tjoa et al. (2008), Winkler et al. (2010), Jorden (1999), Garlick (2011), Liu & Ormaner (2009), Grimaila (2004), Wang et al. (2005), Cha et al. (2008), Ncemane & Weeks (2012), Lawler et al. (2007), Madni & Jackson (2009), Tjoa et al. (2011), Zambon et al. (2007), Hayhoe (2006), Kolb (2008), O'Callaghan & Mariappanadar (2008), Senda et al. (2013), Alhazmi & Malaiya (2013), Xiang et al. (2008), Rejeb et al. (2012), Elliott et al. (2010), Cousins (2007), Iyer & Sarkis (1998), Zheng et al. (2013), Gang (2009), Shao (2005), Tsai & Sang (2010), Draheim & Pirinen (2011), Roberts (2006)
3.2	Risk Management & BIA	4	4	1,0	Used authors: Fallara (2004), Dey (2011), Wang et al. (2005), Zambon et al. (2007); Result not representative	
3.3	Resilience	8	41	5,1	Madni & Jackson (2009), Alhazmi & Malaiya (2012), Dey (2011)	Garlick (2011), Sheffi (2005), Nelson (2006), Tjoa et al. (2011), Senda et al. (2013)

Table 8: Summary of used samples and quotations

4.2 Relevance

The most influencing samples in DRP and BCM are Nelson (2006), Hoong & Marthandan (2011), Fallara (2004) and Dey (2011). In total, they include one third of all used quotation. In resilience, the most influencing samples are Madni & Jackson (2009), Alhazmi & Malaiya (2012) and Dey (2011). They include 83 % of all used quotations.

According to the used quotations, the most important multi-disciplinary samples are Nelson (2006), Alhazmi & Malaiya (2012), Dey (2011) and Madni & Jackson (2009). Alhazmi & Malaiya (2012) and Dey (2011) are above the average quotations in subsection DRP / BCM and subsection resilience. However, Nelson (2006) is above the average quotation in subsection DRP / BCM and Madni & Jackson (2009) is above the average in subsection resilience. In total, these four samples incorporate more than one third *(35 %)* of all used quotations in these sections.

The following table visualizes the amount of used quotation per sample. Also, the table shows, where and when the samples above the average per subsection got presented or published.

Quotation(s)	DRP & BCM	RM	Resilience	Presented at / Published in	Year
1	Zheng et al. (2013), Iyer & Sarkis (1998), Cousins (2007), Elliott et al. (2010), Rejeb et al. (2012), Xiang et al. (2008), Alhazmi & Malaiya (2013), Senda et al. (2013)	Fallara (2004), Dey (2011), Wang et al. (2005), Zambon et al. (2007)	Nelson (2006), Tjoa et al. (2011), Senda et al. (2013)		
2	O'Callaghan & Mariappanadar (2008), Kolb (2008), Zambon et al. (2007), Hayhoe (2006), Tjoa et al. (2011), Madni & Jackson (2009)		Garlick (2011), Sheffi (2005)		
3	Lawler et al. (2007), Ncemane & Weeks (2012), Cha et al. (2008), Wang et al. (2005), Grimaila (2004), Liu & Ormaner (2009), Garlick (2011)				
4	Jorden (1999), Roberts (2006), Draheim & Pirinen (2011), Tsai & Sang (2010), Shao (2005), Gang (2009)				
4,2	Average				
5	Winkler et al. (2010)			Quality of Information and Communications Technology (QUATIC), 2010 Seventh International Conference on the	2010
5,1			Average		
6	Tjoa et al. (2008)			Availability, Reliability and Security (ARES), 2011 Sixth International Conference on	2011
	Costello (2012)			IT Professional	2006

7	Wan & Chan (2008)			Business-driven IT Management, 2008. BDIM 2008. 3rd IEEE/IFIP International Workshop on	2008
	Wang et al. (2005)			Parallel and Distributed Computing, Applications and Technologies, 2005. PDCAT 2005. Sixth International Conference on	2005
	McDonald (2008)			Rural Electric Power Conference, 2008 IEEE	2008
	Alhazmi & Malaiya (2012)			Software Reliability Engineering Workshops (ISSREW), 2012 IEEE 23rd International Symposium on	2012
9	Dey (2011)			GCC Conference and Exhibition (GCC), 2011 IEEE	2011
10	Fallara (2004)			Potentials, IEEE	2003
11			Dey (2011)	GCC Conference and Exhibition (GCC), 2011 IEEE	2011
			Alhazmi & Malaiya (2012)	Software Reliability Engineering Workshops (ISSREW), 2012 IEEE 23rd International Symposium on	2012
12			Madni & Jackson (2009)	Systems Journal, IEEE	2009
16	Wang et al. (2005)			Research and Innovation in Information Systems (ICRIIS), 2011 International Conference on	2011
20	Nelson (2006)			System Sciences, 2006. HICSS '06. Proceedings of the 39th Annual Hawaii International Conference on	2006

Table 9: Statistic of used quotation per sample

At this place, the authors point out that in the concept of resilience, several authors from different fields of research got cited *(e. g. Sterbenz et al.; Westrum (in Madni & Jackson (2009)), Oldfield; Sundstrom and Hollnagel (in Ncemane & Weeks (2012))*. This confirms again the authors' assumption, that the concept of resilience in DRP and BCM get adopted from other fields of research.

4.3 (Overlapping) Strategies and extended strategies

Top continuity strategies in the concept of DRP and BCM are backups, redundancies, management commitment and active planning and testing. The following table visualizes the strategies and its rating by quotations.

Strategy	Quotations	Samples
Backup	7	Nelson (2006), Fallara (2004), Alhazmi & Malaiya (2013), Tsai & Sang (2010), Hoong & Marthandan (2011), Wang et al. (2005), Garlick (2011)
Redundancy	6	Nelson (2006), Fallara (2004), Shao (2005), Hoong & Marthandan (2011), McDonald (2008), Alhazmi & Malaiya (2013)
Management Commitment	5	Nelson (2006), Tjoa et al. (2008), Jorden (1999), Hoong & Marthandan (2011)
Active planning & testing	5	Fallara (2004), Alhazmi & Malaiya (2013), Hoong & Marthandan (2011), McDonald (2008), Gang (2009)
Flexibility	3	Nelson (2006), Fallara (2004), Gang (2009)
Optimization, indcident management and scenario planning	3	Nelson (2006), Fallara (2008), Gang (2009)
Technology	2	Fallara (2004), Liu & Ormaner (2009)
Training & education	1	Liu & Ormaner (2009)
Information sharing	1	Zheng et al. (2013)

Table 10: DRP and BCM strategies

Training and education as well as information sharing, which are essentials in the concepts of resilience, are underrepresented in DRP and BCM. Overlapping strategies within the concept of resilience are flexibility and redundancy, as well as the use of risk management as anticipation and mitigation method.

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Knowledge Transfer Challenges in ERP Development Networks: *The Quest for a Shared Development Model*

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Abstract

Contemporary Enterprise Resource Planning (ERP) system development is conducted in a multi-stakeholder network. It requires the collaboration of different organizations and stakeholders. Knowledge transfer (KT) is difficult and often causes failure in projects, yet it has not been thoroughly investigated from the network's perspective. Thus, this interpretive case study investigates what makes KT difficult in ERP development networks. As a result, seven categories of KT challenges were found: articulating domain knowledge, unwillingness to communicate, excessive trust, using informal communication channels and methods, different ways of working, missing or unidirectional connections between parties, and unsuitable or missing tools. The main contribution is gaining a deeper understanding of ERP development networks and especially about what makes KT difficult when developing ERP systems in a multi-stakeholder context. These findings imply that a shared development model for the EDN needs to be created in order to avoid KT challenges.

Keywords: Knowledge transfer, Challenges, ERP development networks, Development model

1 Introduction

> "*[Knowledge Transfer] in the [Enterprise System] context provides continuing challenges for practitioners and many opportunities for researchers*" (Volkoff et al., 2004, p. 302).

This statement introduces our research topic: knowledge transfer (KT) in an Enterprise Resource Planning (ERP) system context. The ERP system enables information flows

between departments inside the organization (Davenport, 1998). It provides a backbone for business collaboration with supply chain partners (Moller, 2005). Despite the abundant attention given to ERP systems, the implementations often fail, at least on some level (Momoh et al., 2010). Knowledge management (KM) has been studied rather extensively in information systems research, yet it is still a major challenge in ERP projects and is prone to failures (Al-Mashari et al., 2003; Sarker & Lee, 2003). Only a few researchers provide empirical evidence or concrete suggestions to overcome these challenges (Corvera Charaf et al., 2013). Contemporary ERP development is rarely done as an in-house project. ERP projects are socio-technical endeavors that include numerous stakeholders from different levels of all the involved organizations, including but not limited to the customer or adopting organization (AO), the vendor, consultants, and third parties such as database vendors or business partners (Dittrich et al., 2009; Sammon & Adam, 2002). In addition, these projects tend to cross national boundaries, as projects are for example sourced to low-cost offshore locations (Levina & Vaast, 2008). The stakeholders involved in ERP development together form an ERP development network (EDN) (Alanne et al., 2014).

When developing the system in a multi-stakeholder network, the inter-organizational boundaries are also blurred, increasing complexity and making close collaboration even harder (Levina & Vaast, 2008; Volkoff et al., 2004). Studies on different levels (individual, group, and organizational) of KT have been conducted, yet with very few exceptions they have been limited to local settings (Sarker et al., 2005). Earlier IS studies have focused on the AO's internal issues (e.g., Lee & Lee, 2000), KT across and within software teams (Heeager & Nielsen, 2013; Joshi et al., 2007), between the AO and the vendor (Al-Salti & Hackney, 2011), and between the consultancy and the AO (Ko et al., 2005; Haines & Goodhue, 2003). Additionally, KT issues between offshored developers and the main vendor have also been studied, e.g., in virtual systems development teams (Levina & Vaast, 2008; Sarker et al., 2005). Overall, the EDNs as a whole and their interaction have not received much attention in the IS research community (Dittrich et al., 2009; Hackney et al., 2008).

In this paper, we focus especially on KT challenges in the EDNs, and identify what makes KT difficult. Our research question is thus: *What are the knowledge transfer challenges in ERP development networks?* An interpretive case study research approach was chosen. We conducted 35 interviews in two EDNs. We consider the development of the ERP system as an on-going operation through the ERP lifecycle instead of simply a phase in the project (see e.g., Alter, 2002).

The rest of the paper is organized as follows. Next, the related research on KT challenges in ERP development networks is presented. The third section introduces the research methods and setting. The fourth section presents the key findings from the empirical data. The discussion part evaluates the findings and links them to earlier literature. After this, the implications of the study are proposed. Finally, the conclusions wrap up the paper with limitations and future work.

2 Related Research

Much of the knowledge residing in organizations is untapped and unknown (Alavi & Leidner, 2001). A substantial increase in productivity and competitive advantage could be gained by identifying and transferring this across the intra- and inter-organizational boundaries (Argote & Ingram, 2000). However, this is often a difficult and laborious

activity because much of the knowledge is embedded in practice, e.g., in organizational processes, which is the case especially in information system development (Orlikowski, 2002; Volkoff et al., 2004).

Knowledge itself may be defined in a variety of ways. Different levels (e.g., data, information, knowledge) or dimensions (tacit and explicit) can be distinguished (Alavi & Leidner, 2001). In this paper, the focus is on knowledge related to development, including both tacit and explicit knowledge. More precisely, we investigate business knowledge concerning the processes and workflow in the AO, and technical knowledge about the system's capabilities and the development skills that are used to translate business needs to software solutions (Al-Salti & Hackney, 2011).

KT has been widely studied in other disciplines, such as organization science (Carlile, 2004), software engineering (Heeager & Nielsen, 2013), and knowledge management (Riege, 2005). The KT in organizations is driven by the communication processes and information flows (Alavi & Leidner, 2001). Moreover, poor communication between different groups, within and between organizations, negatively affects the ERP projects (Al-Mashari et al., 2003). Especially when developing systems in a multinational environment, the cultural issues and different communication methods need to be considered (Levina & Vaast, 2008). The terms "knowledge sharing" and "knowledge transfer" are sometimes used in parallel in the literature (Heeager & Nielsen, 2013). However, here we will focus on knowledge transfer, since it considers both sharing and using the transferred knowledge (Argote & Ingram, 2000) essential for the development. KT may happen on various levels: between individuals, from individual to explicit sources, between and across groups, and among organizations (Alavi & Leidner, 2001; Argote & Ingram, 2000).

The need to efficiently transfer knowledge is highlighted in ERP development networks as there are multiple stakeholders from different organizations. The stakeholders in the EDN have their expertise in different fields. Shared understanding about the scope of the system and mutual "language" is crucial (Jones, 2005; Ko et al., 2005). The domain knowledge of each stakeholder needs to be transferred within the network, over groups and organizational boundaries. KT becomes more difficult as the individuals and organizations might have significantly differing objectives and goals for the development (Volkoff et al., 2004; Alanne et al., 2014). In addition, the EDNs are not stable. Changes in individuals involved as well as the temporal role of stakeholders in the development makes mutual understanding even harder to achieve (Alanne et al., 2014).

The KT challenges can be divided into three key levels: *individual* (the level where knowledge resides), *organizational* (the level where knowledge attains its economic and competitive value), and *technological* (the level that provides tools for knowledge sharing) (Riege, 2005). Figure 1 illustrates the initial levels and categories of KT challenges in EDN as derived from the literature.

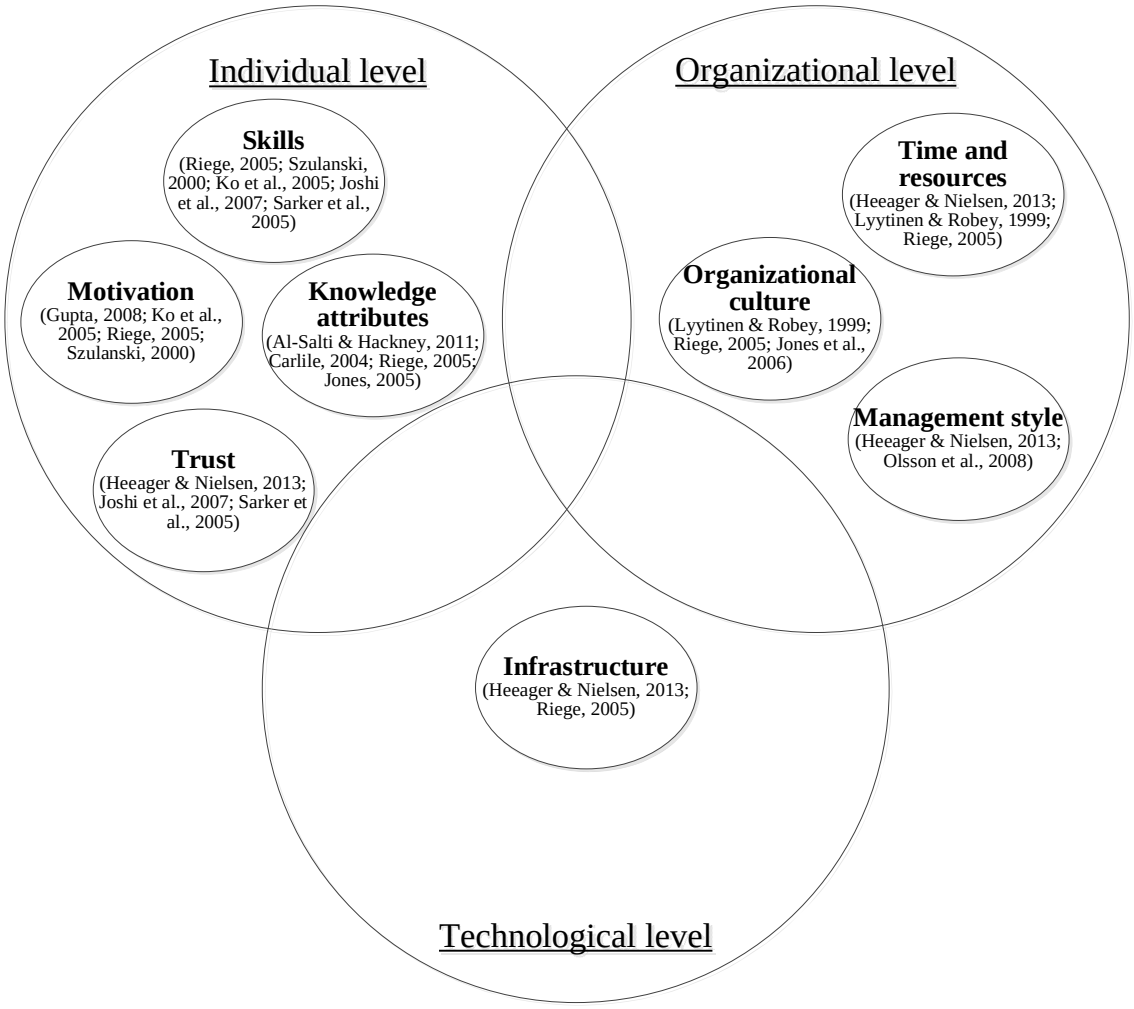


Figure 1: Knowledge transfer challenges in ERP development networks

3 Research Methods and Setting

An interpretive case study approach (Walsham, 2006) was selected in order to gain in-depth knowledge of ERP development networks. We gathered data from two different cases by conducting 35 theme-based interviews: 33 in January-June 2013 and two in February 2014 (the offshore department in Case B). Cross-organizational interviews were used to enhance the credibility and to allow the testing of one source of information against others, i.e., in "*representing a variety of voices*" (Myers & Newman, 2007, p. 22).

3.1 Case organizations

Both case companies operate in global environments. Case A is a large manufacturing company and Case B is a large service provider in the retail business. Each of them can be considered regular enterprises acquiring a custom ERP system. A tailored ERP system was chosen due to the fact that standard software would not satisfy the unique business process needs of AOs. In all cases, the cooperation between the AO and the

vendor has lasted for several years. In both EDNs, at least five relevant stakeholders were present: AO business, AO IT, vendor, offshore department, and third parties.

3.2 Data collection

We started the data collection in each AO with an initial interview with our main contact person. The subsequent interviewees were chosen by snowball sampling, i.e., the interviewee recommends a suitable person to be interviewed. This way, the EDN was investigated by moving from one node to another. The data gathering was stopped when the interviewees did not suggest any new persons to interview. This allowed us to obtain critical mass of interview data (Myers & Newman, 2007). The interviewees and organizations are shown in Table 1.

	AO Business	AO IT	ERP vendor	Offshore department	Third parties	Total
Case A	2	6	6	1	2 (Middleware vendor)	17
Case B	6	5	4	2	1 (Corporate IT)	18
Total	8	11	10	3	3	35

Table 1: The number of interviewees and their affiliated organizations

The interview questions were semi-structured. The open-ended questions considered the following areas: identification of stakeholders in the latest ERP development activity, own experiences, and successful/problematic issues. Each interview was conducted onsite at the case organizations. They lasted from 11 to 98 minutes, the average being about one hour per interview. The interviews were recorded and transcribed for analysis purposes. The researchers also collected secondary research material, such as documents and memos, to better understand the contexts.

3.3 Data analysis

There was a dedicated researcher responsible for the data analysis in each case organization. First, this responsible researcher coded the data from the case organization starting immediately after the first interviews (Walsham, 2006). The challenges in the ERP development were searched from the data and the first version of categories was created. Then, the focus was on EDN related communication and knowledge management challenges, which were further categorized. A comparison of these issues and categories between cases was done in several brainstorming sessions between the researchers. The aim was to find similarities and differences as well as to harmonize the codes and categories for the analysis (see Figure 2).

Extracts from the data	Used codes	Interpretation and harmonization
Case A: "*It has been challenging to transfer that knowledge to outsiders with only technical IT understanding, and no understanding of the business.*"	"distribution of domain knowledge", "offshoring"	Domain knowledge of each stakeholder group is difficult to transfer outside of the group, and further throughout the EDN
Case B: "*The understanding in India is not always as deep as here regarding to [domain knowledge]*"	"business knowledge", "network"	
Case A: "*... the cooperation between all [departments] is not always the best possible. Certain kinds of silos form, and sometimes you may even observe some company internal defensiveness. Instead of providing things together for the business, everyone has a bit of their own stance.*"	"internal collaboration", "conflict"	Transferring knowledge becomes difficult if certain parties or individuals are not willing to participate in the development or are undermotivated to share their knowledge.
Case B: "*If we think about the group of people involved in the definitions, they sure will get more passive after that phase. Even if asked statements to already made documents, very few people will read or comment them afterwards.*"	"information distribution", "documentation", "cooperation"	
Case A: "*The challenges were with day-to-day work. There are still differences in how Asian culture matches with European, values and we still have topics on how reliable certain tasks and how we work together there.*"	"cultural challenges", "offshoring"	Cultural differences and dissimilar practices among the organizations in EDNs may hinder the knowledge transfer and create the need to match the local practices with new working environments, especially in multinational environment.
Case B: "*The offices work differently. They're used to using systems a little differently earlier. The modes of operating have been a little different, how they are used to doing things.*"	"business processes", "business knowledge"	

Figure 2: Examples of coding and harmonization

The data was revisited iteratively to gather more detailed information and to confirm the identified issues. The initial findings were also discussed with the main contact persons in the case organizations and further revised based on the feedback. The resulting categories of KT challenges in EDNs are presented in the next section.

4 Findings

The findings are categorized under three main levels and further into subcategories, as summarized in Table 2.

Level of knowledge transfer challenge	Subcategory
Individual	Articulating domain knowledge
	Unwillingness to communicate
	Excessive trust
Organizational	Using informal communication channels and methods
	Different ways of working
	Missing or unidirectional connections between parties
Technological	Unsuitable or missing tools

Table 2: Identified categories of knowledge transfer challenges

4.1 Individual level

KT challenges related to individuals were identified from the data. These are categorized into: *articulating domain knowledge*, *unwillingness to communicate*, and *excessive trust*.

4.1.1 Articulating domain knowledge

The knowledge that is communicated through the EDN is often tacit and embedded in local practices. This causes difficulties in articulating. Some issues surface only when

the system is used. The tacitness of knowledge is highlighted when the key individuals left the project:

> "*…there was a clear dip in performance when he [project manager] left, there was no single person who has the 13 years of experience about the system.*"–Case B, AO Business

The business needs emerging from the AO should be forwarded throughout the EDN. Challenges in reaching an understanding between technical and business personnel of the AO and the vendor were pointed out:

> "*…it takes several people on both ends to manage and figure out what is wanted. So it's challenging to specify in that way, and in general, there are so many moving parts there.*"–Case B, Vendor

On the other hand, the users may not have enough IT competence and they cannot challenge the system enough, thus expressing true needs forward is difficult. The vendor of Case B saw piloting as essential because only then are the practical issues, such as different working styles and methods, revealed. Additional challenges emerged as the domain knowledge had to be further transferred to the remote locations:

> "*There's a lot of know-how in the heads of our guys in this country. It has been challenging to transfer that knowledge to outsiders with only technical IT understanding, and no understanding of the business. In Asia it's hard to find developers that would understand the domain.*"–Case A, Vendor

Also, lack of skills in sharing knowledge and the foreign language sets certain limitations for the KT.

4.1.2 Unwillingness to communicate

The importance of the system under development was not always understood by the business side personnel. Sometimes, lack of communication is a matter of attitudes:

> "*... the cooperation between all [the departments] is not always the best possible. Certain kinds of silos form… Instead of providing things together for the business, everyone has a bit of their own stance.*"–Case A, AO IT

In Case A, joint project groups were formed between the AO and the vendor to ensure adequate cooperation and communication for the development projects. However, currently the AO is sometimes unwilling to participate in them. This can lead to unidirectional information flow, distancing the developers further away from the actual users of the system. Moreover, in Case B, business representatives were not interested in taking part in the project even if asked for their opinions, e.g., the requirement documentation review was dismissed, and IT had to follow the original definitions. Similarly in Case A, the "*business people disappeared along the way*" (AO IT), the project went on and ran into complications.

Because of the global nature of the EDN, some parties, especially subcontractors and offshored developers, may not have enough motivation to receive the knowledge:

> "*On the one hand, they are [foreigners] and on the other hand they aren't our own employees and [are] not so interested in the knowledge.*"–Case B, Vendor

4.1.3 Excessive trust

Having too much trust between stakeholders can lead to problems. All the relevant knowledge may not be transferred because it is assumed that the other party already has it. More specifically, if the EDN stakeholders have a long history of cooperation, some domain understanding is expected of the partners. AOs often seem to assume that the vendor and partners have a good understanding of their business logic; hence, the vendor's competence is taken for granted:

> "*The advantage with this vendor is that during the years the domain knowledge has been built up to a certain level also within there. So they really understand immediately what we are talking about.*"–Case B, AO IT

Moreover, this can lead to a situation in which the documentations are rather vague:

> "*…some functions [have been] described like 'this is how it should work'*"–Case B, AO IT

Due to the vendor's familiarity with the AO's business, it was not seen as necessary to do the documentation very rigorously. However, this method for KT was not suitable for the offshore department. The specifications had to be redefined to be understandable for the offshore developers.

Still, it appeared that the vendor has much tacit knowledge about the AO's business, so that ending the cooperation or changing the vendor is not possible. For example, Case A considered the relationship with the vendor as a "*forced marriage*," and even considered buying the system source code from the vendor, but this "*did not turn out to be a realistic option*." In Case B, sticking with the same vendor was considered natural since choosing a new vendor "*would have meant that they would have had to spend a couple of years learning about the domain issues*."

4.2 Organizational level

Three issues related to organizational level were found: *using informal communication channels and methods*, *different ways of working*, and *missing or unidirectional connections between parties*.

4.2.1 Use of informal communication channels and methods

Informal channels and methods were often used instead of intended ones. The EDNs are the result of a long period of cooperation; hence, personal relationships are inevitably formed and the official communication routes are bypassed:

> "*If I have questions concerning the system and I cannot contact our IT manager right away, the next place for me to call is the CEO of the vendor directly.*"–Case B, AO Business

Distributing documented knowledge was also seen as challenging. A centralized tracking system was agreed to be the primary choice of communication because "*otherwise it wouldn't stay under control*" (Case B, Vendor). However, in practice, email and phone calls were often used instead. Further challenges were caused by not having standardized documentation practices. In Case B, for example, the original requirement specification documents were managed in various ways:

> "*It is difficult to dig up that information when there is no single specification document…the specification that is done with the vendor can be just email conversations…*"–Case B, AO IT

Informal documentation methods can lead to confusion about who possesses the needed information in the organization. This hinders the KT as the necessary pieces of information have to be "fished" from various stakeholders.

At times, official methods are not used due to practical reasons. For example, the IT department of Case B is rather small and all its members are co-located and hence share knowledge casually along the daily routines. This may be efficient for knowledge sharing within the group, but not for the whole EDN if one group decides and evaluates which information is distributed to all relevant parties.

4.2.2 Different ways of working

Different ways of working among the organizations in EDNs may hinder the cooperation and create the need to match the local practices with new working environments. Achieving a common understanding between the AO and the vendor turned out to be challenging in Case A:

> "*I was talking about the fence pole and [the vendor] was talking about the fence. We had agreed on completely different things and neither of us understood anything.*"–Case A, AO IT

Similarly, the third parties may be used to dissimilar practices. For example, the subcontractors are accustomed to working strictly along the specifications. This is challenging as the business needs are described loosely to leave room for novel ideas from the technical experts.

In both cases, the ERP systems are to be deployed to multiple countries. This has added challenges for KT as the practices are dissimilar:

> "*The challenges were with day-to-day work. There are still differences in how Asian culture matches with European, values and we still have topics on how reliable certain tasks and how we work together there.*"–Case A, Vendor

Multinational development required two-way knowledge transfer: both gathering the specific needs of other countries and also implementing the business logic of the system into these locations. Besides the national differences, local differences in the business units created a need to match the practices. Both the vendor and the AO in Case B saw that difficulties arise because the offices were used to doing things differently and had their own unique cultures.

4.2.3 Missing or unidirectional connections between parties

Missing connections slowing down the information flow between stakeholders were identified at different levels. In Case A, it turned out to be challenging to manage the needs of different business areas. In Case B, lack of collaboration between the AO's business and IT departments was identified. For example, business representatives felt like they do not get enough information on the progress of the project and were uncertain which of their needs will be realized and which will not.

The AOs' IT departments, which are leading the development, are almost entirely situated in a single country, yet the ERP system is eventually (or already has been) implemented in multiple nations. Countries other than the focal one are easily forgotten from the information distribution chain. In Case B, attempts were initially made to avoid this by keeping the other countries informed about the development progress and asking for their unique requirements in joint meetings. However, this activity slowly faded as the project was delayed.

The missing connections were identified between the AO and the vendor. The vendor felt that they were not getting enough feedback from the AO and consequently, the AO's IT department did not get enough information from the vendor. Moreover, the vendor of Case A highlighted the need to have direct contact with the AO's business representatives to be more involved in specifying the system:

> "*Their business units are customers to their IT department. Our customer is their IT organization. This is the old model that we've stuck with.*"–Case A, Vendor

In the worst case, this unidirectional knowledge distribution may lead to a situation whereby the technical know-how (e.g., what can be done with the system) is not transferred through the network. For example, the offshored developers felt they did not have enough information about the overall picture in order not to "*reinvent the wheel.*" Moreover, this has affected the offshored developers' ability to advance their ideas and competence:

> "*If you want to make a proposition, you'll need to have information about [the environment]*"–Case B, Offshore Department

4.3 Technological level

The tools that are used for communication and KT can be unsuitable or they may not exist at all. For example, it appeared that the old integrative systems used as the basis for the developed system are often not well-documented. These systems were, however, used as tools between all parties, to which they refer to while discussing the system development:

> "*The aim is that the new version has at least all the same features as the old version. It has many features that are not documented anywhere, they just are there. So digging them and finding out what is there has been quite a big part of the work.*"–Case B, Vendor

In Case A, it appeared that during the project phase of the ERP system development, there were no tools to manage change requests. Furthermore, the need for centralized systems in information sharing was emphasized; the offshored unit said that there is no centralized repository for business process descriptions. Similarly, in Case B, the offshored unit highlighted the lack of certain tools (e.g., storyboards) in the development process hindering the KT.

5 Discussion

We have identified KT challenges hindering the ERP development in networks. Most of these issues are recognized in the literature on some level, but we have also found

undiscovered aspects of KT challenges. In Figure 3, our findings are mapped to the related research.

Level	Knowledge transfer barriers	Barriers in EDNs	Literature coverage
Individual	Motivation	Unwillingness to communicate	YES
	Skills	Not an issue	-
	Trust	Excessive trust	PARTLY
	Knowledge attributes	Articulating domain knowledge	YES
Organizational	Organizational culture	Different ways of working	PARTLY
	Time and resources	Not an issue	-
	Management style	Not an issue	-
Technological	Infrastructure	Unsuitable or missing tools	YES
Development network	Development model	Using informal communication channels and methods	NO
		Missing or unidirectional connections between parties	NO

Figure 3: Identified knowledge transfer challenges in relation to the literature

In general, KT is time-consuming and lack of resources hinders it (Lyytinen & Robey, 1999; Riege, 2005; Szulanski, 2000). Surprisingly, this is not the case in these EDNs. Besides only a few mentions about not having time to write documentations, having scarce resources was not considered a problem. Issues related to individuals' skills, for example personal characteristics and interpersonal skills (Riege, 2005), absorptive capacity (Szulanski, 2000), and different levels of expertize (Joshi et al., 2007) were not considered as challenges in KT in our cases. Management style related issues (e.g., ISD change from traditional project management to agile) have been identified as a barrier (Heeager & Nielsen, 2013) or unsuitable communication level or hierarchy (Olsson et al., 2008). However, these were not evident in our cases.

The challenges found in the three subcategories were aligned with the literature. First, the nature of knowledge makes the KT in EDN fundamentally difficult, as suggested by the literature and confirmed in our findings. In EDNs, both the business and technical knowledge is often tacit and embedded in practices, and hence, difficult to explicitly express let alone to articulate it outside the community possessing it (Carlile, 2004; Jones, 2005). The situatedness of the domain knowledge has been acknowledged in our cases; practical means are chosen to transfer these insights to a foreign country by bringing the developers on-site to the AO's premises. Second, the identified motivational issues were also aligned with the literature. Especially intrinsic motivation (Ko et al., 2005) and unwillingness to share knowledge (Gupta, 2008) were hindering the KT in EDNs. Third, similar to our findings, technology level issues such as inadequate level of technical infrastructure (Heeager & Nielsen, 2013) or reluctance to use the systems (Riege, 2005) have been identified in the literature.

Some of the findings were partly covered in the literature. Lack of trust (Heeager & Nielsen, 2013; Riege, 2005) and source credibility (Joshi et al., 2007; Sarker et al., 2005) hinder KT, yet they were not observed in this study. However, we found that having too much trust may hinder the KT. Personal relationships are potentially helpful for KT (Jones et al., 2006), but we also found that bypassing formal communication routes creates difficulties. Different ways of working was hindering the ERP system development. The literature has suggested that cultural issues, such as organizational

design and lack of knowledge sharing spaces, hinder the KT (Riege, 2005). Our findings highlight that dissimilar practices cause problems especially in a multinational environment.

We found that using informal communication channels and missing or unidirectional connections between parties introduced challenges for KT in EDNs. The former entails choosing practicality over formality, hence hindering the management of the development. Using informal mechanisms is, however, seen as a reasonable choice when transferring highly context specific knowledge. It may in fact be effective in personal knowledge exchange but weaken wider distribution (Alavi & Leidner, 2001). The latter turned out to be critical in Case A, where the vendor could not have direct contact with the AO's business. Similarly in Case B, the technical know-how from the offshored department was not distributed through the EDN. Yet the existence and richness of transmission channels is one of the relevant elements of KT (Gupta & Govindarajan, 2000). More importantly, these issues will not fit directly under any other category because they are consequences of the networked nature of ERP development. Thus, we suggest the *development model* as being a new category of KT challenges in IS development.

6 The Quest for a Shared Development Model

The levels of KT challenges are intertwined in practice (Riege, 2005), as illustrated in Figure 1. For example, the reluctance to use the system (technological) may be inherently caused by lack of motivation (individual). Also, it is important to emphasize that there are multiple organizations involved in the EDN. They may have different cultures, practices, and tools, i.e., each stakeholder in the EDN may have their own challenges under these levels. The *shared development model* of the EDN sits at the intersection of all levels of KT challenges (Figure 4). It includes practices and processes for KT and determines the communication channels and methods for carrying out the cooperative development between the stakeholders in the EDN. The development model has to match the differing practices and evolve along with changes among individuals and organizations and their relationships during the ERP system development.

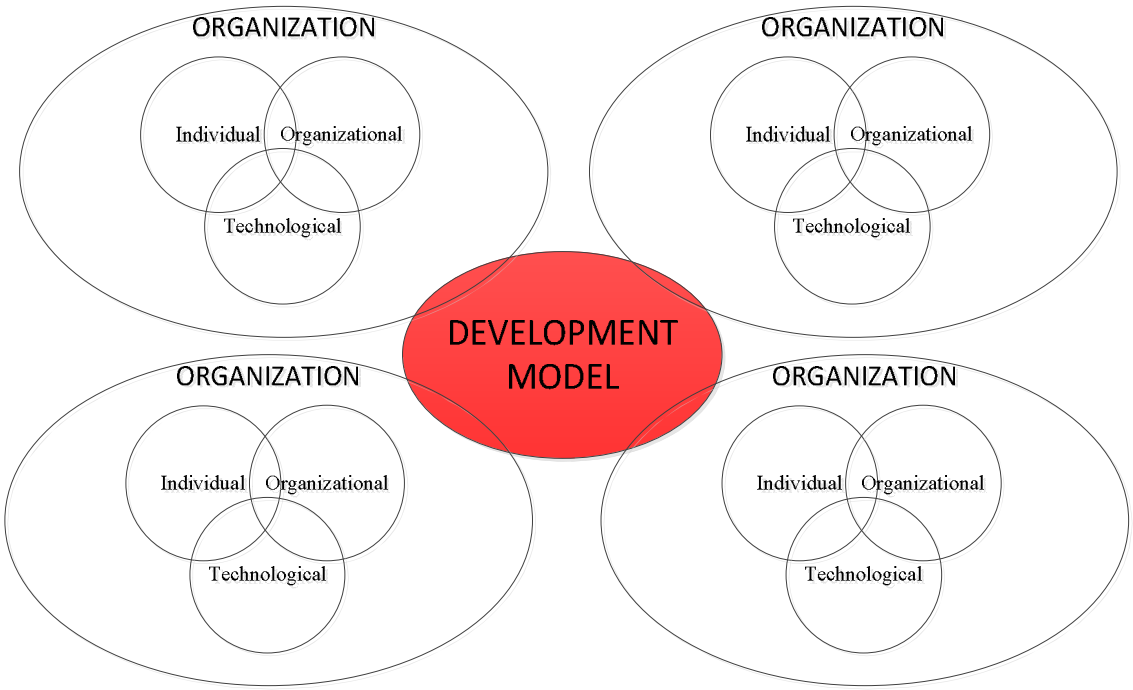


Figure 4: Development model in EDN

The development model should enable KT within the EDN. In both cases, the development of the ERP system has been outsourced to a remote country, and implemented and used globally in several locations. Issues such as culture and distance make knowledge management more difficult when development has been offshored (e.g., Olsson et al., 2008; Levina & Vaast, 2008; Sarker et al., 2005). This environment not only makes the EDN more complex, but also emphasizes the role of the shared development model.

The systems in our cases were built from scratch. In the early phases of development, there was nothing concrete (e.g., a demo version) to show for the AO, and thus, the coordination of the development tasks became more difficult. This implies a lack of working intermediary artifacts to support gaining a mutual understanding or the shared knowledge space needed for truly exchanging knowledge. These objects, e.g., prototypes or models, are helpful for KT in new product development (Bechky, 2003; Carlile, 2004). The ERP development in network is not, however, directly comparable to this environment since the stakeholders involved may not share a goal, e.g., the vendor develops a product and the AO develops a custom system (Volkoff et al., 2004; Alanne et al., 2014). Nevertheless, we suggest creating such tools as part of the development model as crossing boundaries within the network would aid to partly overcome the introduced KT challenges.

7 Conclusions

We conducted an interpretive case study in two large enterprises. We identified KT challenges hindering ERP development in networks. The shared development model includes commonly agreed practices and tools for all involved organizations. It must be in place to enable knowledge flows throughout the EDN in order to reach a mutual

understanding between stakeholders. Thus, our main contribution is gaining a deeper understanding of ERP development networks and especially about what makes KT difficult when developing ERP systems in a multinational context. In addition, we confirmed earlier observations about KT barriers, yet also identified novel challenges, especially in EDNs. For practitioners, these issues alone are important for choosing the right counter-measures.

This study has its limitations. The context should not be dismissed when applying these findings. These networks are all from similar cultural environments that are generally considered to be democratic in terms of coordination. Within and between the organizations, more emphasis is laid on trust than on different legal agreements. Hence, these findings may not be applicable to North American organizations for example. Also, we have investigated tailored ERP systems, which may differ from the networks implementing and developing standardized packages. It has been suggested, however, that the differences in development between these systems are "*one of degree, not kind*" (Chiasson & Green, 2007, p. 553); thus, we are confident that our findings are also relevant in a packaged system development environment.

It should be noted, however, that the traditional solutions to overcoming KT barriers may not be applicable in EDNs due to the complexity and number of stakeholders. Identifying suitable solutions and tools to overcome the KT barriers and create shared development models is left for future research.

8 Acknowledgements

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Business Model for Business Rules:

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Abstract

Business rule models are widely applied, standalone and embedded in smart objects. They have become segregated from information technology and they are now a valuable asset in their own right. As more business rule models are becoming assets, business models to monetize these assets are designed. The goal of this work is to present a step towards business model classification for organizations for which its value position is characterized by business rule models. Based on a survey we propose a business model categorization that is aligned to different types of assets and business model archetypes. The results show five main categories of business models: The value adding business rule model, the 'create me a business rule model' business model, the KAAS business model, the bait and hook business model and the market place business model.

Keywords: Business models, Business Rules Management, Business Rule Models.

1 Introduction

Everyday objects such as watches, phones, refrigerators, bracelets, diapers, and toothbrushes are becoming smart objects by adding various (information) technologies like embedded sensors and near field communication. A smart object is an object that is aware of events and activities that occur in the physical world and is able to react on it. In addition, more and more smart objects are getting connected to the internet. This paradigm is coined as the "Internet of Things". The internet of things is a network of interconnected (smart) objects that can be uniquely addressed, based on standard communication protocols(Kortuem et al., 2010, Atzori et al., 2010). Kortuem et al. (2010) found that smart objects can be clustered around three main object types: 1) activity aware smart objects, 2) policy aware smart objects, and 3) process aware smart objects. An activity aware smart object is aware of its own usage (e.g. pick up and turn on) and can accumulate such activities over time. A policy aware smart object is aware of its surrounding and can compare if the current situation is compliant with organizational policies. To be able to do so, it uses a set of business rules to create decisions and guide actions. A process-aware smart object is aware of the surrounding and relates to organizational processes. To be able to do so, it uses context-aware process models.

Decisions, context aware processes and data collection can be formulated and restricted by business rules (Zoet et al., 2011). A business rule is (Morgan, 2002) "a statement that defines or constrains some aspect of the business, intending to assert business structure or to control the behaviour of the business." In a survey of 144 context-aware smart objects, 96% applied business rule (models) to reason (Perera et al., 2013). The application of business rules in smart objects is relatively new. More traditional applications of business rules can be found in administrative and production information systems. Examples of business rule model applications in information systems are psychiatric treatment, production planning, teaching, advisory, alcohol production, DNA histogram interpretation, biochemical nanotechnology, and load scheduling (Liao, 2004).

Until recently, business rules in both smart objects as well as administrative systems were hard coded in source code (Boyer and Mili, 2011, Graham, 2006). Business rule models that are hard coded in source code or implemented in stored procedures, manuals and, the mind of humans are called implementation dependent business rules (Zoet and Versendaal, 2013). Implementation dependent business rules are business rules that are written to be executed by a specific actor, where an actor can be a human or automated. The biggest challenge with implementation dependent business rules is keeping them all synced and up to date since multiple implementation of one business rule model exists at once. With the rise of smart objects even more implementations of the same business rule exist at a specific moment. To solve this problem organization now create independent business rules models. This model serves as single point of truth and from this single point of truth implementation dependent models are generated. Still multiple business rules implementations exist, however all are based on a single source. An additional benefit of implementation independent business rule models is that such business rules models can be created and maintained by business users such as marketers, sales persons and, lawyers, this referred to as the tangibilization of business rules (Nelson et al., 2008, Nelson et al., 2010). The transformation from implementation dependent business rules to implementation independent business rules follows the separation of concerns trend that is occurring since the 1960's (Van der Aalst, 1996).

The number of growing applications and devices (smart objects) that use business rule models and the tangibilization of business rules allow organizations to treat business rules as an organizational asset (Blenko et al., 2010, Liao, 2004). To monetize this asset business model are designed around it. Therefore, in this research we look at the following question: Which business models are feasible for organizations for which its value position is characterized by business rule models?

In the remainder of this paper, we first identify and describe relevant literature regarding Business Rules and Business Models. Subsequently, we describe the applied research method, followed the elaboration on the process of data collection. Then, we report on the results derived from the applied data analysis techniques. Finally, a conclusion is provided containing a discussion of our research, design implications and directions for future research.

2 Literature

Breuker and Van de Velde (1994) identified eleven types of analytical tasks in which business rule models are applied: classification, assessment, diagnosis, monitoring, prediction, configuration, design, modelling, planning, scheduling and, assignment. For each type of analytical task, Breuker and Van de Velde (1994) describe the way they work, for a detailed description we refer to their work. Although each task is unique and applies business rules for a different purpose, the tasks apply them in the same manner. To apply business rule models, three elements need to be in place: 1) a business rule inferencing method (engine), 2) a business rule repository, and 3) a business rule authoring service (Breuker and Van De Velde, 1994, Graham, 2006). The relation between these three components and their external environment is shown in Figure 1.

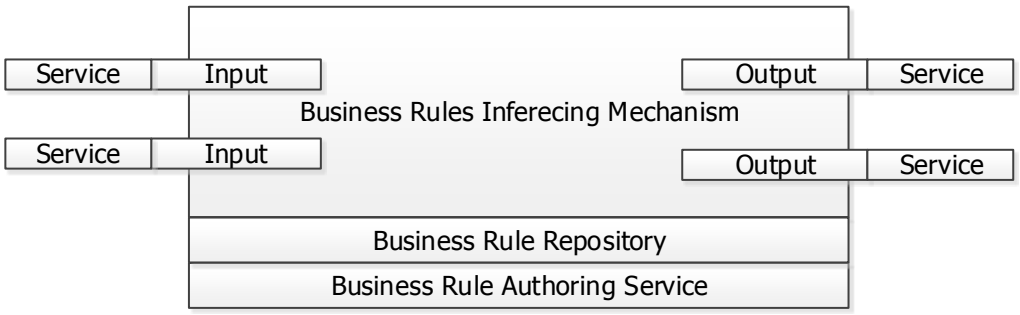


Figure 1: Schematic overview of a business rule architecture

A business rule authoring service is the client or application in which the actual business rule model is formulated. After the business rule model is formulated it needs to be stored. The element that stores the business rule model is called the business rule repository. After the business rule model is stored it can be used for execution. To execute the business rule model a business rule engine is applied. A business rule engine applies inferencing methods such as backward and forward chaining to execute business rules. The business rule inference engine, business rule repository and business rule authoring service are applied to execute logic. In order to be able to function, the business rule architecture requires input (data). This data is delivered by external services. Services in this case can be additional information systems. The same applies to the output of the business rule model which is used by another service. Until recently, each element was hard coded this is in line with the information technology evolution (Boyer and Mili, 2011, Graham, 2006, Van der Aalst, 1996).

One of the underlying characteristics of the information technology evolution has been the separation of concerns (Versendaal, 1991, Van der Aalst, 1996, Weske, 2007). Although various separation of concerns have been proposed, various authors agree on a general evolution of information technology architecture which is depicted in Figure 2. Until recently, business rules were hard coded in the operating system layer. However, now authors propose to separate the business rules from the operating systems and create a separate layer (Boyer and Mili, 2011, Graham, 2006). As a result, standard products to manage business rules are created. A standard software product is defined as a packaged configuration of software components or as

a software-based service (Xu and Brinkkemper, 2007). Examples of standard software to model business rule models are BeInformed (Be Informed, 2014), Corticon (Progress Software, 2012) and, Pega Systems (Pega Systems, 2013). The emergence of standard software has resulted in two separate types of assets for Business Rules Management vendors: the software system and the business rule model created by the software system. For both the software system and the business rule model, different rights are sold. For example, vendors sell standard business rule models for specific solutions such as Fatca or Permit Systems, independent from the sales of the actual system. The type of assets and asset rights involved are two of the fundamental dimensions of a business model (Malone et al. 2006).

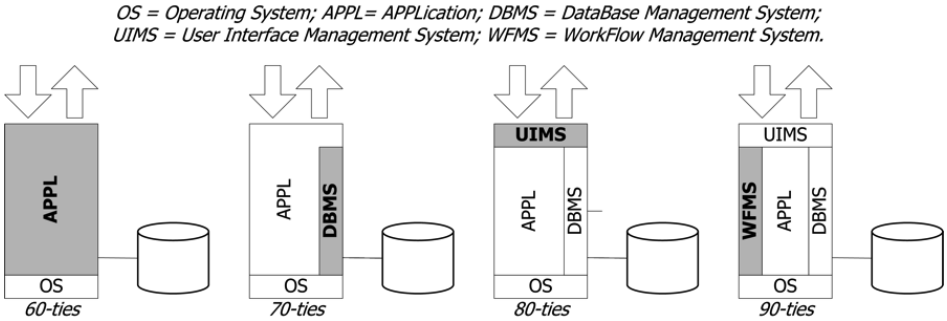


Figure 2: Evolution of Information Technology Architecture (Van der Aalst, 1996)

A business model is defined by Osterwalder (2004) as: *"A conceptual tool containing a set of objects, concepts and their relationships with the objective to express the business logic of a specific firm."* Osterwalder (2004) presents the business canvas model, an ontology to represent business models. This model can be applied to define a specific business model. Malone et al. (2006) extended the knowledge base by means of a systematic study of business models by defining business models based on two fundamental dimensions: The asset rights that are sold and the type of assets involved (Osterwalder, 2004).

The first dimension concerns the type of rights that are being sold, also called the archetypes. The second dimension considers the type of assets being involved. The combination of these dimensions leads to different business models shown in Table 1. As can be derived from Table 1, there are four different archetypes concerning business models (Malone et al., 2006). A creator archetype transforms goods into a product, where its main task focuses on designing and producing the product. A distributor buys a product and distributes it to its customers. A lessor provides the rights to use but not owns a product or service. An example of a lessor is a cloud solution. A broker facilitates the matching of potential buyers and sellers. A broker never takes ownership of the product and/or service. An example of this can be identified as eBay (Popp, 2011).

The second dimension concerns assets of businesses, which is split into four different categories. Malone et al. (2006) state that four main types of assets are applicable: physical, financial, intangible, and human. Physical assets include durable items (such as cars, computers and phones). Financial assets include cash and other assets like bonds and insurance policies that give their owners rights to potential future cash flows. Intangible assets include legally protected intellectual property (such as patents, copyrights and trademarks). Human assets include employee time and effort, in a way that people's knowledge is being rented for a fee (Popp 2011).

Malone et al. (2006) continued to determine if particular business models financially perform better than others, based on research on roughly one thousand companies. The framework proposed by Malone et al. (2006) contains two business models that are labelled as n/a. These

two business models are included for comprehensiveness of the framework, but are illegal in modern society, where a human creator concerns transactions for giving birth and a human distributor concerns human trafficking. Due to this fact, we do not take these two identified business models into account in the following sections.

		Types of goods/services offered			
		Financial	**Physical**	**Intangible**	**Human**
Business model archetypes	**Creator**	Entrepreneur	Manufacturer	Inventor	n/a
	Distributor	Financial trader	Wholesaler, retailer	IP distributor	n/a
	Lessor	Financial lessor	Physical lessor	IP lessor	Contractor
	Broker	Financial broker	Physical broker	IP broker	HR broker

Table 1: Business model archetypes and types of goods and services (Malone et al., 2006)

Popp (2011) continued research on business models in the software industry to identify other, nowadays more relevant business models based on the proposed framework for business models by Malone et al. (2006). According to his research, hybrid models that contain elements of multiple business model archetypes and asset types are also possible. A good example of this is a software company that acts like an inventor and IP lessor where combining business models can result in a company offering Software as a Product (SaaP) and/or Software as a Service (SaaS).

3 Data Collection

Selection of respondents and documentation is based on the phenomenon being studied in a group of individuals, organization, information technology, or community that best represents this phenomenon (Strauss and Corbin, 1990). The goal of this research is to identify and explore different business models made possible by applying business rule models. The chosen unit of analysis is therefore a single business model that applies one or more business rule models. One organization can implement multiple business models implying that one organization can contribute multiple units of analysis.

Industry	Number of organizations
Financial	2
Healthcare	13
Consulting	7
Transport	1
Software	34
Retail	15
System integrator	6
Remainder	1

Table 2: Number of organizations per industry

For a case to be included in the study it has to meet two criteria. The first criterion to be included is that an organization must offer services delivered by means of business rule models or that the organization must provide products that embed business rule models or is supported by business rule models. The second criterion is that the organization creates or defines business rule models. Organizations were selected from the multiple sources. The first source was our database with previous research. Secondly, TechCrunch (TechCrunch, 2014) was analysed and thirdly, our personal network of researchers was consulted. This resulted in the analysis of 79 organizations in eight different categories, see Table 2. Data for this study is collected through written documentation, archival records and direct observations.

Business model	Financial - Creator	Financial - Distributor	Financial - Lessor	Financial - Broker	Physical - Creator	Physical - Distributor	Physical - Lessor	Physical - Broker	Intangible - Creator	Intangible - Distributor	Intangible - Lessor	Intangible - Broker	Human - Creator	Human - Distributor	Human - Lessor	Human - Broker
Production & Model	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0
Production & Model	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0
Production & Model	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Customer Order	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Bait & Hook	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0
Bait & Hook	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0
Verticals	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0
Verticals	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0
Marketplace	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Marketplace	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Marketplace	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Customer Check	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Customer Check	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0

Figure 3: Snapshot ordinal comparison table

4 Data Analysis

Multiple methods are available for synthesizing collected data. Dixon-Woods et al. (2005) identified and compared eleven methods to synthesize data. In this study, we want to categorize data, from multiple case studies, based on predefined categories, determine frequencies of this data and identify recurring themes. The analysed data consists of business models applied by organisations and are therefore 'outcome values'. Based on these characteristics, Case Survey is most suitable for our research (Dixon-Woods et al., 2005). Case Survey is a method in which data is extracted from a large number of qualitative cases (Yin and

Heald, 1975). The extraction process occurs by means of a set of highly structured closed questions. After the data is converted from qualitative to quantitative data, a (basic) statistical analysis is conducted (Jensen and Rodgers, 2001).

Data analysis consisted of three phases, namely (1) determine overall business model type(s) per organization, (2) determine categories of business model types, and (3) define business model types. During the first phase, each surveyed case has been classified based on the goods/services it offers as well as the business model archetype it deploys. This occurred by formulating two questions. The first question was: "*Which good or combination of goods is offered by the surveyed case?"* The possible answers are: financial, physical, intangible, human or a combination of previous mentioned goods /services. The second question was: *"For each identified individual good or combination of goods which business model archetype is applied?*" After each individual case was classified, they were added to the ordinal comparison table, see Figure 3. An ordinal comparison table exists of exclusive categories. In our ordinal comparison table, these categories correspond to combinations of services and business model archetypes, that either are present (1) or absent (0). Due to space limitations the complete ordinal comparison table could not be added to the paper, a snapshot has been added instead (see Figure 3).

Indentified Categories	Business Model Combination	Count	Summarized Categories
1	Intangible Creator, Intangible Distributor, Human Lessor	36	'Create me a Business Rule Model' Business Model
2	Intangible Creator, Intangible lessor, Human lessor	5	Bait and Hook Business Model
3	Intangible Lessor	3	The Market Place Business Model
4	Physical Creator, Physical Distributor, Intangible Creator, Intangible Distributor	24	Value Adding Business Rule Business Model
5	Intangible Creator, Intangible Lessor	8	KAAS Business Model
6	Physical Creator, Physical Distributor, Intangible Creator, Intangible Lessor	1	Value Adding Business Rule Business Model
7	Physical Lessor, Intangible Creator, Intangible Lessor	1	Value Adding Business Rule Business Model

Table 3: Hybrid business model categories

During the second phase, we categorized surveyed cases according unique assets / business model archetype combinations. In total seven categories with a unique combination of assets / business model archetypes have been identified, see Table 3. Two categories, category six and category seven, only occur once. The remainder of the categories occur at least three times, with category 1 (N=36) and category 4 (N=24) as absolute highs. When formulating categories, specific variables must be taken into account: usefulness, actual use, mutual exclusivity and completeness (Hevner et al., 2004). The only way to assess completeness of a categorization is through the use of deduction (Baskerville et al., 2009). To generalize our categorization outside the collected units, further analysis should be conducted; we note that such a deductive validation is outside the scope of this study.

Mutual exclusivity implies that none of the categories overlap. In our dataset, each of the seven categories overlaps partly with another category except for category 3. The reason that the business rule categories overlap is threefold. First, the characteristic *"intangible creator"* is

present in six out of seven business model categories (BM-categories). Additionally, each BM-category either contains the characteristic *"intangible lessor"* or *"intangible distributor"*. This can be explained due to the fact that for a business model an organisations needs to less or distribute a business rule model, which only is possible after they created it. To support usefulness of our BM-categorization, we decided to allow overlap. However after analysing the BM-categories, we merged BM-category six and seven with category four. Category four and six only differ with respect to one business model archetype characteristic: *"intangible lessor"* versus *"intangible distributor."* The difference between category six and seven is caused due to the fact that physical goods are not created but leased by the organization. Both options are added to category *"value adding business rule model."* During the third phase, we described the five remaining categories and their characteristics. Both the categories and their characteristics are described in section 5.

5 Results

In this section first the overall results are presented. Secondly, the identified BM-categories that can be applied for business rule models are presented. For each BM-category, we describe (1) the application of the model and (2) one or two specific examples.

5.1 Value Adding Business Rule Business Model

The first category of business models is the value adding business rule models. Organizations that apply an embedded business rule model deliver additional value by adding a business rule model to a physical product, which they manufacture and/or sell, see Table 4. For both the physical product and business rule model, the organization can be a creator, distributor, lessor or combination of previous business model archetypes.

Two examples of specific instantiations for the business-to-consumer market are the smart diaper and smart toothbrush. The smart diaper contains a chip which collects data about the child wearing the diaper as well as the content of the diaper (Pixie Scientific, 2013). It analyses the data about the content for signs of dehydration and kidney problems. If anomalies occur, a signal is send to the mobile phone of a parent. The smart toothbrush created by Proctor and Gamble collects data about the movement of the toothbrush (Oral-B, 2013). Based on the movement, a business rule model indicates which areas the brusher missed. Additionally, based on historical data, the business rule model develops a fully personalized brushing routine.

An example of a specific instantiation for the business-to-business market is the Safe Watch from Mercy Hospital (Mercy Hospital, 2013). Safe Watch monitors a patient's body functions that are wired to a business rule model. Mercy sells the Safe Watch business rule model to other hospitals that use them in monitoring their patients' body functions to deliver added value. Currently, the technical implementation of this business model can be found in two forms: the first form is applicable when only the data collection happens in the physical device while the analysis of the data happens on a second device with stronger calculation capabilities. The second form is applicable when both the data collection and the data analysis are performed by the physical device.

		Types of goods/services offered			
		Financial	**Physical**	**Intangible**	**Human**
Business model archetypes	**Creator**	Entrepreneur	Manufacturer	Inventor	n/a
	Distributor	Financial trader	Wholesaler, retailer	IP distributor	n/a
	Lessor	Financial lessor	Physical lessor	IP lessor	Contractor
	Broker	Financial broker	Physical broker	IP broker	HR broker

Table 4: Characteristics value adding business rule model

5.2 'Create me a Business Rule Model' Business Model

The second category of business models is the 'create me a business rule model', as shown in Table 5. This model is applied by organizations that create a business rule model that is ordered by customers. Instantiations of this business model are mostly found at systems integrators, vendors and consultancy partners such as: Capgemini, Ordina, Pega Systems, Rule Management Group and Be Informed. Based on an order by customer they create a specific business rule model. The rights of the business rule model are distributed to the customer. To create the model, consultants and modellers are leased to the customer. Two examples of specific instantiations for the business-to-business market are: (1) BeInformed creates a business rule model for CAK (Be Informed, 2014) and (2) Pega Systems creates a business rule model for Bank of America (Pega Systems, 2013).

		Types of goods/services offered			
		Financial	**Physical**	**Intangible**	**Human**
Business model archetypes	**Creator**	Entrepreneur	Manufacturer	Inventor	n/a
	Distributor	Financial trader	Wholesaler, retailer	IP distributor	n/a
	Lessor	Financial lessor	Physical lessor	IP lessor	Contractor
	Broker	Financial broker	Physical broker	IP broker	HR broker

Table 5: Characteristics Create me a Business Rules Model

5.3 The KAAS Business Model

The third category of business models is the 'Knowledge as a Service' (KAAS) business model, as shown in Table 6. This model is applied by organizations that offer the result(s) of a business rule model to customers. Organizations host the business rule models but create a service from it, of which customers can access the logic. Instantiations of this model are executed by FashionGirls and Chef Watson (IBM, 2013). In the first case, a business rule model is used to determine the perfect set of clothes for a woman, based on body characteristics, where customers pay per fashion advice. Chef Watson is a business rule model created by IBM. Based on available ingredients it matches chemical flavour compounds and provides a receipt as output. Watson is particular know for creating recipes human chefs not commonly will create.

		Types of goods/services offered			
		Financial	**Physical**	**Intangible**	**Human**
Business model archetypes	**Creator**	Entrepreneur	Manufacturer	Inventor	n/a
	Distributor	Financial trader	Wholesaler, retailer	IP distributor	n/a
	Lessor	Financial lessor	Physical lessor	IP lessor	Contractor
	Broker	Financial broker	Physical broker	IP broker	HR broker

Table 6: Characteristics KAAS business rule model

5.4 The Bait and Hook Business Model

The fourth category of business models is the 'Bait and Hook' business model, as shown in Table 7. This model is an extension of the KAAS business model. Organizations that apply this business model codify a part of their basic knowledge and provide this to their clients for a small fee or for free. If the customer wants in-depth or additional information, they have to pay an additional fee. Instantiations of this business model are applied by the big four consultancy firms. An example is when an organization wants advice about risk management; it can deliver some specific details about risks for that specific organization. For example, it will provide a free report about the most common risk for an organization with a specific number of employees in a specific branch. If the organizations want more detailed information, they have to pay for additional consultancy hours.

		Types of goods/services offered			
		Financial	**Physical**	**Intangible**	**Human**
Business model archetypes	**Creator**	Entrepreneur	Manufacturer	Inventor	n/a
	Distributor	Financial trader	Wholesaler, retailer	IP distributor	n/a
	Lessor	Financial lessor	Physical lessor	IP lessor	Contractor
	Broker	Financial broker	Physical broker	IP broker	HR broker

Table 7: Characteristics Bait and Hook business rule model

5.5 The Market Place Business Model

The fifth business model is the 'Market Place' business rule model, as shown in Table 8. By applying this model, an organization facilitates a marketplace that can connect potential buyers and sellers with regard to business rule models. The models are not created by the organizations itself but by third parties. The organizations only act as broker, which generates their turnover. Instantiations of this business model are found at two types of organizations: vendors and independent markets. For organizations, it can be an additional channel to deliver content for their own software. Vendors and independent markets create an I-tunes like market where organizations can buy specific business rule models. For example, organizations have to be compliant to FATCA or HIPPAA. Specific firms create business rule models that can check for compliance. They offer these models on specific markets for specific software.

		Types of goods/services offered			
		Financial	**Physical**	**Intangible**	**Human**
Business model archetypes	**Creator**	Entrepreneur	Manufacturer	Inventor	n/a
	Distributor	Financial trader	Wholesaler, retailer	IP distributor	n/a
	Lessor	Financial lessor	Physical lessor	IP lessor	Contractor
	Broker	Financial broker	Physical broker	IP broker	HR broker

Table 8: Characteristics Market Place business rule model

6 Conclusion

Business rule models are widely applied, standalone and embedded in smart objects. They have become segregated from information technology and they are a valuable asset in their own right. As more business rule models are becoming an asset, business models to monetize these assets are designed. In this paper, we set out to find an answer to the following question: Which business models are feasible for organizations for which its value position is characterized by business rule models? In order to answer this question, we first identified the elements that characterize a business model. This resulted in a framework which is intended for the classification of business models of organizations, which apply business rule models to deliver their value proposition.

From the data, we identified five categories of frequently applied and feasible business models for business rule models: (1) value adding business rule model, (2) create me a business rule model' business model, (3) Knowledge As A Service business model, (4) bait and hook business model, and (5) market place business model. From a practical perspective, our study provides organisations with a diagnostic tool for identifying and describing their business rule model. From a research perspective, our study provides a fundament for identifying and classifying business models for business rule models. Our results serve as input since business rule models are becoming more important with the increasing number of smart objects being added to the internet of things.

Several limitations may affect our results. The first limitation is the number of organizations analysed, this may limit generalization. While we believe our study represents a large number of organisations, more detailed categorization may be realized by applying a factor analysis on a larger data set to identify other possible combinations of business model archetypes and types of assets offered by organizations. The second limitation is the omission of payment models in our model. In addition to the types of services offered and business model archetypes, payment models are the third pillar of business models. Adding payment models will be a part of further research.

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Optimal Bundling and Pricing of Multi-Service Bundles from a Value-based Perspective: A Software-as-a-Service case

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Abstract

*Software vendors are increasingly adopting Software-as-a-Service (SaaS) pricing model, whereby software is offered as a web-based service in exchange for a subscription fee. In addition, software vendors become increasingly interested in using bundling of services to maximize their market penetration, revenue and, or profits. The objective of this paper is aimed at presenting and demonstrating a method that can be used to estimate consumer-level reservation prices for a set of SaaS offerings, to show how the method can be used to categorize different services based on the heterogeneity of reservation prices, and thirdly, to determine the optimality of different bundling strategies. A conjoint analysis study is used to determine the reservation prices of the services and to assess what price-bundle combinations are most attractive. Next a simulation model is used to show that the optimality of different bundling strategies. The results underline the importance of a value-based perspective on SaaS pricing models in pursuing different objectives of software vendors. T*o achieve profit maximization, software vendors should consider mixed price-bundling strategies in which bundles are offered at a discount. In case SaaS offerings complement a core service as well as entail high contribution margins (i.e. the services are reinforcing) a pure price-bundling strategy may be considered to target highly profitable customers. To achieve revenue maximization, mixed price-bundling should be considered for SaaS offerings with competing characteristics. In case the SaaS offerings are reinforcing, an unbundled strategy should be considered.

Keywords: Bundling, pricing, conjoint analysis, reservation prices, software-as-a-service

1 Introduction

The software industry continues to go through a major transformation in the way software is delivered. Computing today involves the use of many software packages, but only a few packages are used on a daily basis. This infrequent usage pattern often does not justify purchasing full licenses and therefore motivates a need for a more flexible way to use and pay for the usage of software [1]. Therefore, software vendors are increasingly adopting the Software-as-a-Service (SaaS) model. In the SaaS model, vendors host applications at a central location, for instance enterprise resource planning (ERP) and customer relationship management (CRM) systems. SaaS presents the embodiment of a one-sided market model for developing and delivering IT services, wherein services flow in a linear fashion from vendors to customers, with revenues flowing in the opposite direction. SaaS offers customers greater flexibility to switch vendors. Switching vendors is difficult with packaged software, which generally has a modular structure, allowing customers to extend their systems over time by adding new modules. With packaged software, customers experience high costs when switching, resulting in *lock-in* and give a software vendor a monopoly position over existing customers [2].

However, SaaS providers have to deal with reduced gross margins as a result of the high fixed operation costs involved in the hosting infrastructure [3]. This makes achieving economies of scale increasingly important [4]. Reduced switching costs pose new challenges to software vendors in terms of customer retention and profit generation. Carefully crafted service pricing and bundling strategies offer several opportunities. First, bundling has the potential to increase and stabilize *customer retention levels*. Customers who subscribe to a bundle of services are less likely to leave for a better deal that affects only one of the service components in the bundle. Furthermore, it is recognized that promotional bundle discounts are strongly related to the customer's perceived value for a given bundle and consequently the *customer's willingness to switch* to the provider. Also, a firm can apply bundling to its product line to increase *market penetration*. Offering a bundle at a special price encourages customers to subscribe to the entire bundle who would otherwise only subscribe to some of the components. And finally, bundling allows firms to apply *price discrimination* to enhance revenues and profits. Hence, SaaS providers can apply bundling and pricing strategies to attain and retain market penetration, revenue and profit levels.

It has been recognized that, in order to apply these strategies successfully, one of the key activities to be carried out is an *economic value analysis*. "Economic value analysis is a tool designed to comprehend and to quantify the sources of value of a given product for a group of potential customers" [5]. Customer value can be seen as the maximum price people are willing to pay for a product or service. Economists call this the *reservation price*. "The reservation price is the highest price that a given person will accept and still purchase the good. In other words, a person's reservation price is the price at which he or she is just indifferent between purchasing or not purchasing the good" [9]. Insight into the reservation price and its heterogeneity supports SaaS providers in determining pricing and bundling strategies aimed at either maximizing market penetration, revenue or profits. Several researchers have attempted to estimate consumer-level reservation prices. Some focus on single-service or single-product bundling [10-11] or on the bundling of a relatively low

number of products or services (3 or fewer) [12], which makes the direct application of these methods to larger and more heterogeneous product-lines, like SaaS bundles more difficult. The goal of this paper is threefold. Firstly, it is aimed at presenting and demonstrating a method that can be used to estimate consumer-level reservation prices for a set of SaaS offerings. Secondly, its aim is to show how the method can be used to categorize different services based on the heterogeneity of reservation prices, which is important for determining optimal bundling strategies. And thirdly, it is aimed at determining the optimality of different bundling strategies for pursuing market penetration, revenue and profitability objectives.

All this is realized by determining the most suitable research approach and method given the goals of this paper. The research method is then applied to categorize and estimate reservation prices from a set of ten services from a large software vendor. Using a simulation model, several hypotheses are tested and the optimal bundling strategies for different types of services and objectives are determined.

The paper is structured as follows. In section 2, a review on bundling, pricing and reservation price literature is carried out, on the basis of which hypotheses are formulated. In section 3, the research approach, experimental design and simulation model are discussed. In section 4, the analysis is carried out and the results discussed. In section 5 and 6, the managerial implications, conclusions, limitations and future research areas are provided.

2 Literature review and hypotheses formulation

A definition of bundling. Adams & Yellen [13] define bundling as "selling goods in packages". Guiltinan [5] stresses that bundles are marketed at a special (discount) price, while Stremersch & Tellis [6] note that bundles consists of separate items for which different markets exist. In this paper the following *definition of bundling* is adopted: "bundling is the marketing and selling of separate services as a single package for a single price", which underlines the fact that bundling is more than merely "selling a package". For reasons of decreased price sensitivity, increasing purchase likelihood, perceived savings, perceived sacrifices and one-bill convenience, it has been recognized that the way the bundles are marketed has a significant influence on their perceived customer value [6]. The services included in a SaaS provider's product line can contain diverse services, which address different customer segments with different levels of willingness to pay. In this paper, the focus is on the use of bundling to increase a SaaS provider's revenue through price discrimination [7], making it possible to address consumers who are willing to buy the bundle at a discount, but who would otherwise only buy one of the items.

Bundling strategies. There are several types of *bundling strategies*, which can be differentiated on the basis of two characteristics: (1) the *bundle focus* and (2) the *bundle form*. With regard to the former, a bundling strategy can focus on [6]: (1) *price-bundling*, (2) *product bundling* or (3) *both*. In the case of price-bundling, two or more non-integrated and in our research non-related services are sold as a package at a 'discount' price. The total value of the package delivered to the customer equals the sum of the components' customer value. With product bundling, two or more services are sold as a package for a 'single' price. The integration between the components enhances the individual value of each component, which means that the total customer value of the package is more than the sum of the components'

customer value. The additional value being created can be translated into revenues by offering the bundle. In this paper, the focus is on the price-bundling of non-integrated and non-related services only. The second characteristic involves the *bundle form* [14]: (1) *unbundling*, (2) *mixed-bundling* and (3) *pure bundling*. In the case of unbundling, services can only be subscribed to separately. With mixed bundling, services can be subscribed to both separately or as a bundle. With pure bundling, the services can only be subscribed to as a bundle. The challenge for firms is to determine which bundle focus and bundle form to pursue.

Next to bundle form, bundle composition plays a role. Bundle composition can be about mutually reinforcing services (e.g. communication and presence information for mobile communication), complementary (e.g. mobile phone and subscription), unrelated (e.g. ringtones and weather information on a mobile) or competing (e.g. ring tones service A and B). The focus in this paper is choosing the optimal bundling strategy for different types of non-integrated and non-related services. While normally in service bundling the services are interdependent in terms of demand, we are focussing on services that are all related to administration practices, but can be considered to be unrelated (see table 2). We expect to acquire insight which services, that from a supply side are perceived to be unrelated, might appear to be complementary or supplementary when we analyses the demand side.

Pricing schemes and methods. Software vendors can apply different *pricing schemes* for charging customers for the use of their SaaS offerings. The pricing schemes for SaaS offerings extend the known schemes for packaged software. Common pricing schemes for SaaS include a per time-period fee, an on-demand fee based on per-use such as with packaged software, per-transaction or per-feature, and free access (the so called freemium model). A per-time period fee is sometimes dubbed as *renting* [15]. The customer has to renew his contract if he wants to continue using the service after the expiry date. In all cases, it is useful to have insight into how much value a customer attaches to a charging unit. However, here the focus is on presenting a method for SaaS offerings with a per time-period fee.

Kotler [38] outlines several *pricing methods* for setting the pricing level of these charging units. In this paper, the focus is on *perceived-value* or *value-based pricing*. We make this choice because quantifying and communicating customer value plays a large role in the success of introducing new SaaS offerings. The idea is to price services (just) below the consumer's reservation price. The reservation price is determined by the surplus value of the service and the perceived fairness of transaction. "The surplus value of products and services is the difference between the economic value assigned to them and their price. The perceived fairness of the transaction is influenced by the price paid compared with internal reference prices" [8]. The internal reference price is the price level that is considered fair. The challenge in the case of value-based pricing is to apply a method that can accurately determine the perceptions of the customer [16].

Optimality of bundling strategies. An important factor in determining which strategy is optimal involves the heterogeneity in conditional reservation prices [6]. There are two types of heterogeneity: (1) *asymmetry* and (2) *variation*. Consider two services: A and B. An asymmetric distribution occurs when, for service A, one customer segment has a lower conditional reservation price than another, while for service B the former customer segment

has a higher conditional reservation price than the latter. This asymmetric distribution in conditional reservation prices leads to a negative correlation between the service preferences [13] In the case of the second type of heterogeneity, variation, there are large differences in reservation prices for the bundle. A high variation occurs when the perceived customer value is high within one customer segment and low within another segment.

The *optimality* of a pricing and price-bundling strategy depends on the deviation from 'first-order price discrimination', whereby each consumer is charged an individual price such that a SaaS provider does not diminishes its profits [17]. According to Adams & Yellen [13], there are three conditions under which a pricing scheme is optimal:

- *Exclusion:* consumers are excluded from subscribing to a service if the reservation price is below the costs of providing the service;
- *Inclusion:* a consumer for which the reservation price exceeds the costs of providing the service actually subscribes to the service;
- *Extraction:* from all consumers who subscribe to the service do not realize any consumer surplus (i.e. the price paid is equal to the willingness to pay).

Because SaaS providers are often restricted from applying personalized pricing (i.e. service prices are pre-defined), the heterogeneity of conditional reservation prices affects the deviation from these three conditions.

Hypotheses. Guiltinan [5] argues that services can be either reinforcing or competing. Services are reinforcing if the subscription of a customer to one service increases the likelihood of that customer also subscribing to another service. In other words, the conditional reservation prices are positively correlated. Services are competing if that likelihood is reduced. In other words, the conditional reservation prices are negatively correlated. Bundling is especially beneficial in cases where conditional reservation prices are negatively correlated, as this would lead to a reduction in the price variation for the bundle [6]. We hypothesize that:

H1: *When a firm's goal is to maximize revenue, mixed price-bundling is the best strategy if the services are (partially) competing in terms of demand.*

For the same reason, it is hypothesized that:

H2: *When a firm's goal is to maximize revenue, unbundling has the least adverse impact on revenue if services are mutually reinforcing in terms of demand.*

Schmalensee [40] states that the higher the normalized difference between the average reservation price for the service and costs of subscribing to the service is, the more likely the price-bundling of services are to enhance profits. On the other hand, Stremersch & Tellis [6] note that the price-bundling of high contribution margin services (i.e. the difference between the price and the variable costs of provisioning) are better able to raise profits. The higher the contribution margin the lower the extra induced sales quantity should be to make a bundle discount profitable. Bouwman, Haaker, & De Vos [19] argue that services may either be *complementing/enhancing* or *supplementing*. Enhancing services directly increase the benefits of the core service/experience, while supplementing services extend benefits in new directions . We hypothesize that:

H3: *When a firm's goal is to maximize profits, pure price-bundling has the least adverse impact on profits if services are complementing the core service/activity and services are mutually reinforcing in terms of demand.*

For the same reason, it is hypothesized that:

H4: *When a firm's goal is to maximize profits, pure price-bundling has the most adverse impact on profit if services are supplementing the core service/activity and services are (partially) competing in terms of demand.*

Because pure price-bundling is a special type of mixed price-bundling for which the separate services' prices are extremely high and unbundling is a special type mixed bundling for which the price of the bundle is extremely high [6] the following is hypothesized:

H5: *When a firm's goal is to maximize profits, mixed price-bundling is either the best strategy or no worse than any other strategy regardless of the types of services.*

The goal of market penetration is not to exclude customers from subscribing to any service. Stremersch & Tellis [6] argue that revenues from a bundle are always higher (if conditional reservation prices are asymmetric) or equal (if conditional reservation prices are symmetric) to the revenues from the separate services. We hypothesized that:

H6: *When a firm's goal is to maximize market penetration first and profits second, pure price-bundling is either the best strategy or no worse than any other strategy.*

These hypotheses indicate under what conditions and for what objectives specific bundling strategies may be optimal. Several methods need to be applied to test hypotheses applicability to SaaS offerings.

3 Method

In this section the methods are discussed for measuring customer value, quantifying customer value in monetary value and evaluating different bundling and pricing strategies for different performance objectives. The research design process follows the standard procedure for conjoint surveys [20]. For the first step, a part-worth function model was used. The regression coefficients represent the utilities of each service. For the second step, the full profile method was used. For the third step, a fractional factorial design was used. Using an orthogonal array, a subset of combinations of attribute levels was created. We selected 10 add-on services in such a way that there shouldn't be reinforcing mechanism or interaction (see table 1). In determining the price attribute level, conditional pricing was used, while the design remains orthogonal and unencumbered by prohibitions. The assumed prices for the services were specified by carrying out a competitor study. The prices can be low (25% discount), regular or high (25% surcharge) (see table 1). The bundle price is calculated on the basis of the services included in the bundle and the discount level as indicated by the price attribute. This resulted in 16 profiles/bundles with different combinations of services at different pricing levels. Two additional profiles were included to test the predictive validity of the conjoint measurement data.

Table 1: The ten included services in the conjoint Experiment

Service	Description	Low / Regular / High price		
1. Book keeping	Vouchers are processed for by an administrator	22.50	30.00	37.50
2. Accounting	Administration is verified and taxes are declared.	22.50	30.00	37.50
3. Invoicing	Digital and postal invoicing on receipts.	7.50	10.00	12.50
4. Time registration	Registration of billable hours.	3.75	5.00.	6.25
5. Expense registration	Registration of made expenses for a customer.	3.75	5.00	6.25
6. Mileage registration	Keep track of your mileage expenses.	3.75	5.00	6.25
7. Project collaboration	Plan and manage a project involving multiple members.	11.25	15.00	18.75
8. Project acquisition	Matching of possible project requests with your profile.	7.50	10.00	12.50
9. Debt collection	Initiate a debt collection procedure for defecting customers.	7.50	10.00	12.50
10. Pay rolling	Remunerating yourself on a monthly basis	7.50	10.00	12.50

The fourth step was carried by collecting response via an online web survey in 2010. The questionnaire was distributed via freelancer portal sites and a general mailing list. People were selected on the basis of sector characteristics and the number of employees. A total of 70 respondents participated in the study, 23 respondents were eliminated which did not show any intent to subscribe to the presented service bundles. The vignettes that were presented showed the bundle composition and the bundle price. For the fifth step, a 7-point rating scale was used to measure the purchase intention. Next, part-worth utilities for individual respondents were calculated using ordinary least squares (OLS). Constrained nonlinear regression (CNLR) was used to constrain the price coefficients to be negative or positive for treating possible price reversals and to investigate whether the predictive validity of the model could be improved

Reservation price estimation method. Generally speaking, to estimate the consumer-level reservation prices from the conjoint analysis, the utility of the no-choice option needs to be estimated. This no-choice utility level determines the minimally required utility from a service(bundle) will it be preferred over the no-choice. A choice from an individual for the no-choice option implicates that none of the alternative services in the set gives the individual sufficient utility to consider subscribing to at least one of the services. Following this line of reasoning, the utility of the no-choice is determined by the utility of the individual's *status quo* and the utility of each of the alternatives in the consideration set (i.e. the utility of the no-choice option is not necessarily *zero*). Following Kohli & Mahajan [10], it is assumed that an individual *i* prefers service *s* over his or her consideration set if:

$$U_{is|\sim p} + U_i(p) \geq U_i * + \varepsilon, \quad (1)$$

- where U is|~p is the utility of service *s* for individual *i excluding* the utility of price from service *s* (or in case conditional pricing is applied: the utility of service *s* for individual *i including* the utility of the regular price level),
- Ui(p) is the utility contribution of the *absolute* monetary price level *p* to individual *i*'s utility for a service,

- U_i* is the highest utility of any option (including the *no-choice option*) in his or her consideration set and
- ε is a small value (here it is assumed that ε equals 0) selected by the user in any application of the model.
- s_i is the estimate of the individual's reservation price r_i for service *s* if equation 1 is satisfied as an equality, that is, it is the price at which the utility of item s exceeds by ϵ the utility of the most preferred item in consumer i's evoked set. As U_i (p) is assumed to be a single-valued, decreasing function of price, a single reservation price p_{is} is estimated for each customer.

According to Kohli & Mahajan [10] equation (1) holds in case the utility of the chosen base case option *equals* the utility of the no-choice option. In our case (and other applications of traditional conjoint analysis) the utility of the base case option is inversely related to the utility of the no-choice, and hence is not equal to the no-choice option. Therefore, in order to simulate consumer choice and to determine reservation price p_i for which equation (1) is satisfied as an equality, it is necessary to prevent the incorporation of the no-choice option's utility in equation (1). Jedidi & Zhang [11] show that traditional conjoint analysis can be augmented for this purpose. Their approach shows that it is legitimate to use the utility of a chosen base case option as the utility of the no-choice option, in which case the following formula can be applied in calculating the reservation price for service bundle r_i (Sb) and simulating consumer choice:

(2) $$r_i(Sb) = \frac{\Delta p}{U_{\Delta p}} \left(\sum_{s=1}^{N} \frac{U_{1s}}{\Delta s} s\right)$$

- where $r_i(Sb)$ is the reservation price for the service bundle,
- Δp is the change in price from the regular price level, where Δp= p-25%, 0, or p +25%
- $U_{\Delta p}$ is the change in utility from that price change, actually the ß's from the dummy's in a linear conjoint analysis, and
- $\frac{U_{1s}}{\Delta s} s$ is the change in utility for including service *s* in the bundle.
- Σ s=1, N refers to of summation of the utilities of the services in the bundle

The first fraction can be seen as the exchange rate between units of utility and difference in price. The changes in utility invoked by including a service in the bundle, as compared to the base case, may be multiplied by an exchange rate to calculate the reservation price for the service (bundle). To make interpretation easier, an empty bundle may be chosen as the base case. If dummy coding is applied to code bundle-price combinations, the constant from the part-worth utility function equals the utility of the base case. Jedidi & Zhang's theoretical derivations validate the common practice of converting attribute utility changes to monetary values.

The part-worth utilities of the services can be translated into reservation prices by applying formula 2. In case conditional pricing is used, as we do here, r_i equals the reservation price *deviation* from the regular price level. In its application, the service coefficients vary among the customers, while the discount and surcharge price coefficients are fixed. According to formula 2, the reservation price for a service is equal to the ratio of the service coefficient with respect to either the discount or surcharge price coefficient (depending on whether a service is considered too expensive or too cheap). By fixing the price coefficients, the distribution of the reservation price has the same form as the distribution of the service's coefficient. Here it is assumed that the service coefficients are all normally distributed and the reservation prices for the services are also normally distributed. This makes it possible to

compare the different strategies for the different services. It also prevents incorrectly signed price coefficients from creating implausible reservation prices and near zero price coefficients from creating extreme high or low reservation prices. As far as the service coefficients are concerned, we see no reason for restriction, because customers could value a service at a regular price as either positive or negative.

Simulation model specification. The hypotheses can be tested via two types of models: (1) analytical models and (2) simulation models. In the first approach an analytical model of consumer behaviour is used to deduce the optimality of different bundling strategies for different service characteristics (e.g. reinforcing, competing, enhancing and supplementing characteristics). An alternative approach concerns the use of a simulation model. Instead of analytically computing the outcomes of a specific bundling and pricing strategy, simulation is used to test the optimality of bundling and pricing strategies. To this end, a spreadsheet-model was specified, for which the following steps were carried out:

- For the services under consideration, an array of reservation prices is specified by the user on the basis of the conjoint analysis;
- For the services under consideration, the user specifies the cost levels of providing one unit of the service;
- For the three different bundling strategies, the reservation prices of the three offerings are calculated by the program. It is assumed that a bundle's reservation price is equal to the sum of the component's reservation prices;
- For the three different offerings, an array of prices is specified which the program tries to optimize;
- Based on the reservation prices and the prices of the offerings, the program calculates the consumer surplus;
- Based on the consumer surplus, the actual sales levels are calculated according the following rules: a consumer buys an offering if and only if the consumer surplus is positive and the consumer surplus is the highest among the offerings. In case the consumer surplus of the bundle equals the consumer surplus of one of the components, the consumer buys the bundle. If the consumer surplus of an offering equals zero, the consumer buys the offering;
- Based on the calculated sales levels, the specified cost levels and the calculated optimal prices, the program calculates the revenue and profit per offering.

To determine the optimal prices, the optimization tool *Evolver* from Palisade was used.

4 Results

The aggregate conjoint model. Multiple linear regression analysis was used to estimate the aggregate main-effects model. The results of this analysis are shown in table 3. Because conditional pricing is applied the presented utilities cannot be interpreted independently from the pricing attribute. Consequently, the utility coefficients indicate whether on average the reservation price is below (negative sign) or above (positive sign) the regular price of the service. For example, it can be calculated that, on average, the reservation price of the accounting service is 13 percent above the regular price of the service. Also, on average, the respondents perceive that their reservation price is 3 percent below the regular price of the book-keeping service. Services with a positive utility (2, 3, 4, 5 and 10) may be regarded as enhancing the administrative core activity/service, and services with a negative utility (1, 6, 7, 8 and 9) may be regarded as unrelated supplementing services, that open new avenues for business development for SaaS providers. Needless to say, this classification would only hold for the target segment respondents represent.

Table 2: Average importance, calculated part-worth utilities and positiveness of services

		Part-worth utility			
Services	**Importance**	**Coefficient**	**Standard Deviation**	**Percentage positive**	**P**
1. Bookkeeping	9.848	-.029	.699	51.1%	ns
2. Accounting	9.959	.215	.648	59.6%	.047
3. Invoicing	7.689	.040	.606	61.7%	ns
4. Time registration	6.171	.029	.406	55.3%	ns
5. Expense registration	8.143	.088	.575	59.6%	ns
6. Mileage registration	8.058	-.098	.580	46.8%	ns
7. Project collaboration	9.228	-.173	.628	36.2%	ns
8. Project acquisition	7.001	-.114	.493	44.7%	ns
9. Debt collection	7.821	-.178	.539	44.7%	ns
10. Pay rolling	9.455	.125	.737	61.7%	ns
Constant		2.420	1.321		
Pricing	16.629				
Low price (25% discount)		.293	.403	80.9%	
Regular price		.059	.350	55.3%	
High price (25% surcharge)		-.351	.344	10.6%	

Model fit: Average Pearson's R = .989 (P < .000). *Average Kendall's Tau* = .919 (P < .000). *Average Kendall's Tau for Holdouts* = 1.000. *Aggregated Pearson's R* = .219 (P < .000). *Aggregated Kendall's Tau* = .155 (P < .000). *Aggregated Kendall's Tau for Holdouts* = .289

The individual conjoint models. The estimation of individual level coefficients enables the analysis of variation (e.g. through standard deviation measures) and asymmetry (e.g. through correlation measures) of conditional reservation prices. The overall outcomes of this analysis have been appended to table 3. The Pearson's R of 0.989 (P < 0.000), Kendall's Tau of 0.919 (P < 0.000) and Kendall's Tau for Holdouts of 1.000 respectively indicate a good fit, consistency in rating the profiles and predictive validity of the individual-level models. A high variation in preferences exists for all services. The preferences for the pay-rolling service show the largest variation (SD = 0.737), which is a logical observation, because this service is, a priori, only relevant for 47 percent of the respondents. The preferences for the time registration service, which is relevant to 72 percent of the respondents, are the most homogeneous (SD = 0.406). Services with a high variation may be good candidates for

bundling because delivering these services as an unbundled offering either excludes many consumers from subscribing or gives consumers a high consumer surplus in their subscription to the service.Table 2 also shows the *relative importance* of the bundle attributes for the overall perceived value. It can be concluded that price is an important attribute in people's intention to subscribe. Although making a careful bundle composition is critically important, as the price attribute is relatively important, pricing discounts can significantly increase people's intention to subscribe to certain service bundles.

The *positiveness* indicates the share of the respondents that positively assess the value of a service relative to its costs at an advertised price equal to the regular price. The unrelated services (2, 3, 4, 5 and 10) have the highest levels of positiveness and can be considered to be complementing. While services (1, 6, 7, 8 and 9) have the lowest levels of positiveness and therefore are more supplementary in nature.

Table 3 shows the asymmetry of conditional services preferences. From the total of 45 estimated coefficients, only the 7 statistically significant coefficients are shown.

Table 3: Asymmetry of conditional service preferences

Services		**Pearson's Correlation**	**P**
1. Bookkeeping	2. Accounting	.327	.025
1. Bookkeeping	4. Time registration	.351	.015
3. Invoicing	4. Time registration	-.371	.010
3. Invoicing	5. Expense registration	.363	.012
6. Mileage registration	8. Project acquisition	.374	.010
7. Project collaboration	10. Pay rolling	-.427	.003
8. Project acquisition	9. Debt collection	,291	,047

To summarize, both from an extraction and an exclusion point of view, the price-bundling of the invoicing and the time registration services would be most profitable because of its complementing characteristics to the core service/activity and its effects on lowering the variation in conditional preferences for the bundle. However, it would appear that the price-bundling of other negatively correlated services can also be optimal in case a higher discount applies to the bundle.

Simulation of bundling strategies. With the use of the reservation price estimation method, a simulation was carried out for different bundling strategies for four combinations of services. To calculate the maximum profit of each strategy, it was assumed that the variable cost of each unit of service was 75 percent of the regular price. The results of the simulation are shown in table 5. From a *revenue maximization* perspective, a mixed bundling strategy is always the best if the bundled services are (partially) competing (A3 & B3). This means that hypothesis 1 can be accepted. It can also be seen that an unbundling strategy is not worse than any other strategy in cases where the service are mutually reinforcing (C3 & D3). In fact, the

optimized mixed bundling strategy for reinforcing services turns out to be an unbundling strategy with an extremely high price for the bundle, which confirms hypothesis 2.

From a *profit maximization* perspective, it can be seen that the pure price-bundling of complementing and reinforcing services do not adversely affect profit levels compared to a mixed bundling strategy (C2). The complementing characteristics create a high normalized difference between costs and price. Because of the reinforcing characteristics of the bundled services, demand for the bundle is not reduced much compared to the separate offerings. Hypothesis 3 can therefore be accepted.

Table 4: Optimality of different bundling strategies for different types of services under different objective

			Revenue maximization			**Profit maximization**			**Market penetration maximization**		
	Services		**Total revenue**	**Total profit**	**Contribution margin**	**Total revenue**	**Total profit**	**Contribution margin**	**Total revenue**	**Total profit**	**Pene-tration**
A. Bundling competing and complementing services											
1. Unbundled	3	4	429	88	21%	351	111	32%	75	-431	97%
2. Bundled	3	4	418	-10	-2%	390	98	25%	32	-496	100%
3. Mixed	3	4	445	89	20%	441	119	27%	32	-496	100%
B. Bundling competing and supplementing services											
1. Unbundled	7	10	586	65	11%	464	157	34%	131	-691	94%
2. Bundled	7	10	617	73	12%	503	110	22%	127	-735	98%
3. Mixed	7	10	710	137	19%	509	172	34%	127	-735	98%
C. Bundling reinforcing and complementing services											
1. Unbundled	3	5	435	90	21%	367	117	32%	102	-393	94%
2. Bundled	3	5	415	100	24%	328	115	35%	160	-335	94%
3. Mixed	3	5	435	90	21%	340	118	35%	216	-271	94%
D. Bundling reinforcing and supplementing services											
1. Unbundled	6	8	370	10	3%	269	85	32%	71	-420	93%
2. Bundled	6	8	325	44	14%	231	74	32%	19	-487	96%
3. Mixed	6	8	372	12	3%	277	90	32%	24	-486	97%

On the same note, supplementing services imply a low normalized difference between costs and price (B2). The competing characteristics adversely affect the profit, which means that hypothesis 4 can be accepted, and because, when it comes to maximizing profits, a mixed bundling strategy is the best or at least equal to any other strategy (A3, B3, C3 & D3), hypothesis 5 can therefore be accepted.

From a *market penetration* perspective, it can be seen that a pure price-bundling strategy is not always the best strategy to maximize market penetration (C2 & D2). For some services, a mixed bundling strategy achieves a higher market penetration, because some consumers show negative reservation prices which offset the positive reservation price of the other service (D3). In this case, an additional unbundled offering would maximize penetration, although under the condition that the use of the positively valued service is only possible if the negatively valued service is also used. In other words, the use of the former service is conditional upon the usage of the latter. Whether this is actually the case depends on the design of the services. Therefore hypothesis 6 can only be fully accepted in case the usage of either service is unconditional.

5 Conclusions

Six hypotheses were tested using the simulation model, in which the results of a conjoint analysis were used in the reservation price estimation method. All hypothese were accepted with the notion that hypotheses 6 was accepted under the condition that the use of either of the bundled services does not depend on the use of any of the other services. Otherwise, a mixed bundling strategy may be best.

Our results illustrate how a set of methods, conjoint analysis, reservation price estimation methods and simulation, can be applied to optimally bundle and price a set of SaaS offerings. The methods that have been used in this study have some limitations. The focus of the research was on *main* effects for these unrelated services and not in interaction effects. Secondly, in transforming conjoint utilities into reservation prices, the price coefficient was fixed. Thirdly, the service and price coefficients involve random errors and may involve cases of price insensitivity.

Future research is needed to test and improve the predictive validity of the reservation price estimation method. For practical research a promising area of study is the adoption of conjoint analysis or other suitable methods for optimally designing of transaction-bundle based SaaS offerings.

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Demonstrating the Impact of E-Marketing on Industrial Sales

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Abstract

The digital world is making customer behavior visible and measurable. However, the relationship between e-marketing and sales is often elusive in businesses where transactions occur offline. The goal of this study is to describe how Web analytics can be exploited for linking e-marketing performance with industrial sales. The findings show that Web analytics (WA) enables an industrial company to link customer behavior online with the generation of sales leads that can be tracked all the way to transaction. However, building such a process successfully requires that the organizational conditions support the deployment of WA.

Keywords: Case Study, E-Marketing, Industrial Marketing, Lead Generation, Web Analytics

1 Introduction

The digital world along with new communication devices and platforms is changing consumer patterns. From a business perspective, the growing role of the digital environment in consumer behavior provides companies with exploding volumes of data and new ways to interact with customers. Not only does this transformation revolutionize consumer markets, but it also induces major changes in industrial marketing practice. This is evidenced by industrial firms' increasing investments in e-marketing, which currently account for about a quarter (26 percent) of their total marketing budgets (Gartner, 2013). Along with customer demands, e-marketing is driven by its results being more easily measured than those of traditional marketing

(Chaffey & Patron, 2012). As customers are increasingly interacting with companies through digital channels, marketers have realized the need to track these interactions and measure their effectiveness (Chaffey & Patron, 2012). For this purpose, firms must adopt Web analytics (WA) defined as "the measurement, collection, analysis and reporting of Internet data for the purposes of understanding and optimizing Web usage" (Web Analytics Association, 2008, p. 3). However, little is known about how industrial companies, characterized by a long-duration selling process and the emphasis on face-to-face interaction with customers (Webster, Malter, & Ganesan, 2005), can harness WA to demonstrate the impact of e-marketing on business performance.

This study presents a case of an industrial company that has managed to harness Web analytics (WA) to demonstrate the impact of e-marketing on offline sales. While the literature has highlighted the benefits of WA for e-commerce, the goal of this study is to describe how WA can be exploited for measuring and optimizing e-marketing performance for (sales) lead generation and subsequent increases in industrial sales revenue. By doing so, the study explores what kinds of organizational conditions are required for building the process. The study contributes to the existing knowledge by showing that when organizational conditions support the deployment of WA, industrial companies can show clear business benefits of e-marketing activities.

The remainder of the paper is structured as follows: First, we outline the existing knowledge on the use of WA for measuring e-marketing performance. Second, we justify the decision to exploit qualitative case study strategy for the purposes of this paper and detail the use of methods in the collection, analysis and reporting of the study results. After that, the main results of this study are shown and illustrated. Finally, we draw the theoretical conclusions and managerial implications on the basis of the results, and evaluate the limitations of the study.

2 Web Analytics Research

Showing the contribution of marketing actions to business performance has been a long-lasting challenge for marketing practitioners and a widely debated topic in academia (e.g., O'Sullivan & Abela, 2007; Rust et al., 2004). Fortunately, the digital world has brought revolutionary opportunities to resolve the measurement challenges by making customer behavior visible and traceable (Hennig-Thurau et al., 2010). The most commonly used tool to assess customer behaviour online is WA software that produces data to track the website traffic driven by specific activities, to understand customer behavior on the website, to measure the outcomes of the visits (e.g., brochure download, contact request, or transaction) and to optimize the customer experience to support business objectives (Nakatani & Chuang, 2011). If marketers have the means to couple this data with personal information via registration or subscription, they can follow interactions with a visitor over time, assess his/her engagement and plan further precise marketing actions directed at the visitor in question (Phippen, Sheppard, & Furnell, 2004).

Although the use of WA is limited to the digital environment, it is an important development step toward measurable marketing. As the role of the digital world expands through increased digital media consumption and the integration of the online and offline worlds, the proportion of marketing actions covered by WA is growing. Indeed, many offline marketing actions already include digital elements that can be

tracked by WA. Some examples include digital television, quick-response (QR) codes embedded in print and outdoor media, and augmented reality applications used at product demonstrations in trade shows. Also, firms can design offline campaigns to drive online traffic and measure the impact on online customer behavior.

Despite the measurement opportunities and increasing importance of WA, academic research on the deployment of WA is somewhat scarce and often draws a discouraging picture of e-marketing performance measurement practices. By interviewing 25 companies, Welling and White (2006) demonstrate that regardless of the industry, website performance measurement is largely idiosyncratic or completely ignored. Hong (2007) comes to a similar conclusion with survey data and shows that although companies consider e-marketing performance measurement important, and are somewhat satisfied with their measurement efforts, they do not use any WA metrics for strategic purposes. In the business-to-business context, the existing survey findings are even more pessimistic; the firms are not actively measuring e-marketing performance with WA, the measurement is not considered important, and the majority of firms have difficulties understanding how they could gain any measurable benefits from e-marketing (Järvinen et al., 2012).

A likely explanation for the improper deployment of WA is that firms do not understand the benefits of WA or are incapable of exploiting the opportunities it provides. Clearly, the volume of data and the number of metrics in the digital world is exploding, which makes it more difficult to choose the correct WA metrics for the firm's needs and to process the data into actionable insights. In a recent survey of 1,000 U.S. marketers, three out of four believed that e-marketing performance measurement was important, but less than one-third (29 percent) thought they were doing it well (Adobe, 2013). Therefore, more research is needed to focus on organizational issues that determine the firms' ability to harness WA for measuring e-marketing performance. To our knowledge, the case study by Phippen et al. (2004) is currently the only academic investigation that discusses organizational conditions in the deployment of WA. In their study, Phippen et al. show how a multinational airline company can reap benefits from the advanced use of WA, when the organization is committed to developing the process and the deployment is tied to corporate goals.

Another important perspective is that a firm's operational environment has major implications on its ability to show the link between e-marketing and business performance; in businesses where transactions can be processed online, the link is much easier to demonstrate compared to those businesses where the selling process occurs after face-to-face negotiations. Accordingly, the success stories of WA deployment typically come from the e-commerce industry (Phippen et al., 2004; Wilson, 2010). However, Breur (2011) notes that there is nothing to suggest that WA would not be applicable in other business contexts. Nevertheless, research has yet to show how firms that sell their offerings offline can measure the impact of e-marketing activities on sales or other business benefits.

3 Methodology

Previous literature establishes case strategy as a viable approach with which to investigate the deployment of WA (Phippen et al., 2004; Wilson, 2010). Similarly, the case study approach is regarded as the most suitable research strategy to meet the

objective of this study. As Yin (1981) states, the case study approach is considered favorable when the study investigates a contemporary phenomenon in its real-life context and when the boundaries between phenomenon and context are not evident. Instead of producing aggregate-level information regarding the use of WA, the purpose of this study is to create in-depth knowledge about the use of WA in one company and to explore organizational conditions that determine the successful use of WA in the industrial setting.

This study was conducted as part of a two-year, e-marketing research project supported by seven large industrial firms and seven service-providers, such as digital marketing agencies. During preliminary discussions with the participating industrial companies, the measurability of e-marketing emerged as a top-priority research theme. However, while several companies had adopted WA for this purpose, only one of them, the target company of this study, was found to use WA for strategic purposes and have a sophisticated e-marketing performance measurement process in place. The target company is a Finnish Public Limited Company with an annual revenue of more than three billion Euros and 10,000 employees. The company operates in the metal industry, with its market reach covering Europe and China (Table 1).

Ownership	Public Limited Company
Main industry	Metal/Steel
Annual revenue (2013)	USD 3+ billion
Number of employees	ca. 10.000
Headquarters	Finland
Market reach	Europe/China
Interviewees and their positions (names have been changed)	Charles: customer data expert in digital marketing Joseph: digital marketing director Thomas: campaign manager in digital marketing Donna: content and SEO manager in digital marketing Carol: customer analyst in digital marketing

Table 1: Background information of case company and interviewees

The primary data collection method for this study was interviewing. Researchers conducted a total of five open-ended interviews with an average duration of 52 minutes. The interviewees were members of the firm's digital marketing team, the size of which was 12 employees. One of the interviewees was the director of the team, whereas the other four were digital marketing experts selected by the director on the basis of their involvement in the deployment of WA. To complement the data from interviews, two workshop sessions were organized that allowed informal group discussions about the key informants' opinions and experiences related to the use of WA.

The analysis of case data followed a three-step thematization process including data condensation, data display, and drawing and verifying conclusions (Miles, Huberman, & Saldaña, 2013, pp.12-14). First, the recorded interviews were transcribed and combined with notes from workshop discussions. Second, content analysis was performed by coding the transcribed text in two phases (Miles et al., 2013, pp. 74, 86-93). The coding process did not rely on previously developed concepts, but was data-driven in nature. In the first coding phase, we identified issues that were brought up by the interviewees with respect to the successful deployment of WA, and applied descriptive codes for those issues. In the second coding phase, we analysed the

interconnections between the descriptive codes, and grouped them under broader categories.

The content analysis was relatively straightforward in a sense that although the interviewees' comments varied in how much they put emphasis on various issues behind the deployment of WA, the process itself was described in a similar manner and the major organizational conditions and success factors were brought up by everyone without apparent contradictions. As a result, we came up with describing the WA deployment process of the case company in four phases and identified six organizational conditions that contribute to the effective deployment of WA. To verify the study results, the interpretations were presented in a meeting where the informants were invited to comment on the study findings and conclusions. Against this background, the results obtained by researchers were sound in terms of managerial relevance.

4 Results

About five years ago, the senior management of the case company responded to the growing role of a digital environment in customer interactions and established a digital marketing team. Recruiting new talents was a big part of building such a team, but relatively fast the firm assembled a team of e-marketing experts. From the very beginning, the new team shared the view that measurability is the key strength of e-marketing, and WA was subsequently adopted for this purpose. It was soon realized that in an industrial business where the transactions require sales negotiations, the e-marketing results could not be linked directly with sales. Instead, the role of e-marketing was to increase the interest and purchase intentions of potential customers by providing meaningful content and engaging the customers for continuous interaction in digital channels. With this mindset, WA was exploited to determine the sources and volume of website traffic and to identify the content that gained major interest among visitors and the pages that led visitors to abandon the site. However, the key to demonstrating the impact of e-marketing on business benefits was the team's decision to start collecting leads through the company website.

Today, the firm's main goal of all e-marketing activities is to generate leads. The lead is defined as a website visitor who has shown interest in company offerings and left personal contact information. WA is used to measure the traffic driven by various online and offline marketing activities, such as search engine marketing, digital newsletters, and printed brochures, and also to analyze the visitor behavior on the website. On the basis of the analysis, the website is modified to optimize online customer experiences and to maximize the number of leads generated. Integrating WA data with a customer relationship management (CRM) system has been an important part of building a system for tracking leads; all customer interactions are automatically recorded in the CRM system which identifies and directs an online lead to an appropriate salesperson. Thereafter, it is the responsibility of the salesperson to contact the lead and ultimately record in the CRM system, whether a sale resulted or not:

> *All customer-related data from digital surveys to campaigns goes directly into our CRM system under a specific customer profile. Leads from a certain campaign are automatically directed to the correct salesmen and we can follow the yield of such a campaign in real-time.* (Charles, customer data expert in digital marketing)

With this kind of lead tracking process in place, the team can accurately calculate the revenue generated by online leads and report it to the management, which is an important way to justify the e-marketing budget. As a result, the e-marketing budget has increased every year; as has the influence of the digital marketing team within the company. Boosted by a larger e-marketing budget, the team has been reinforced with more experts and has invested in better analytics tools:

> *Lately, digital marketing has been systematically invested in. You can clearly see direct monetary and human resource investments as well as the top management commitment to this thing. Along with analytics, the management and sales teams have undoubtedly noticed that our digital services, Web site and all our activities have a powerful impact, and the change has been radical in the last few years. The budget is still bigger for offline marketing, but digital marketing budgets have been multiplied. Last year, I think we more or less tripled our budget.* (Joseph, digital marketing director)

To sum up, through the use of WA, the case company has managed to build an effective process to link its e-marketing performance with offline sales revenue (Figure 1). However, the task is not as simple as it may appear, and further research found six organizational conditions that contributed to the effective deployment of WA. First, the senior management played a crucial role in initiating and constantly advocating the use of WA. Second, new talents with e-marketing and analytical skills were acquired to build the process. Third, organization culture promoted cooperation and the use of data in decision making. Fourth, clear goals and target levels were set for the development of e-marketing, and metrics were systematically selected to measure the achievement of those goals. Fifth, WA was integrated with the CRM database to combine WA data with an existing knowledge of customers and their previous interactions with the company. Sixth, the firm had designed a transparent process and responsibilities for measuring, analyzing, and ultimately reporting the results for the executive board, which enabled the digital marketing team to convince the board of business benefits of the system to allocate larger budgets for future e-marketing investments.

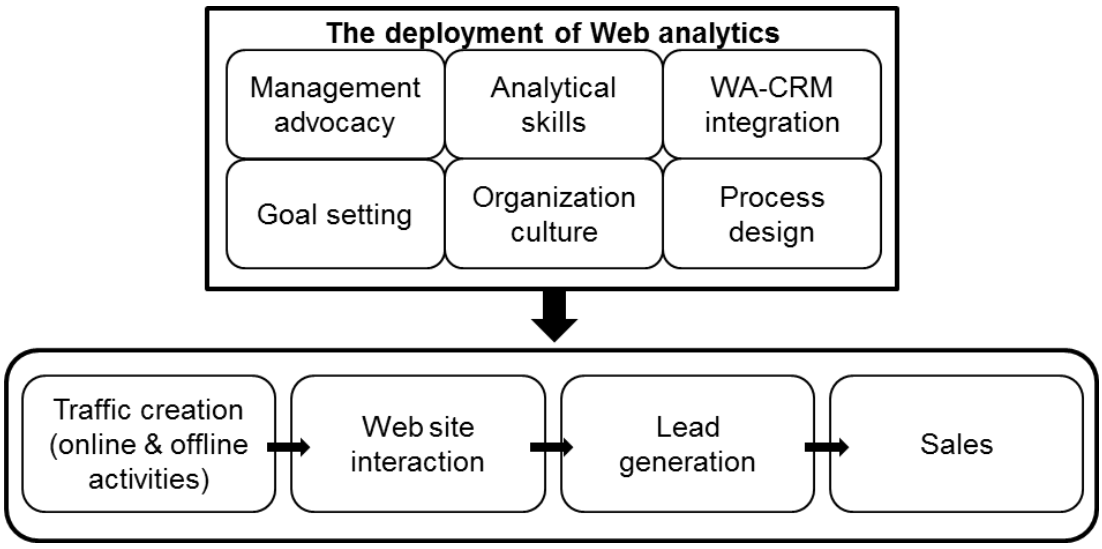


Figure 1: The case company's process of linking e-marketing performance with sales

Finally, it is noteworthy that despite the case firm's ability to demonstrate that e-marketing does influence sales, it is unable to measure the total return on e-marketing in

financial terms for several reasons. First, although the lead is generated through the website, it is not clear if the lead was generated due to e-marketing or if the customer's decision to contact the company was made beforehand, and the website was simply the easiest way to do it. Second, the selling process typically takes a long time, and the firm finds it difficult to define how much the final purchase decision is owed to e-marketing and how much the salesperson should be credited. Finally, the goal of e-marketing in the case company was to generate leads, because it was considered the easiest way to demonstrate the business benefits of e-marketing. However, the long-term impacts of e-marketing, such as brand awareness and image, had been ignored, because the team had not figured out how to link them with financial value:

> *I admit that it is a little bit shortsighted to measure digital marketing performance by comparing costs to produce a sales lead resulting in sales with its monetary value. Investing in brand building might yield even better results in the long run, but then again, lead generation metrics make it easy to justify the costs of a campaign and show its direct monetary value.* (Thomas, campaign manager in digital marketing)

To conclude, despite the significant progress in marketing measurability in the digital world, challenges remain to demonstrate the total return on e-marketing in the industrial setting.

5 Conclusions and Evaluation of the Study

As stated, previous studies have drawn slightly discouraging pictures of the deployment of WA (Hong, 2007; Järvinen et al., 2012; Welling & White, 2006), and the few success stories have been from the field of e-commerce (Phippen, et al., 2004; Wilson, 2010). Consequently, this study makes an essential contribution to existing knowledge by showing that even an industrial company is able to harness WA for demonstrating the business benefits of e-marketing. In the industrial sector, marketers have traditionally struggled to justify their spending due to the long-duration selling process and the emphasis on face-to-face interaction with customers (Webster et al., 2005). However, this study has raised optimism by showing that the digital world offers new opportunities for industrial marketers to create a relationship between marketing actions and revenue generated. Simultaneously, the findings have implications for the discussion of measuring the synergy between online and offline marketing. The second contribution of this study is to create insights into the organizational conditions that influence the firm's ability to deploy WA. The findings imply that the effective use of WA may not primarily be a matter of a firm's industry or strategy, but rather the organization's capabilities and commitment to make the most of WA.

The managerial implications of the study encourage organizations from a variety of industries to find ways to make better use of the digital data available to them. Any organization should start from the business objectives of its e-marketing and design a measurement system that suits its needs. The study highlights that when deploying WA for building an effective measurement system, the senior management team plays a pivotal role in evaluating current capabilities and investing in skills and tools needed for the task. Moreover, the management needs to take an active role in advocating the use of analytics and driving a cultural change in the organization.

The results of this study must be examined in light of certain limitations. First, the study does not allow for generalization of the results. The qualitative investigation of one company allowed researchers to create in-depth knowledge of the study phenomenon and insights into theory development. However, the results are not transferable, and further research is needed to investigate the deployment of WA in other organizations. Second, the study was exploratory in nature and did not rely on a solid theoretical framework. The purpose of the framework used in this study was solely to illustrate the case findings and to provide a basis for theory development in future research, but its functionality may vary in different contexts and the concepts of the framework require elaboration with regard to existing theories.

Further research could strengthen theoretical and practical insights generated in this study. Two particularly important topics deserve more attention: First, as WA was found to be an effective tool to track lead generation and link it with sales, future research could focus on the use of WA for measuring other business benefits. For instance, it remains unclear if WA can be harnessed for measuring brand-related objectives that influence long-term business performance. Second, this study found six key organizational conditions determining the deployment of WA in the case company, but it is unlikely to be an all-embracing list; more research is needed to investigate if the same conditions are identified in other organizations and if there are other conditions not found in the case data.

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The Identification of Decision Constructs used in Online Transactional Processes

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Abstract

From prior research, the authors found that certain design features amongst some online retailers were atypical of 'good' design elsewhere. It was apparent the transactional process was being used to present consumers with optional extras (and other decisions) that not only slowed the process down, but also stressed and agitated users. The research identified some new and unusual decision constructs such as the 'must-opt'. This paper seeks to produce a taxonomy of the type and nature of decision constructs encountered throughout on-line Business-to-Consumer (B2C) transactional processes. The findings presented herein make an incremental contribution in theorizing, identifying and analyzing new decision constructs alongside established ones.

Keywords: IS development, User experience, Website design, Must-opt, Decision constructs.

1 Introduction

From prior research, the authors found that certain design features amongst some online retailers were atypical of 'good' design elsewhere. It was apparent the transactional process was being used to present consumers with optional extras (and other decisions) that not only slowed the process down, but also stressed and agitated users. There has long been an 'assumed' notion that information systems developers, using long-

established human computer interaction (HCI) principles, develop applications that are easy to use and make the user experience positively engaging and productive (Rogers et al., 2011; Shneiderman and Plaisant, 2010; Sklar, 2006). Such assumptions are questionable today as many points in commercial Business-to-Consumer (B2C) transactional processes are riddled with pitfalls and landmines that seem designed to slowdown, confuse or trick consumers (Barry and Torres, 2009). This paper sets out to produce a taxonomy of the type and nature of decision constructs encountered throughout on-line Business-to-Consumer (B2C) transactional processes. The findings presented herein make an incremental contribution in theorizing, identifying and categorizing some new decision constructs alongside established ones. Finally, an exploratory examination of some of the salient issues is conducted.

2 Research Focus - The Transactional Process

Central to the work presented here is a pedantic examination of the transactional process. Specifically, the authors are interested in the part of the interaction after which consumers become psychologically committed to purchase, for example when a user presses a 'BUY' button. This transactional process between a business and a consumer is comprised of a number of decisions, typically across a number of pages, until payment is made and the process concluded. What sometimes happens from this point onwards is the user is presented with choices that do not seem central to the product or service being purchased and are difficult, if not impossible, to avoid because of the design. While many businesses do seek to offer a satisfying user experience and treat consumers fairly, not all firms are so minded. Whether through benign incompetence or wilful intent, some retailers pepper the transactional processes with elements that seem designed to force consumers to slow down, stop or accidentally select options they did not intend. To understand why consumers are experiencing these intermittent junctures, it was first necessary to categorize the types and the nature of decisions encountered in the transactional process.

For clarification, this study is not concerned with the decisions core to the actual product or service. Those decisions about quantity, shoe size or colour are fundamental to the acquisition of the product or service. It is the decisions that involve some element of optionality that are of more interest in this paper. Each decision point presents some form of a decision 'construct'. A construct is a graphical user interface (GUI) control or mechanism that allows a user to make a selection. Early controls were radio buttons, checkboxes, drop-down lists, spinners and sliders. New technologies have meant, for example, icons as button or images, or interactive elements may be presented on-screen or in pop-ups or as widgets.

3 Regulatory Attention on Optional Charges and Pricing

Following a case taken to the European Court of Justice (eBookers Germany v BVV 2012), the European Union acted to bring some clarity to the definition of optional price supplements as specified in the regulations on the operation of air services (European Union, 2008). A key article (Article 23(1) of Regulation No. 1008/2008) states 'optional price supplements shall be communicated in a clear, transparent and unambiguous way at the start of any booking process and their acceptance by the customer shall be on an

'opt-in' basis'. The judgement in relation to this regulation has clarified the issue somewhat. It states that optional price supplements are not unavoidable and are neither compulsory nor necessary for the carriage of passengers or cargo. While the regulation only applies to airline websites, its reference to optional price supplements is clear and could be used to define optional price supplements on other e-commerce websites.

The European Union has introduced regulation in relation to other forms of distance and off-premises contracts, which would include e-commerce transactions. In 2011 they introduced a new directive on consumer rights (European Union, 2011) to protect the consumer in distance contracts. This directive states additional payments above and beyond the minimum cost of the transaction require the explicit consent of the consumer. The European Union recognises consumers need to be protected against unscrupulous practices that may result in inadvertent purchases. For airlines, they assert additional options may only be purchased on an 'opt-in' basis while for all other distance contracts, the consumer's express consent is required and the vendor may not use default options that require the consumer to reject the option. However, neither piece of legislation defines what is meant by an 'opt-in' or what type of constructs are allowed where the consumer must make a decision on an optional extra. It is therefore at the discretion of the vendor to determine the most suitable method of obtaining the consent.

In the United Kingdom, the Office of Fair Trading carried out a study on the impact of pricing practices on consumer behaviour (Ahmetoglu et al., 2010). In this study, they described a process referred to as 'drip pricing'. This tactic is the practice of presenting the user with an element of the price up front and then presenting additional components as 'drips' throughout the buying process. The drips can be either compulsory, where they are inherent to the product (e.g., shipping cost) or optional, where they are generally add-ons (e.g., an optional warranty). These 'drips' can be presented in a variety of ways including opt-ins and opt-outs.

4 The Presentation of Choice

The manner in which options are presented to consumers has been found to have a significant impact upon the choices that are made. Research, not necessarily in the area of e-commerce, has been carried out to determine whether users are more likely to participate when an option is framed as an opt-out rather than an opt-in (McKenzie et al., 2006; Junghans et al., 2005; Johnson and Goldstein, 2003; Madrian and Shea, 2001). They generally conclude an individual is more likely to retain the default option than to change it even if the decision is detrimental to them. That is, they are more likely to participate if an option is presented as an opt-out, rather than an opt-in. Johnson and Goldstein (2003) also found there was little difference in acceptance rates between an opt-out and a must-opt (see section 6.4 for a full explanation and Table 1 for an illustration of a must-opt). The reasons identified for this negligible difference are participant inertia and a perception that the presentation of a default is a recommendation. McKenzie et al. (2006) take that conclusion further and maintain those presenting the choice are more likely to present it in a way that indicates their beliefs or attitudes towards the choice.

Belman et al. (2001) and Lai and Hui (2006) both examined the impact of question framing on user decisions. They found users were more likely to accept an option when the language was expressed in an acceptance format rather than a rejection format for both opt-in (e.g., 'Please send me newsletters' with the checkbox un-ticked versus 'Please do not send me newsletters' with the checkbox ticked) and opt-out (e.g., 'Notify me about more health surveys' with the Yes button pre-selected versus 'Do not notify about more health surveys' with the No button pre-selected).

5 Research Plan

The research plan is three-phase. Firstly, identify an exhaustive list of the various decision constructs users encounter when purchasing a product or service whilst on-line and then consider some of the more salient issues that surround the process. Secondly, a more intense analysis of the presentation of the decision constructs will be conducted, including an exploration of the juxtaposition between optionality and question framing. Thirdly, a framework will be constructed, and factor analysis conducted to determine the nature of the relationships between independent variables such as industry category and decision constructs; and factors such as ease of use, level of persuasion, clarity and trust. The first phase of the study is the subject of this paper and it is in turn made up of two parts outlined below.

Initially the authors, by means of theorizing and analysing websites, proposed an exhaustive taxonomy of decision constructs. The methodology involved identifying the highest-level meta-categories and sub-dividing each logically until a series of mutually exclusive constructs were identified. A large number of retailers' websites were explored and on some, several products or services were studied. This discussion is laid out in section 7. Secondly, 145 decision constructs across 25 websites were examined in detail. Representative e-commerce B2C websites were identified from firms listed with Retail Ireland, Ireland's Small Firm's Association, and analysis from Google Analytics and Google Ad Planner. The decision constructs were encountered during typical B2C transactions on these websites.

6 Identifying Decision Constructs

6.1 Fundamental Decision Types

The transactional process on each website is normally made up of a number of sequential webpages that end in a payments page. After the core product or service has been selected, the user is presented with various decisions points. Most of these decision points relate to real 'options' that may be chosen or declined. The customer will be able to complete the purchase without choosing the option, such as an extended warranty. It is an ancillary aspect of the product or service, usually at an extra cost. However, there are also common decisions that must be made that involve some element of optionality. Such decisions are 'essential' to obtaining the product or service (for example choosing between different payment methods). Thus, the first meta-category of decisions is whether they are essential or truly optional.

6.2 Optionality

Optionality proffers the proposition that an option presented to a user is a straightforward choice - you either wish to secure the option or not. The reality is that optionality is far more complex. When the European Union recognized particular problems within the airline industry in how they dealt with the presentation of an optional extra or charge, they produced a directive (European Union 2008), stating "all optional price supplements should only be accepted by the consumer on an 'opt-in' basis". However, it did not define optionality or what constituted an opt-in. Some firms appear to have taken great care to reflect considerably on this concept. In seeking to define the notion of optionality, the following were identified:

- Merriam Webster (2013) define optional as 'involving an option**:** not compulsory'
- Geddes and Grosset (2004) define to opt as 'to choose or exercise an option'
- Merriam Webster (2013) have no definition for opt-in, but define opt-out as 'to choose not to participate in something'
- The Oxford English Dictionary (2013) define opt-in as 'to choose to participate in something and opt-out to 'choose not to participate in something'

A more nuanced consideration is found on wiktionary.org (2013) where the following distinction is made between opt-in and opt-out.

- To opt-in - of a selection, the property of having to choose explicitly to join or permit something; a decision having the default option being exclusion or avoidance.
- To opt-out - of a selection, the property of having to choose explicitly to avoid or forbid something; a decision having the default option being inclusion or permission.

A distinction is made here between opt-in and opt-out that deals more comprehensively with the idea of the outcome of the default option. Thus, most consumers purchasing on the internet are well aware an option is not always presented as an opt-in and at times they have to deliberately choose to opt-out, normally by de-selecting a checkbox or a radio button. Thus, the optional decision may be categorized as either opt-in or opt-out.

6.3 Un-selected and Pre-selected Constructs

In exploring various decision constructs it soon became clear that some opt-in, opt-out and essential decisions were sometimes un-selected and sometimes pre-selected. Some ways in which the decision is presented are quite peculiar. Opt-in decisions normally involve explicitly choosing one of a number of options, thus, an *un-selected opt-in*. However, a *pre-selected opt-in* is more ambiguous. A ticked checked box, for example, is suggestive of something having been pre-selected for the user. However, using rejection framing such as 'I do *not* want an email newsletter', the action of ticking the

box means the user opts-in. The juxtaposition of pre-selection (something appears chosen) against negative framing (something is not being received) is counter-intuitive and is unlikely to be inadvertent poor design, given the most frequently encountered opt-in is un-selected with acceptance framing.

Opt-out decisions normally appear as a pre-selected tick in a checkbox with associated acceptance framing, e.g., 'I wish to receive email'. However, an opt-out construct can be designed so that it is un-selected, appearing like a 'normal' opt-in decision. This requires the decision be framed to imply rejection or a negation of the decision (e.g., an un-ticked checkbox accompanied by the text 'I do *not* want Collision Damage Waiver'). Again, this construct is unconventional and extraordinarily confusing. Conventionally, a user might safely overlook an un-selected option, assuming it to be opt-in. However, the un-selected opt-out construct is designed so a user must tick a box to reverse out of the decision. Drawing attention to the option in this manner may result in the user giving the option more consideration than they would otherwise. The same juxtaposition can be applied to essential decisions. These may also be pre-selected (e.g., a fast delivery method) or more usually un-selected (e.g., choice of a payment method), see Table 1.

Decision Construct	Description	Illustration
Un-selected opt-in	Default: don't receive the option Normal presentation: un-ticked Framing: acceptance	☐ I want an extended warranty
Pre-selected opt-in	Default: don't receive the option Normal presentation: ticked Framing: rejection	☑ I do not want an extended warranty
Un-selected opt-out	Default: receive the option Normal presentation: un-ticked Framing: rejection	☐ Quote valid for 30 days. We would like to email you reminders over this period. If you don't wish to receive these emails please tick here.
Pre-selected opt-out	Default: receive the option Normal presentation: ticked Framing: acceptance	☑ Transit Insurance (optional) €0.75
Must-opt	Default: cannot proceed Normal presentation: multiple un-ticked Framing: normally acceptance	**Additional drivers:** ○ Yes ○ No
Un-selected essential decision	Default: cannot proceed Normal presentation: multiple un-ticked Framing: normally acceptance	○ Express delivery in 2 days (€5.00) ○ Fast delivery in 3-4 days (€2.00) ○ Free delivery in 5-7 days (free)
Pre-selected essential decision	Default: variant selected Normal presentation: ticked Framing: normally acceptance	○ FREE Super Saver Delivery (4-5 business days) ◉ Standard (3-4 business days) ○ Two-Day Delivery : get it on Monday, December 9

Table 1: A Taxonomy of Decision Constructs

6.4 The Must-opt Construct

From previous research, the authors identified and described a new decision construct, coined a '*must-opt*' decision, in online commercial transactions (Barry et al., 2011). It appears its use in the airline sector was an attempt to side step the 2008 EU directive mentioned earlier. A must-opt decision occurs when an optional extra is presented with no option selected, ostensibly an opt-in decision. However, it is not truly an opt-in since it is impossible to progress to the next webpage until the user explicitly accepts or rejects the option – thus, they must-opt. Various devices may be used to prohibit progression such as a pop-up window or highlighting in red missing responses. Thus, the user must go back and read and consider the option variants and choose one. It is illustrated in Table 1.

6.5 Distinguishing Essential from Optional Decisions

A casual examination of a must-opt and an un-selected essential decision might suggest they are the same. Although they may look similar they are fundamentally different. In the examples shown in Table 1, both decision constructs consist of a number of un-selected radio buttons. However, the must-opt allows the user to select or decline the option of adding additional drivers. In contrast, the un-selected essential decision requires the user to choose between a number of delivery options, one of which must be chosen. Hence, the must-opt deals with an optional extra that can be declined whereas the un-selected essential decision offers a choice between different variants but cannot be declined.

6.6 A Taxonomy of Decision Constructs

From the discussion above a taxonomy may be proposed made up of seven decision constructs, described and illustrated in Table 1. While authors believe they have identified all decision construct types in use across a range of sectors and commercial transactions, in time the number may increase as firms choose increasingly inventive ways of presenting users with optional extras.

7 Descriptive Analysis

Thus far the authors have theorized on the existence of these decision constructs. A descriptive analysis of a number of websites accessible to Irish consumers was conducted in order to: (a) determine whether the decision constructs identified are used in practice; (b) determine whether any additional decision constructs need to be added to the list; and (c) examine the constructs in terms of factors such as opacity, clarity and frustration. A total of 25 websites were examined. The websites represented a number of different categories: Travel, Consumer Products, Financial Services, Accommodation, and Entertainment and Recreation with between 2 and 9 websites selected from each category.

A single representative task was chosen for each website (e.g., purchase a book) and each decision point encountered during that transaction was recorded. All decision constructs were examined in order to determine whether they could be categorized according to the construct types identified above. Some websites had multiple decision

constructs, while others had very few. For example, the travel websites had a total of 65 decisions based on 6 websites whereas consumer products had 27 decisions based on 9 websites.

As can be seen in Table 2 the most commonly encountered decision construct is the un-selected opt-in with 69 instances, followed by the un-selected essential decision with 26 instances. Each construct encountered was assessed in terms of: clarity - that is, whether the type of construct would be clear to the user; clarity of the optionality of the decision; clarity of the available options; the level of opacity for the decision construct; and the level of frustration experienced when the construct was encountered. Each of these, other than frustration, was measured on a 5-point Likert scale. Frustration was measured on a 3-point scale. On each scale, the more negative measure was at the low end of the scale (e.g., very unclear) and the more positive measure was at the high end of the scale (e.g., very transparent).

	Measure									
Type of Decision Structure	**Clarity of decision structure 1-5, 1= v unclear, 5 = v clear**		**Clarity of optionality 1-5, 1= v unclear, 5 = v clear**		**Clarity of available options 1-5, 1= v unclear, 5 = v clear**		**Level of opacity 1-5, 1= v opaque, 5 = v transparent**		**Level of frustration 1-3, 1= v frustrated, 3 = not frustrated**	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pre-selected opt-in (n=6)	3.50	.84	4.33	.82	4.83	.41	4.00	1.10	2.83	.41
Un-selected opt-in (n=69)	3.91	.95	4.18	.94	4.17	1.03	4.00	.96	2.86	.43
Pre-selected opt-out (n=9)	3.33	.71	3.88	.64	3.89	.60	3.22	.67	3.00	.00
Un-selected opt-out (n=5)	2.00	.00	2.80	1.64	2.80	1.10	2.40	.89	2.60	.55
Pre-selected essential decision (n=15)	4.00	.76	N/A	N/A	4.47	.52	4.40	.63	3.00	.00
Un-selected essential decision (n=26)	4.40	.58	N/A	N/A	4.14	1.15	4.08	.85	2.88	.43
Must-opt (n=15)	2.33	.82	3.50	1.09	3.73	1.03	3.40	.91	2.27	.46

Table 2: Analysis of Decision Constructs

The mean values for each of the constructs were calculated. Due to the small numbers in certain categories, no detailed statistical analysis was conducted. As can be seen, the

mean values for the must-opt and the un-selected opt-out were lower than the other mean values in the majority of the measures reported above. This finding suggests: the type of construct encountered was less obvious; it was less obvious that the option encountered was optional (this does not apply to essential decisions as they are not optional decisions); the choices available to the user were less clear; the constructs were more opaque; and the use of the construct led to higher levels of frustration than did the other construct types. However, the pre-selected opt-out had a higher level of opacity than the must-opt and was only slightly better in terms of clarity of optionality and clarity of the available options. This finding is not unexpected as the pre-selected opt-out can easily result in the user inadvertently choosing an option if they do not take action to decline it and is, therefore, generally an opaque option. In contrast, even though a must-opt may initially be opaque to the user, the fact that the user is informed that they must make a choice before they can move on to the next page removes some of the ambiguity and opacity in relation to this form of construct. However, as the pre-selected opt-out is the more commonly encountered form of opt-out, the user is more likely to react to this form of decision structure and decline the option than they would for an un-selected opt-out. This finding would suggest it is likely to be clearer and less opaque than the must-opt or the un-selected opt-out, both of which are 'newer', and therefore less familiar, ways of presenting options.

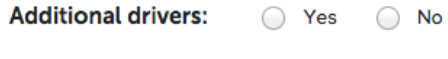
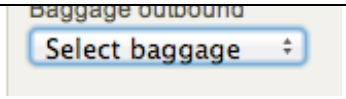
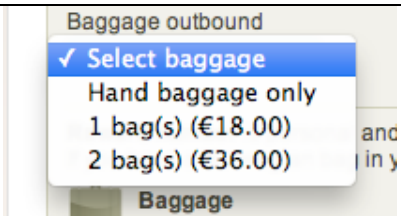
Presentation	Illustration
(a) Must-opt using radio buttons	
(b) Must-opt using a drop-down menu	
(c) Must-opt drop-down menu once clicked on	

Figure 1: Presentation of Must-opts Construct

The opt-ins and the essential decisions had higher mean values for all measures, suggesting: it was more obvious what type of structure was encountered; the choices were clearer; the constructs were less opaque; the use of the constructs led to less frustration; and in the case of the opt-ins, it was clearer that the decision was optional. As can be seen from Table 2, the number of opt-outs, both pre-selected and un-selected is quite small (9 and 5 respectively). Opt-outs are most probably being used less frequently as a result of legislation currently in place, as discussed previously (European Union, 2011). The lead in to the introduction of this legislation may have led to the use of the must-opt as a way to force the user to make a decision regarding an option.

The must-opts were generally presented in 2 different formats: radio buttons with none of the options pre-selected and a drop-down menu where the user selected one of the options (see Figure 1). Of the 15 must-opts identified, 11 were radio buttons and 4 were

drop-down menus. The small number of drop-down menus means it was not possible to compare means in a meaningful way.

A user could be easily forgiven for mistaking the must-opts in Figure 1(a) and (b) for un-selected opt-ins, as there is no indication the user must take action in order to make a decision. In the case of the radio buttons, while it is normal to have one radio button selected, it would be reasonable for the user to presume they were not required to consider the options unless they wished to add a driver. In the case of the drop-down menu, the user could also reasonably presume that no action is required unless they intend bringing carry-on luggage. Once the user clicks on the menu (see Figure 1(c)), it is more apparent that action is required. However, if the user has continued with the interaction without engaging with either of these must-opts, they will have no indication action is required until they attempt to proceed to the next page. At this point they will be informed they must specify whether they wish to add additional drivers or whether they wish to have hand baggage only or checked-in baggage.

The un-selected opt-out also fared poorly in the evaluation. They were all presented using checkboxes and all used rejection framing in the wording (see discussion earlier in section 4 and Figure 2(a) below).

Presentation	Illustration
(a) Un-selected opt-out	☐ Quote valid for 30 days. We would like to email you reminders over this period. If you don't wish to receive these emails please tick here.
(b) Un-selected opt-in	☐ I need wheelchair assistance for this booking

Figure 2: Presentation of Un-selected Constructs

As can be seen, the user is required to tick the box if they do not desire the option presented. The user could easily mistake this for an un-selected opt-in (see Figure 2(b)). The main difference in the two constructs is the way in which the option is phrased. The un-selected opt-out uses rejection framing that requires the user to take action if they do not want the option whereas the un-selected opt-in uses acceptance framing that only requires action if the user wants the option. As the un-selected opt-in is by far the most commonly encountered construct, a hurried user could easily presume that an un-selected checkbox is an un-selected opt-in, resulting in the inadvertent selection of the option.

8 Conclusions

The genesis for the research question was to explore whether firms were acting in good faith in relation to consumer protection regulations. As noted earlier, the European Union has recognised that programming constructs are being used to nudge consumers

to behave in a way that airlines wish and have recently enacted additional legislation that applies to all distance contracts.

This study set out to theorize all possible ways in which essential and optional decision constructs can be presented to a user in an on-line transactional process. From this exercise seven mutually exclusive decision constructs were identified and organized into a taxonomy. The study then proceeded to examine whether the constructs are used in practice and to identify any additional constructs that had been missed in the initial process. The second part of the research successfully identified the use of all the proposed constructs across multiple websites and B2C sectors. No constructs were encountered that were not captured by the taxonomy. The results of this study indicate firms, in most cases, are using obvious and appropriate decision constructs that allow the user to make a quick decision that requires little deliberation, leading to a useable and productive user experience. However, there are a small number of firms using more complex constructs such as the must-opt, the un-selected opt-out or pre-selected opt-in, possibly in order to increase the likelihood of the user selecting the option. These interactions would appear to be counter-intuitive to good user experience design. Additionally, each of the constructs was examined in terms of factors such as opacity, clarity and frustration. While common constructs such as un-selected opt-ins and essential decisions fared well, the must-opt and the un-selected opt-out constructs tended to be more problematic in on-line transactional processes.

Therefore, on certain websites, consumers needs to pay close attention to all decisions encountered if they are to successfully negotiate obstacles placed in their path through the course of a transaction. With the must-opt and other ambiguously presented decisions, it is clear that European Union regulations deal with the notion of optionality inadequately. Some firms will continue to behave inventively as they seek ways of attracting users attention to various ancillary products and services. The theory of cultural lag identified by Ogburn (1957) is a resilient one as firms, in this case, are using new technologies to shape user behaviour in their favour - researchers and regulators take note.

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Identification of Success Factors for Mobile Systems Deployment: *A Method*

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Abstract

The present work determines how to identify (critical) success factors for mobile systems and shows why they are important for deployment of these systems. In comparison to stationary systems mobile systems have a bundle of singularities calling for success factors that have to be taken into account. In order to get a clear view especially on critical success factors for a (defined) mobile system, not only the interdependencies between the single (mobile) system components and tasks but also between the success factors themselves have to be examined. The present work depicts a procedure how critical success factors can be identified and weighted. The assumptions of this work are supported by application in practice.

Keywords: Mobile Systems, (Critical) Success Factors.

1 Mobile Systems and Productivity

Since the late 80´s, the debate about the cost-effectiveness of Information and Communication Technologies (ICT) is consistently resurrected. For example, Solow (1987) stated that the computer age could be seen everywhere except in the productivity statistics, and also Loveman had no doubt that "IT capital had little, if any, marginal impact on output or labour productivity, whereas all the other inputs into production - including non-IT capital – had significant positive impact on out-put and labour productivity" (Loveman 1994). By the current state of scientific knowledge it is accepted that the assumed productivity paradox is due to the lack of appropriate methodologies for the profitability of ICT (see e.g. Brynjolfsson, Hitt and Yang 2002). Especially integrative effects of the systems are not taken into account (Pietsch 1999).

The authors of this paper see also in depth reasons for the shortcomings between ICT investments and their monetary or qualitative outputs: ICT projects are quite often not

as successful and do not support processes in the way they have been ment to do. The reason for this is that these systems are mostly quite complex systems that have to support complex processes. In contrast to robots or machines for manufacturing plants human beings are much more influencing factors. Thus success factors that originate from taking a multi-dimensional, not only technical, approach are the basis for this work. This work strictly distinguishes between ICT and ICS (Information and Communication *Systems*). The term ICS is defined in dependence on systems theory which is an approach that focuses on entities and that postulates that the system itself comes into existence by the relationships among the system components and the resulting interactions. The analysis of structures, reactions and functions allows certain predictions about the expected system behaviour, whereas it does not focus on a separate consideration of each component (see Bartalanffy 1976). Following these reflextions, it becomes clear that while the term ICT is focusing only on technologies that support information exchange and communication, the term ICS comprehends besides the technological components also system-components of human nature that proceed processes as well as their relationships and their properties. These reflections can also be applied to a special type of ICS, i.e. mobile systems (with mobile technologies as a special type of ICT).

In dependence on system theory and expanding the above, the authors propose following socio-technical definition of the term mobile system:

> *A mobile system is a set of mobile technology and human (system) components which are inherently related. They form an entity due to their interactions that is earmarked or task-related and that executes appropriate business processes. The mobile system distinguishes itself in this respect from the surrounding environment. Technical components of mobile systems compass mobile hardware (e.g. PDAs and TabletPCs), appropriate applications as well as mobile operating systems and middleware (if necessary). Additionally, they include wireless communication technologies like UMTS, GPRS and WLAN.*

Mobile systems exist in different forms and have a multiplicity of characteristics. The aim of mobile systems is to integrate mobile processes and workstations into internal, mostly stationary corporate and enterprise-wide process chains and thus to overcome their spatial separation and accompanying information losses.

Critical success factors are a limited number of properties of a system that particularly contribute to achieving the objectives (set by the company). They are defined by (Rockart 1979) as follows: “Critical success factors thus are, for any business, the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organisation”. Relating to a mobile system, the current work defines critical success factors as technical as well as human system parameters that have a significant impact on the economics of the mobile system. System parameters are quantities, whose values characterize the behaviour of the system with a given structure (DIN 1995; Tröster 2011). Following the reflections given above, we define the following research question:

> *How to identify (critical) success factors for mobile systems, taking a multi-dimensional perspective?*

As mentioned before, success factors play an important role for the economic efficiency of mobile systems as they are system parameters which influence the behaviour of a

system. In order to predict the behaviour of a system, it is necessary to identify critical success factors. As result of an explorative literature research on success factors it became clear that most of the publications that are discussing success factors in the context of mobile computing are focusing on mobile commerce and thus on the external orientation of mobile business. They mostly do not take into account the internal orientation which is the central aspect of this work. This paper proposes a methodology for the identification of success factors for the deployment of mobile systems. The following section provides further background on the singularities of mobile systems which form the basis for the identification of success factors. We build a framework for the identification of critical success factors for mobile systems in section 3. Through a case study we judge the validity of the framework in section 4. We end our paper with summarizing our results, and providing implications and anticipated further research.

2 Singularities of Mobile Systems

Mobile technologies promise an increased efficiency of business processes by the spatial and temporal decoupling of communication and information processes (Scheer et al. 2001). The ubiquitous access to relevant information via mobile technologies enables new ways of working, e.g. by transforming unused waiting times on airports into productive working hours. At the same time mobile systems face a bundle of challenges and hurdles like security issues (Kołodziej et al. 2013) or the absence of data networks due to their singularities. Comparing mobile devices and stationary computers, the following main differences become apparent: First, mobile devices are much smaller than desktop computers and second, they are portable (in the meaning of that they can be used when being carried around which in turn implies that a screen is integrated). The singularities of mobile devices are thus a result of the size of devices and the fact that the devices are portable. At the same time, the user is not bound anymore to a stationary working place – s/he becomes mobile by using portable devices. Table 1 shows the the relationship between the three main distinguishing features and flashlights resulting singularities of mobile systems:

Distinguishing feature	**Resulting Singularity**
Size	• "One-piece-system" (often no keyboard, no external (big) screen, no mouse) • Screen size • Battery size -> low capacity • …
Portability	• Due to environmental issues (sunlight, dust, rain, …): Ruggedized, sunlight-readable display… • Security problems (often stolen / forgotten, …) • Connection to wireless networks • Battery as only energy supply • New kinds of human-device-interaction • …
Mobility	• Distances to be bridged (by walking, driving, …) • Adaption to new environments • Distraction (noise, weather, visual impressions, …)

	• Media discontinuity • …

Table 1: Singularities of mobile systems

Despite intensive research, mobile devices still face many restrictions (see also Schach et al. 2007; Lonthoff & Ortner 2007) due to their size. For example, the input options of mobile devices differ substantially from those of stationary PCs. While the latter ones have a large and easy to use keyboard, the keyboards of mobile devices are – with exception of the keyboards of notebooks – mostly incomplete and in many cases unhandy. Meanwhile, most of the keyboards even do not exist – the latest generations of mobile devices have virtual keyboards that are only shown if the device is on. Although new developments promise to enhance the usability of these kinds of keyboards, they will not achieve the comfort of traditional keyboards in a long term, especially regarding writing speed.

The usage of mobile devices is hindered by the relatively small displays, which have limited facilities for the reproduction of contents (Rawolle, Kirchfeld and Hess 2002). For this reason, the development of mobile applications is experiencing a peak: In contrast to the earlier development trends, in which traditional applications (developed for stationary devices) are simply adopted to the restrictions of mobile devices, meanwhile special applications are designed and developed specifically for mobile devices (so called mobile apps) and take into account all peculiarities of these devices.

Due to the small battery size the battery capacity is still quite low. Taken the hitherto existing development, it can be assumed that the battery capacity will increase by only a few percent in the coming years. This fact, on the other hand, requires increased energy efficiency of mobile devices and corresponding applications; for example, by the reduction of electricity consumption (e.g. of the display and the processors). On the other hand, with decreasing size, also the computing capacity is decreased. In conjunction with inefficient main storage mobile devices have worse information processing capacities compared to the capacities of stationary ICT. This fact must be taken into account when developing mobile applications, which have to cope with the mentioned restrictions of mobile devices (see also Kornmeier 2009).

Mobile devices are continuously transported, thus they have to be quickly operational. This in turn requires a small size and minimum weight of the devices with maximum robustness. A real challenge is the ambient light: Although sunlight-readable displays are available, images and texts are less visible than in closed rooms. Many devices have an automatic recognition of ambient light and adjust accordingly the backlight, reading the display in bright sunlight is very tiring for the eyes. Additionally, mobile devices are hardly usable in rain or dusty areas. Ruggedized versions of many mobile devices already exist, nevertheless it is a challenge for the users to handle them during these aggravations.

Despite a variety of security mechanisms, data security in mobile applications and devices is low compared to stationary computers. The reason therefor is not because of lacking possibilities and options, but rather in the negligence of users, who bypass security mechanisms for convenience. As mobile devices are lost or stolen much more frequently than their stationary counterparts (see also Frolick & Chen 2004; Gluschke 2001; Day et al. 2000), the security issue is not yet solved in the area of mobile technologies satisfactorily. The same applies for the security of data transfer: Many

users log into unsecure wireless networks without taking into account all the risks they are facing. Especially Bluetooth is known for severe security problems, but even the security of data transfer via wide area networks is lagging behind the transfer via LANs. Thus, mobile systems deployment also has to account for security issues, e.g. by integrating the ROSI method (Return of Security Investments).

In contrast to stationary computers that are always connected to the same network, data transmission to mobile devices is carried out via many different, partially heterogeneous networks which can be based on different standards. In addition, wireless data transmission rates are still mostly much lower than cable-based transmission. Transmission problems can be caused by fluctuating bandwidth or insufficient network coverage and can hinder continuous work with mobile devices (Gerpott & Kornmeier 2004). The quality of the "interface" air in relation to reliability and quality of the transmission and to availability of wide area networks is subject to many fluctuations. Slow or interrupted connections represent disruptive factors and may reduce the quality of service greatly. The accessibility of required data anytime and everywhere is of key importance in order to reach the maximum possible efficiency of mobile systems.

As already mentioned, in contrast to stationary ICT mobile devices are often disconnected to electric supply networks, their only power supply is their battery which has in most cases still a low capacity. The impacts of the latter restriction have been discussed before, so no further explanation is needed.

The authors regard mobility in the context of business processes: Mobile business processes differ from stationary business processes significantly by the spatial distribution (of process steps) which is mostly unknown in advance and the mobility of people involved in the process (see also Köhler & Gruhn 2004). While an employee, who is working stationary, can focus his senses on an application or information, a mobile worker is distracted by his surroundings and has to adapt often to new environments. Additionally, in many cases he has not both hands free, which imposes additional usability requirements on the keyboards and the input methods respectively (Wallbaum & Pils 2002).

While bridging distances employees are in motion – which again requires more attention and exposes the mobile workers to multiple distractions like ambient noise or visual impressions.

Above singularities and restrictions have to be taken into account when identifying (critical) success factors of mobile systems, because they may affect the efficiency of these systems negatively. In addition, all interdependencies between the single components of a mobile system have to be considered. Questions that have to be answered are for example: How do the single technical components like mobile devices, applications and data transfer affect each other – and what are success factors that reduce negative effects? How can the most important component of a mobile system – the human being – be affected by the technical components as well as by the surroundings when proceeding his tasks and how can these influences be minimized?

3 A Method for the Identification of Critical Success Factors for Mobile Systems

Back in the 80s it was recognized that the inobservance of human and social factors may contribute to the failure of technically mature and successful systems (Horvath 1988). For this reason, the identification of critical success factors (CSFs) that are not limited on technical factors (so-called system criteria) is of particular importance for the implementation of ICS and thus also for mobile systems. The work of Ward & Peppard (2002) is considered as a profound and good starting point for the discussion of success factors, as they take a multi-dimensional approach based on Kaplan & Norton's (1996) balanced scorecard (Ward & Peppard (2002), p. 206). The findings of Ward & Peppard (2002) build the basis for the authors´ method to identify critical success factors for mobile systems from a multi-dimensional perspective. Nevertheless, Ward & Peppard (2002) proposed methodology does not take into account the singularities of mobile systems which is crucial for the successful deployment of mobile systems.

Business processes are a central object of observation within organizational transformations. The terms "process" and "business process" are used synonymously in the present work; they are very often discussed in the literature and partially defined quite differently (see e.g. Allweyer 2005; Becker & Vossen 1996; Davenport 1993, Hammer & Champy 1993). The present work defines a process according to Richter-von Hagen & Stucky (2004, p. 23): “A business process is a sequence of activities or tasks that aim at creating a product or a service. It is started and ended by one or more incidents. An organizational structure forms the basis of all processes.”

3.1 Defining Success Factors of Mobile Systems

Due to the fact that each single project is unique, there can be no standardized procedure for the identification of success factors that are related to this single / special system. Rather a project-specific identification of so called system-related success factors has to be proceeded that takes into account the users (user profiles) being involved in the mobile process, the tasks that have to be fulfilled and the targets that were set by e.g. the management. Additionally, a project-specific weighting of the success factors is necessary in order to take into account all specific conditions (see also Walter 1995, p. 285, he explains the topic „Hierarchy of success factors” in detail).

The authors propose the following procedure for identifying critical success factors (figure 1):

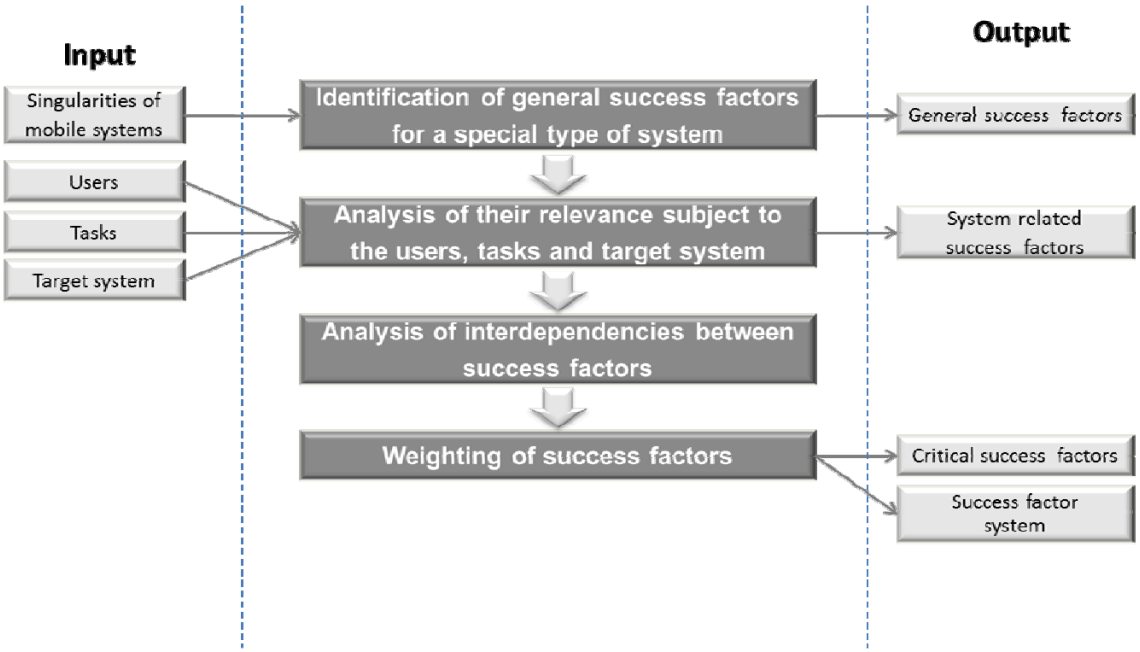


Figure 1: Method for the identification of success factors

In the first step, general success factors for a special kind of mobile system (e.g. a mobile maintenance or a mobile customer relationship system) are identified. This can be done by a.o. singularities of mobile systems as shown in Table 1. As a result a "bunch" of general success factors for a special type of system is identified. In order to find out which of these general success factors are really relevant additional steps are necessary. The relevance of success factors is subject to user characteristics, tasks and targets/goals of the business processes which include mobile technology.

For relevance determination the Task-Technology-Fit-Model by (Goodhue & Thompson 1995) can be used. It allows statements about the suitability of technologies to address particular tasks that are conducted away from stationary workplaces. Meanwhile, this model has been adapted to the needs of mobile information systems by (Gebauer et al. 2005). Their Task-Technology-Fit-Model is based on the general theory of Task-Technology-Fit by (Goodhue & Thompson 1995) and the specific theory of Task-Technology-Fit for group collaboration support systems by (Zigurs & Buckland 1998). It is defined as "a three-way match between the profiles of managerial tasks (operationalized by difficulty, interdependence and time-criticality), mobile information systems (operationalized by functionality as notification, communication, information access, and data pro-cessing; form factors; and location-awareness), and individual use context (operationalized by distraction, movement, quality of network connection, and previous experience)" (Gebauer et al. 2005). As result of the Task-Technology-Analysis success factors most influencing the tasks can be identified.

In the next step interdependencies between success factors are analysed. The authors suggests the Analytical Hierarchy Process (AHP) by Saaty (1980, 1996)(see also Ahlert (2003), p. 36ff.) as starting point for the analysis of interdependencies. As a result of this analysis it becomes apparent which success factors have positive or negative effects on other success factors, and which success factors are neutral. Success factors with a positive influence on other success factors should get a higher importance than factors with a neutral or negative effect. The reason for this is that they contribute more to the

overall success of the project and thus shall get a higher weighting. On the one hand, weighting is necessary to assign the appropriate meaning to every single critical success factor; on the other hand it is needed in order to get a better valuation basis for the different alternatives. All alternatives must be examined to what extent they take into account success factors.

The following chapter will present some of the main results of practical application and by doing so it will validate the importance of success factors for deployment of mobile systems.

4 Validation: Application in Practice

In the previous sections we have created a method for the identification of critical success factors; this is considered important for mobile systems – at least in theory. This has motivated the authors to evaluate this proposition in several real-life projects in the chemical industry at German Global Player companies, all focusing on the support of daily tasks of maintenance engineers by mobile technologies. Describing every single objective and identified success factor even for a single project would go beyond the scope of this work. Thus the following will only depict the key findings that are important to prove the importance of defining success factors in accordance to the tasks and the components of a mobile system that was deployed in one of the companies. This company can be sketched as follows (benchmark data): It was a Global Player in the chemical industry with more than 100.000 employees. The maintenance management system was planned for a maintenance engineers group that was working under difficult conditions (explosion prevention) at a German plant.

Main objective of one of the projects on the task level was to:

- Minimize errors occurring during gathering data (mainly tasks reports): Data have to be collected until the end of shift by the respective maintenance engineer and to be entered directly into the mobile devices.
- Minimize errors due to unclear task definitions (e.g. sometimes it is not definitely clear which machine has to be repaired, esp. if two identical machines stand by each other)
- Reduction of the general information loss: Important information should not be retained in personal notepads, but it is accessible to all in a central system. Thus data and information do not get lost, esp. when employees with long-time experience leave the company
- Documentation of all steps of the maintenance (proof documentation): All individual steps of the maintenance tasks that require verification should be individually signed and verified.

Main objective of one of the projects on the company level was to:

- Be able to interpret the data (measurements, test results, etc.): All data should be stored in a single system. The system should be able to analyse the data according to customer requirements.
- Improve control (with respect to activities and documentation), especially accelerate control: It has to be ensured by reading bar codes or RFID tags that the

maintenance engineer was actually at the object to which the maintenance task is assigned. Incomplete documentation must be immediately identifiable.

All these objectives have one target in common: To save money due to reduced processing time, less errors and due to longer life-cycle of the machines.

First, general success factors for mobile maintenance systems were determined with the support of a profound literature search (e.g. Birkhofer et al. 2007; Brodt & Verburg 2007; Gebauer & Shaw 2004) and as a result of personal professional experience of the authors. Table 2 shows some general success factors for the chosen project as examples:

Mobile Maintenance System singularity features	**General success factors**
Portability	• Robustness (ruggedized) • High security in terms of explosion control • Size (subject to tasks) • Weight (maintenance engineers have to carry with them a bunch of tools)
Mobility	• Reach • Security • Stability • Performance
Size and other	• High usability • Always on • Simple reporting

Table 2: General success factors for mobile maintenance management systems

The next step was to identify main tasks that have to be supported by mobile technologies and the involved user "types", some examples are shown in the following table 3:

Tasks	**Maintenance engineer**	**Decision maker**
Documentation of tasks & activities	x	
Recording of detected malfunctions, problems etc.	x	
Analysis of data		x
Control		x

Table 3: Tasks of different kinds of employees / roles

In order to find out the relevance of these general success factors for mobile maintenance management systems for a special kind of such a system a task-technology-fit analysis was proceeded. The task-technology-fit analysis for mobile systems by (Gebauer, Shaw and Gribbins, 1995) is based on the general theory of task-technology fit by (Goodhue & Thompson, 1995) and the specific theory of task-technology fit for systems with focus on the support of group collaboration by (Zigurs and Buckland, 1998). The main results of the task-technology-fit analysis including some other aspects are depicted in the following table 4:

Tasks	Maintenance engineer	Decision maker	Mobile device	Connectivity	Security level (confidentiality)
Documentation of tasks & activities	x		PDA	continuous	Low
Recording of detected malfunctions, problems etc.	x		PDA	continuous	Medium
Analysis of data		x	Tablet / Notebook	temporary	High
Control		x	Tablet / Notebook	temporary	High
…..		x			

Table 4: Results of the tasks-technology-fit-analysis

Already in the table above it becomes clear, that the tasks and requirements concerning mobile technologies differ widely between the different employees / roles. This allows the assumption that also the success factors differ in many ways. Table 5 shows some of the main success factors analysed during the above mentioned project:

Tasks	Maintenance engineer	Decision maker	System-related success factors
Documentation of tasks & activities	x		• Minimum size & weight of device • Always-on connectivity • Usability of device and programs • Ruggedized device • Explosion prevention and protection class II • No “pen” needed (usable only with fingers)
Analysis of data		x	• High security / privacy • Speed of processing data • High resolution / big display • Existence of a well-usable keyboard

Table 5: Success factors subject to different tasks and roles

In order to finish the definition of system-related success factors, the influence of the general success factors on the targets set was analysed which is shown in table 6.

A profound discussion of table 6 would go beyond the scope of the present work. One thing that becomes obvious is that the always-on connectivity of mobile devices and the usability of devices and applications has a strong influence of most of the targets and should thus be regarded as a critical success factor (Nielsen 1994). The same applies to the existence of a well-usable keyboard. But we also see that for some of the tasks it is of key importance that no pen shall be needed which means that the entry of data should be feasible by using only fingers. As a result only devices can be chosen that support this kind of data entry. The weighting of critical success factors is proceeded as last step. The critical success factors can be weighted according to the Analytical Hierarchy Process (Saaty 1980; Saaty 1996) mentioned above.

	Effect on target…						
System-related success factors	**Minimizing errors (gathering data)**	**Minimizing errors (task definitions)**	**Reduction of general information loss**	**Documentation of all steps**	**Data analysis / interpretation**	**Improve control**	**Critical**
Minimum size & weight of device	none	none	medium	medium	none	none	**no**
Always-on connectivity	medium	high	high	medium	none	medium	**yes**
Usability of device and programs	high	none-medium	high	high	medium	none	**yes**
Ruggedized device	none	none	medium	none-medium	none	none	**no**
Explosion prevention and protection class II	none	none	none	none	none	none	**no**
No "pen" needed (usable only with fingers)	high	none	high	high	none	none	**yes**
High security / privacy	none	none	none-medium	none	medium	none	**no**
Speed of processing data	none	none	medium	none	medium	medium	**no**
High resolution / big display	none	none	none	none	high	none-medium	**no**
Existence of a well-usable keyboard	high	none-medium	high	high	medium	none-medium	**yes**

Table 6: Influence of success factors on targets

Legend	
None	System-related success factor x does not influence the achievement of the target y. E.g. The minimum size and weight of a device have no influence on the achievement of the target "minimizing errors during gathering data"
Medium	System-related success factor x does influence the achievement of the target y. E.g. The always-on connectivity does influence the achievement of the target "documentation of all steps" (because if the device is not always connected, data can be lost more easily).
High	System-related success factor x does strongly influence the achievement of the target y. E.g. The usability of device and programs does strongly influence the achievement of the target "minimizing errors during gathering data" (because the easier an application is to be used the less errors are made during the insertion of data).

The described project shows the importance of identifying and taking into account success factors as well as tasks and the targets set: If a decision maker would have to proceed analysis and control tasks by using a PDA (personal digital assistant), it would not matter how excellent all other components are – he would not even rudimentary be able to be as productive if using a tablet or notebook. Thus the economic efficiency would be greatly decreased. Traditional approaches do not take success factors in this way into account.

5 Conclusions and Implications

This work has depicted the deficiency of existing approaches for the identification of success factors for mobile systems by identifying singularities of mobile systems. Though used meanwhile in almost all industries by all kinds of employees it still remains unclear if such a system can be deployed successfully and thus if it is profitable or not. Chapter two has shown particularities of mobile systems and thus the differences to desktop-based ICS. A method for the identification of critical success factors for mobile systems was presented in chapter three. It was shown that success factors play an important role in the deployment of such systems. Chapter five validated the findings through practical application. Here the interdependence of success factors and their relation to tasks, objectives and system components became clear.

The present work has shown the importance of not only focusing on the abilities of technologies while evaluating an ICS and mobile system respectively. Especially the "system component" human being affects exceptionally the efficiency of a system by his behaviour, his requirements on the technical components and his tasks – it becomes clear that success factors play an important role in this overall structure. Additionally, also targets set by decision makers have to be taken into account when defining success factors.

Our method can also be used to evaluate the effectiveness of mobile systems: which success factors are already taken into account, and which can be added to provide for a strategy for more effectiveness of the mobile system. Further research is focussing on a multi-dimensional evaluation of mobile systems.

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Adoption of Mobile Business Solutions and its Impact on Organizational Stakeholders

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Abstract

Companies which create mobile business solutions require users to adopt them in order to create value for the organization. However, when mobile devices enter the workplace, companies themselves face an adoption process, in having to integrate these devices into the existing IT infrastructure. In this research project, we conducted a focus group with subsequent expert interviews, following a grounded theory approach. We identified seven drivers of mobile business solution adoption in an organizational context: mobile user experience, social influence, time to market, security, workplace flexibility, information availability and process mobilization. While these factors facilitate adoption for some users, they create challenges for or require strategic decisions from other organizational stakeholders, such as internal users, operating departments and corporate IT. The adoption factors and implications for organizational stakeholders were compiled in a conceptual framework.

Keywords: Mobile Enterprise, Adoption, Mobile Business Solutions

1 Introduction

If employees do not actively use a provided mobile business solution, the company has invested in a channel which will run dry. Therefore, facilitating the adoption of mobile business solutions is an important challenge for organizations. Companies also experience employees demanding mobile devices as state of the art instruments in the workplace and use their personal devices and applications for business purposes. So who has to adopt enterprise mobility – the employees or the organizations themselves?

Going mobile has great potential for enterprises, but has also changed common practice in corporate information technology, in terms of security challenges or innovation

management (Sammer, Brechbühl, & Back, 2013). Therefore, CIOs need to manage the change process and in this context, the adoption task is crucial in order to generate business value from mobile IT (Stieglitz & Brockmann, 2012).

Technology innovation processes have always required users to adopt new solutions and practices (Zaltman, Duncan, & Holbek, 1973). However, with mobile devices, there is another important concept to consider, namely the consumerization of IT. In contrast to other IT innovations, mobile business solutions are not always forced upon employees, but particularly smartphone and tablet devices enter the workplace through users who already use such devices privately and then start using them for business purposes (Harris, Ives, & Junglas, 2012).

Accordingly, the adoption process of mobile business solutions in organizations is twofold. On the one hand, when required to use internal mobile business applications individual employees are influenced by various factors, such as ease of use, social influence by their friends or other variables like age or habit (Venkatesh, Morris, Davis, & Davis, 2003). On the other hand, the fact that employees bring their own mobile devices and consumer applications to work, requires organizations to adapt traditional IT practices and adopt the employee's mobile habits. We assume that the factors facilitating adoption within an organizational context might differ from those in a consumer environment. Also, we wish to explore how the adoption of mobile business solutions impact on organizations. Therefore, we propose the following research questions:

RQ (1): What are the main drivers of mobile business solution adoption in a corporate environment?

RQ (2): What implications do these drivers have for different organizational stakeholders?

2 Theoretical Background

The topic of adoption has been widely investigated in past research. There are many theoretical models, such as the Technology Acceptance Model (TAM) (Davis, 1989), Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), Diffusion of Innovations (Rogers, 2003) or the Theory of Planned Behaviour (Ajzen, 1991).

However, these models investigate factors relating to individual adoption. When applied to adoption in organizational contexts, these models contain flaws, fail to cover all relevant issues, or to explain phenomena caused by organizational factors (Gallivan, 2001; Hameed, Counsell, & Swift, 2012). Individual adoption drivers and inhibitors are still applicable in organizational settings, but additionally, individual adoption influences other stakeholders, and challenges the status quo of common practice. IT-induced organizational changes are demanding, particularly when individual users do not behave as expected (Venkatesh & Bala, 2008). Some research has addressed this issue and attempted to develop theoretical and conceptual frameworks to explain organizational adoption factors.

Oliveira and Martins present an extensive literature review for IT adoption models at firm level and discussed diffusion of innovations and technology, organization and environment framework in detail (Oliveira & Martins, 2011).

Frambach and Schillewart have developed a framework which includes the individual adopter level, as well as the organizational level. According to these researchers, the adoption process is twofold and the implementation process within an organization is different from the organizational adoption decision (Frambach & Schillewaert, 2002)**.**

Gallivan discusses how the adoption of information technology in an organizational context is imposed on people, since decisions are made by authorities and then implemented on the individual user (Gallivan, 2001). While this holds true for some situations, we argue that particularly for the adoption of mobile devices, the effect of consumer devices being brought to the workplace is equally important.

Hameed et al. argue that despite the fact that adoption has been widely investigated, knowledge on IT adoption for organizations is still limited, since existing work only discusses the adoption process until the innovation is acquired, but does not explore whether the innovation is permanently and effectively integrated into the organization. Therefore, the authors combine previous adoption models in a new conceptual framework which covers the full adoption process through the various implementation stages (Hameed et al., 2012).

Laumer and Eckhardt focus on why people in organizations reject technologies. The authors build a unified theoretical framework and their research indicates that technology resistance can be explained by their affective, behavioral and cognitive resistance to change, as well as personal trait resistance (Laumer & Eckhardt, 2010)

Since the existing research on organizational technology adoption presented in this chapter agrees on the fact that there is a lack of research with regard to adoption in a business context and in particular does not discuss the specific characteristics of mobile innovation, the aim of this research is to explore adoption factors and their implications for internal mobile business solutions within an organizational context.

3 Methodology

In order to understand the current organizational challenges with regard to adoption, we adopted a grounded theory approach. We first collected insights from a focus group and then strengthened them with expert interviews, after which we inductively analysed the collected data (Punch, 2013).

As a first step, we conducted a focus group with eleven managers (e.g. business unit leaders) from different industries (healthcare, banking, commerce, software, transportation, IT consulting and media) in order to identify the challenges that have arisen in their organizations from the implementation of mobile IT. The main identified challenge is the adoption of mobile business solutions as a critical prerequisite for the success of these solutions. The factors mentioned by the participants as facilitating adoption were gathered and discussed in a world café approach, with small group rounds for each hot topic. These results provided an initial idea on how to cluster the outcomes of the subsequent interview phase.

We then conducted additional expert interviews in seven organizations currently dealing with mobile business solutions. Interviews were conducted with mobile decision makers from IT, as well as operating departments from different industries (commerce, logistics & transportation, healthcare, insurance, software, IT consulting). The interview style was semi-structured. The interview guideline covered questions on (1) context

(individual's role and mobile solutions used in the organization), (2) individual adoption drivers, (3) individual adoption inhibitors, (4) organizational adoption drivers and (5) organizational adoption inhibitors. Questions were adapted according to the participant's background and the course of the interview. Interviews were then transcribed following a pragmatic approach suggested in Halcomb & Davidson (2006). During the interviews, notes were taken that covered all issues and aspects mentioned in the interview. After the interview, these notes were reviewed and amended using an audio recording of the interview.

In order to answer research question (1), the transcribed interviews were then coded. In total, 81 different aspects were discovered, which could be clustered into seven adoption factors. In order to answer research question (2), for each of these factors, the relationships and influences on the different organizational stakeholders were explored.

4 Results

Within an organizational context, the introduction of mobile business solutions affects various stakeholders. As the most relevant stakeholders, the participants mentioned internal users, operating departments and corporate IT. The following sections explain the seven adoption factors identified in the interviews.

4.1 Mobile User Experience

The cluster "mobile user experience" contains three main aspects:

The first aspect is an **easy-to-use use interface design** of the mobile solution. This not only relates to visually attractive design elements, but also to usability, user experience and interaction patterns. The interview participants unanimously mentioned that an easy to use interface is fundamental to users acceptance of a solution.

"When I get a solution which is only based on the underlying IT system, and the object model defines how the interface looks, this leads to dissatisfaction." (Head of Mobile Unit, IT Consultancy)

The second aspect that was mentioned is the **touch interaction paradigm**. Business applications are usually optimized for keyboard and mouse interaction, but as touch devices such as smartphones and tablets become more popular, the touch interaction paradigm is increasingly relevant for workplace interaction as well. This refers to the interface design of business software, as well as usability of hardware devices.

"The user has to get out his laptop and boot it, but he really just wants to press the power button on his iPad and start typing" (Head of Mobile IT, Healthcare)

The third aspect revealed in the interviews is the beneficial use of **global and standardized interaction patterns**. This factor is particularly relevant to global organizations, in which mobile business solutions are rolled-out to a great number of users. Solutions relying on standardized interaction patterns that are used worldwide have an advantage over proprietary solutions. Global and standardized interaction patterns help users to quickly adopt and use solutions without dedicated training.

"This was released to 3500 people without training. We offered training, but nobody needed it." (Head of Mobile CM, Insurance Company)

All aspects related to the "Mobile User Experience" cluster do indeed greatly influence adoption for users, but have no direct impact on other organizational stakeholders. This factor can be regarded as a prerequisite to the adoption of innovative mobile solutions. Previous research has shown that users who encounter discomfort in the use of mobile devices, may abandon them or create workarounds in order to handle them (Zamani, Giaglis, & Pouloudi, 2013).

4.2 Social Influence

The cluster "social influence" contains factors that can facilitate adoption for internal users, and also for operating departments. The concept of social influence indicates that the behaviour of individuals is influenced by that of others. In the technology acceptance models, the concept of norm is important where the user believes that others expect him or her to use this technology (Venkatesh et al., 2003)

The interview participants mentioned that the **opinions and experiences** of other users are a valuable reference point. Features known from app stores, such as ratings and detailed reviews on applications are important for users in a business context as well. Also, personal feedback on applications, such as having a mobile solution presented by colleagues or the boss, has a positive effect on adoption.

"I noticed that when I show the app to somebody, people think it's awesome and they will tell someone else. This works better than the usual means of communication" (Lead Mobile Services, Logistics and Transportation Company)

One important factor mentioned in the interviews, was that mobile devices, especially tablet devices, are required by users to enhance their **image**, especially when interacting with clients. Social influence and image are factors that apply directly to the actual user of the system, but also to operating departments, as the initiating units for mobile innovation.

"Often it's just a prestige thing and the reason to buy an iPad, but when you look closer at the real uses you wonder what the advantage is." (Head of Mobile IT, Healthcare)

This result has also been evident in other technology adoption research. The factor image, defined as the "degree to which using a specific systems is perceived to enhance one's status in a social organization", is considered a separate factor, since it is one of the strongest influences (Moore & Benbasat, 1991).

4.3 Time to market

The interview participants mentioned different factors which can be subsumed to the cluster "time to market", that facilitate adoption for the operating departments, but at the same time cause challenges or problems for the corporate IT. A rapid implementation of mobile business solutions is considered extremely important and a key advantage for operating departments. Particularly mobile business apps can be comparably cheap and fast to implement for operating departments.

"These are very moderate investments, apps for less than CHF 200.000, implemented in less than 6 months […] this also convinces the management." (Head of Mobile CM, Insurance Company)

However, these mentioned investments do not include maintenance costs and infrastructure changes. IT departments are also considered too slow from the operating department's point of view. Therefore, operating departments often turn to external vendors in order to have mobile solutions realized faster. Cloud services are in fact easier and more readily available, but at the same time challenging to integrate into an existing IT infrastructure.

"For example, when you want a central communication platform, you don't want to wait six months until it's implemented" (Mobile Product Manager, Software Provider)

Within a larger organization, the speed of implementation of a mobile project can serve as a competitive advantage for the operating department. Interview participants reported cases where once a mobile solution had been developed, it served as a blueprint for other solutions in other countries or business units.

"It's not only a mobile project, with it we decide internally which IT system will be used. There were two competing systems with product data and the one that the mobile solution pulled its data from won." (Head of Mobile Unit, IT Consultancy)

4.4 Security

Security is a facilitating factor for operating departments, which requires strategic decisions from corporate IT, but at the same time, the results can put pressure on the users of the system. Without protecting internal or customer data, operating departments will not be able to use mobile solutions. IT departments therefore need to define measures to achieve this protection from a technological perspective. For instance, the interview participants mentioned that devices used for business purposes need to be encrypted and secured by an additional PIN. Especially when the user is using personal devices, this forms an extra barrier.

"People get pretty angry when IT says - you can use your own device, but we will restrict functionality, put a virus scanner on it and you need an 8-digit PIN [...] This is a real problem when you just want to write an SMS on your own device and have to type in an 8-digit PIN" (Head of Enterprise Mobility, IT Consultancy)

4.5 Workplace Flexibility

The cluster "workplace flexibility" is one of the strongest facilitating influences for users of mobile business solutions, but creates challenges for the Corporate IT department.

Mobile devices have become an important expression of a modern and individualist lifestyle. Employees who frequently use mobile devices also tend to bring them to work or expect their employer to provide a mobile workplace.

"This is an expression of individuality, people like to express themselves at work; they like to be comfortable [...] modern and mobile. It's almost a status symbol."(Head of Enterprise Mobility, IT Consultancy)

This is also connected to the fact that the workplace is nowadays less tied to a fixed office, and by using mobile devices, users can work from anywhere.

This does not only apply to hardware, but also to software applications. For example, participants mentioned the use of file sharing applications like Dropbox, in a business context, even if comparable proprietary solutions exist for businesses.

"You want to use the devices that you know from your spare time. That's why touch functionality is becoming more important in business applications […]. Also younger people prefer to use chat, like WhatsApp, rather than e-mail." (Mobile Product Manager, Software Provider)

The integration of personal devices into a corporate IT landscape generally proves to be challenging. Devices have to be manageable for corporate IT when used in a business context, meaning they need to be able to block devices or delete data, in case a device is stolen. On the other hand, personal devices in the workplace can reduce some IT service efforts, since with personal devices, users are familiar with the administration of hardware and software themselves and therefore require less IT-support.

4.6 Information availability

Having important information available in a mobile context is one of the main factors that aids in implementing mobile business solutions.

Mobile business solutions make important information accessible anywhere. This is particularly important for employees in the field who do not have a fixed desktop workstation, like sales personnel or customer service. In some cases, people working in a mobile context need to have their hands free or operate a mobile device at the same time as other devices, which has also been mentioned in research (Kristoffersen & Ljungberg, 1999).

"They have a driver app which makes their life easier. There are lots of documents they have to carry around, they have to be updated. This gets checked by the authorities and now we combine this on an iPad." (Lead Mobile Services, Logistics and Transportation Company)

Mobile and digital information enables personalizing information for the specific user's needs and requirements. This means that current user profiles need to be reworked, but the relevance of information and therefore the usability of the solutions will be higher.

The convenience of the digital format plays an important role. Information can easily be updated and synchronized on demand. Also, the use of digital information instead of paper provides a physical advantage:

"What we also see is that for a trip which takes up to two weeks, you have an iPad which weighs 400gm. In the past, our colleagues reported that they travelled with 13kg of paper." (Head of Mobile CM, Insurance Company)

This adoption factor is critical for operating departments, as well as for users. Therefore, operating departments need to define mobile use cases and make strategic decisions about what information is critical.

"Some demands just don't make sense for a mobile use case. [...] I don't want an SAP screen with lots of entry fields on a mobile device" (Head of Mobile IT, Healthcare)

In order to provide relevant information, mobile business solutions need to have access to internal systems such as the intranet, internal databases or collaboration spaces. However, from an IT perspective, this might not be easy to implement.

"With the iPad it is not possible to access our intranet, for example. Authentication is based on Microsoft certificates, so this does not work for Android and iOS." (Head of Mobile IT, Healthcare)

For corporate IT departments, this would mean that they need to ensure cross-platform interoperability of information. Ideally, content is stored in one system and can be syndicated through multiple channels. However, this can require a different infrastructure and a content management system that needs to be maintained and must be scalable, so as to incorporate more platforms in the future.

4.7 Process Mobilization

Not only does information have to be available on mobile devices, but operating departments need to consider the entire workflow in order to make processes easier for users and not create additional complexity. IT departments face the challenge of building the respective infrastructure.

For internal users, a mobile business solution can enhance productivity by enabling new features, when the hardware functionality of a mobile device, such as camera or GPS, that had not been available before, is taken into account. In this case, mobile solutions enable new process steps, which may simplify existing processes.

"If I wanted to add a new client into the system, it is very complicated [...] I can't do this myself as client manager. Today, I take the business card, I take a picture, there is an automatic partial matching, I just have to add three values and the client is then automatically saved in the backend and accessible for everybody." (Head of Mobile CM, Insurance Company)

However, in order to ensure enhanced productivity through mobile business solutions, these processes need to be integrated into existing workflows. Mobile business solutions can enhance process efficiency, but only if processes are entirely mobilized and not redundant to or placed top of existing workflows.

"*One client wanted a mobile solution for his sales staff, but when they got back to the office with their mobile devices, they had to continue in the paper process"* (Head of Mobile Unit, IT Consultancy)

5 Discussion and Implications

The results from these interviews show, that there are several factors that facilitate the adoption of mobile business solutions in organizations. The adoption factors that emerged have an influence on single or many of these stakeholders. Adoption factors can either *influence the adoption* of mobile business solutions for one specific stakeholder, they can *require a strategic decision* or they can *create a challenge*.

5.1 Conceptual Framework

The adoption factors and the organizational stakeholders were placed in a conceptual framework (Figure 1) in order to build a comprehensive model and understand the relationships between them (Miles, Huberman, & Saldaña, 2014).

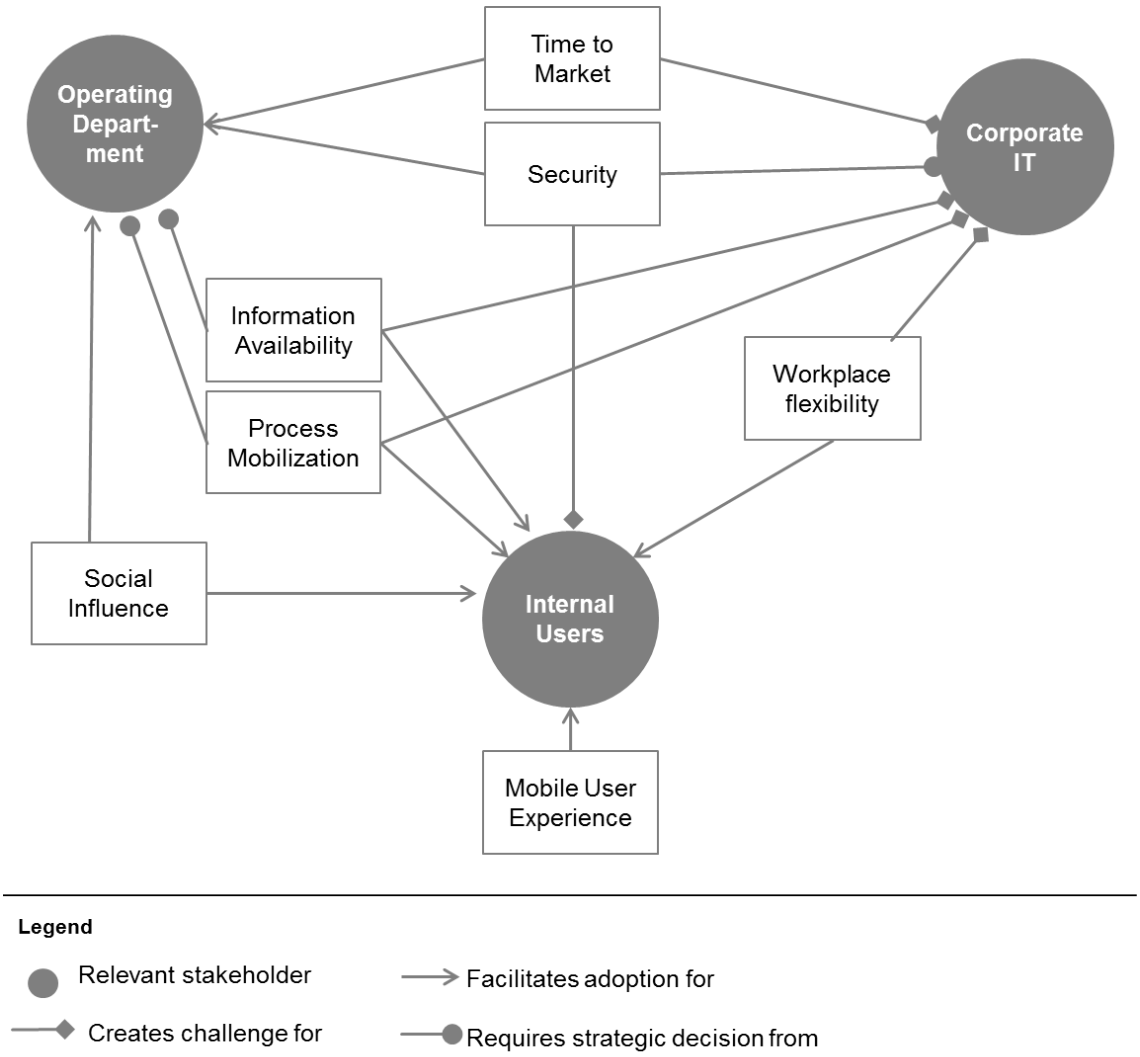


Figure 1: Conceptual Framework - Organizational Adoption of Mobile Business Solutions

The two factors that only influence single stakeholders, but have no simultaneous effect on others are *mobile user experience* and *social influence*. These factors influence adoption for operating departments and internal users, but this influence does not create any challenges for other stakeholders or require any strategic decision from them. Factors that impact mainly on the operating department and at the same time create challenges for the corporate IT are *time to market* and *security*. The factor *workplace flexibility* does connect internal users and IT, but does not affect the operating department. The factors *information availability* and *process mobilization* influence internal users and at the same time effect both the operating department and corporate IT.

5.2 Practical Implications

Based on this research, we can frame the following guidelines:

Guidelines for corporate IT

IT departments need to **rethink IT infrastructures** in order to provide the tools that are demanded by users and operating departments. This includes the challenge of managing complexity that is created by the mobile channel. Enterprise mobility often requires IT infrastructure in addition to traditional IT infrastructure. Developing strategies for handling this complexity is crucial for successful change management. Also, IT departments need to **prepare for an increasing consumerization of IT**, which concerns hardware as well as software. Focussing on application management in addition to mobile device management can be one strategy for tackling this challenge.

Guidelines for operating departments

Operating departments need to focus on **defining mobile processes** and devote particular attention to deciding what processes need to be mobilized, what features should be included, and what is not needed. **Using a phased approach**, where not everything is mobilized at once and features are increased incrementally, is a possible strategy for keeping mobile business solutions easy to use and for reducing complexity for IT departments. Operating departments need to prepare for the requirements of users in creating a more **flexible workplace**. Besides defining how users can bring their own devices and consumer applications to work, this also involves **integrating different working styles**. Within a heterogeneous workforce, the requirements may differ, but in order to ensure smooth collaboration, different working styles need to be integrated.

Finally, one important factor is **collaboration** between operating departments, users and IT in order to understand user requirements better and to build solutions that are tailored to mobilizing relevant processes and making information available in the field, while at the same time making use of mobile interaction patterns.

5.3 Conclusion

In this research, we explored the drivers for the adoption of mobile technology in an organizational setting and the impact they have on operating departments and corporate IT. We conducted a focus group in order to identify important topics and then deepened the results with expert interviews. We compiled our findings to a conceptual framework and framed guidelines for organizational stakeholders on how to deal with the impact of mobile technology in organizations.

This research demonstrates that the introduction of mobile business solutions can have serious implications for organizational processes, since the application of mobile IT challenges current practices. This shows the need to rethink IT infrastructure, to mobilize processes and allow for flexible working styles. Since the development of mobile business apps can be fast and flexible, they entail a risk of being implemented too quickly, without paying sufficient attention to the effects this may have on organizational structures.

While this research provides interesting insights, it inevitably has some limitations. With only seven interviews, the sample size is too small to provide a full picture of all requirements. Also, besides the stakeholder groups relevant for this research (internal users, operating departments and corporate IT), there are other important groups whose

influence could be taken into account, such as management, external users or external partners and vendors. For future research it could be interesting and useful to delve deeper into the specific preferences and demands of the different stakeholder groups, also into those not included in this research. Nevertheless, the adoption drivers and inhibitors, and their implications, provide valuable insights into the adoption of mobile business solutions in organizations. Especially the important role of consumerization of IT, and employees actively demanding a mobile and flexible workspace, and the associated need for organizations to integrate these different working styles into their workforce is a promising subject for further research.

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Enriching Everyday Experience with a Digital Service: *Case Study in Rural Retail Store*

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Abstract

A novel omnichannel service concept was developed and piloted in the context of everyday retail service environment. A starting point for the new service was a need to provide the customers of a small rural retail store with wider selection of goods through integrating web shopping interface to the store's service processes. One of the driving design principles was to achieve a seamless service experience by a fusion of web and physical retail channels. The findings from the case study were analysed from the viewpoint of store customers and personnel. Over half of the interviewed customers stated they were likely to use the novel retail service in the future. Previous experience with online shopping appeared to have a direct, positive effect on the customers' willingness to adopt the service into use. The hands-on demonstration was proved to be an advantageous way for introducing the novel service to potential users. Personnel's attitudes towards the service concept were in general enthusiastic and positive; however the service also invoked some initial concerns mostly related to additional work load. The personnel also clearly appreciated the positive effects of the new service on the store and customers.

Keywords: Retail, Case study, Digital service, Omnichannel, Brick-and-mortar store, Web store, Customer experience

1 Introduction

The retail sector is considered as one of the most rapid technology adoptive sectors (e.g. Ahmed, 2012). Over the years, retailers have learned how to design their stores to better meet shoppers' needs and to drive sales. In addition, the technical infrastructure that supports most retail stores has grown enormously (GS1, 2010). The retail industry has evolved from traditional physical stores through the emergence of electronic commerce into a combination of physical and digital channels. Seeing the future of retailing is quite complex and challenging; busy customers expect that the companies must use innovative approaches to facilitate their shopping process efficiently and economically along with providing value added shopping experiences. People no longer only go shopping when they need something: the experience of shopping is becoming more important (Gehring et al., 2011).

There are a number of challenges and opportunities retailers face on their long-term radar such as changes in consumer behavior and consumer digitalization. These drivers

affecting retail sector should be a key consideration for retailers of all shapes and sizes (Reinartz, 2011). The next subsections discuss the consumer-based changes faced by retail sector in more detail.

1.1 Increased Consumer Power

It is likely that the power of the consumers will continue to grow, as they become increasingly willing and able to seek, use and share information, which leads to retailers facing growing pressure due to this increased awareness of consumers (cf. Aubrey and Judge, 2012). The consumer, from the demand-side, will be empowered to direct the way in which the revolution will unfold (Doherty and Ellis-Chadwick, 2010).The focus on buying behavior is changing from products to services (Marjanen, 2010). Thus, the established retailers will need to start consider how they can more effectively integrate their online and off-line channels to provide customers with the very highest levels of service (ibid).

1.2 Digitalization of Consumer Experience

It is now widely recognized that the Internet's power, scope and interactivity provide retailers with the potential to transform their customers' shopping experience, and in so doing, strengthen their own competitive positions (Doherty and Ellis-Chadwick, 2010). Frost & Sullivan (2012, 2013) predicts that by 2025, nearly 20% of retail will happen through online channels, the global online retail sales reaching $4.3 trillion.

Thus, retailers are facing digitalization of the touch-point and consumer needs (Reinartz, 2011). By 2025, 80 billion devices will connect the world with each person carrying 5 connected devices (Frost & Sullivan, 2012). Mobile and online information technology make consumers more and more flexible in terms of where and how they wish to access retailer information and where and how to purchase products. Consumer behavior is changing as a growing number of smarter, digitally-connected, price-conscious consumers exploit multiple shopping channels, thus making the multichannel retail as an established shopping behavior (Aubrey and Judge, 2012). Described as channel agnostic, they do not care whether they buy online, via mobile or in-store as long as they get the product they want, when they want it at the right price (ibid). A new behavior of test-and-buy-elsewhere is becoming more common (Anderson et al., 2012) and retailers must adapt to the buying behavior of these "channel-hoppers" (Ahlert et al., 2010).

However, simply "adding digital" is not the answer for retailers – yet that is an approach too often taken (Anderson et al., 2012). For traditional retailers to survive, they must pursue a strategy of an integrated sales experience that blends online and in-store experiences seamlessly, leading to the merger of web store and physical store (Maestro, 2012). According to Frost & Sullivan (2012), the retail model will evolve from a single/multiple channel model to an integrated hybrid cross-channel model, and they call it as *bricks and clicks*. Thus, shoppers of the future float seamlessly across mobile, online and real-world platforms (PSFK, 2012).

1.3 From Multichannel to Omnichannel Retailing

Adoption of both online and physical channels to sell simultaneously through multiple marketing channels is referred to as *multichannel* retailing (Turban et al., 2010). Today in an ever digitizing world the line between channels is fading as the different channels are no more separate and alternative means for delivering shopping services, but customers increasingly use them as complementing each other or even simultaneously. Hence, the term multichannel is not enough to describe this phenomenon, and instead

the new concept of *omnichannel* is adopted (Rigby, 2011). Rigby (2011) defines omnichannel as "an integrated sales experience that melds the advantages of physical stores with the information-rich experience of online shopping". The customers connect and use the offered channels as best fits to their shopping process, creating their unique combinations of using different complementary and alternative channels. In an omnichannel solution the customer has a possibility to seamlessly move between channels which are designed to support this "channel-hopping".

Payne and Frow (2004) examined how multichannel integration affects customer relationship management and stated that it is essential to integrate channels to create positive customer experiences. They pointed out how a seamless and consistent customer experience creates trust and leads to stronger customer relationships as long as the experience occurs both within channels and between them. Technology-savvy consumers expect pre-sales information, during-sales services and after-sales support through a channel customized to their convenience (Oh et al., 2012). All these needs and requirements must come together as a unified, holistic solution, and retailers should be able to exploit the channel-specific capabilities in a meaningful way (Goersch, 2002).

The aim of this paper is to describe and analyze the findings of a case study of a novel omnichannel service concept implemented in the retail sector paying particular emphasis on aligning the company values and needs with those of consumers.

2 Research Setting

Rigby (2011) states that in pursuit of omnichannel experience, retailers should start to consider their stores not as a liability but as an asset. Omnichannel can provide a way to fight against the phenomenon where retailers spend time serving their customers and providing their expertise only to see the customers to check the cheapest price from the web and in the end buy the product from the online retailer. Thus, there are many good reasons for providing digital shopping solutions. When new technologies and devices emerge, the channel-specific capabilities can be exploited to create new service possibilities and making sure these or other options are available for all customers (Goersch, 2002). The technology should be used as a tool, to deliver a seamless and enhanced experience across channels where customers can trial, research, compare, review, order for home delivery or buy in-store. As such, in-store technology needs to be integrated and meaningful, and relevant to consumer needs (Aubrey and Judge, 2012). It is about nurturing a symbiotic relationship between digital and physical channels, so that they work together side-by-side, supporting each other (ibid).

In this research context the retailer also wanted to integrate the novel services and adapt retail processes to better serve and meet the needs of the rural store's older customers closer to their homes. Many of the senior population were known not to have an access to larger selections of retailer's online stores. Thus, in the development of the novel service concept the utilization of Internet possibilities and the importance of sales persons guiding and socializing alongside the older customers at the physical store were emphasised (cf. Nyrhinen et al., 2011).

2.1 Case Study Description

The pilot case study described in this paper was done in the context of developing and piloting a novel omnichannel service concept for a Finnish retail chain. A starting point for the new service was a need to provide wider selection of goods for the customers of a small, distant rural store. The store is owned by a large national co-operative retail chain. The retail company provided access to a pilot environment with all retail value chain actors from customer interface (i.e. employees) to wholesale actors and finally to the end-customer.

The service concept was based on the idea of providing customers with the selection of large stores by integrating an e-commerce solution within the service of a rural store. This was practically done by integrating the service provider's digital web store to service processes of the small brick-and-mortar store. Burke et al. (2002) suggest that retailers who want to web-enable their store should optimize the interface to the in-store environment instead of just providing web access. Thus, one of the driving design principles of our case study was to achieve a seamless retail experience by a fusion of web and physical retail channels. The novelty of the service concept was on how it was integrated to the service processes of a physical store, i.e. how the different channels were used together to create as seamless retail experience as possible.

A co-design process was used in the service design. The build-and-evaluate design cycle involved a small group of researchers and the employees of the retail company. The researchers were active actors in the design process, participating in service concept design and facilitating co-design activities. Technical experts of the retail organization were involved in specification how the developed solution would best integrate with the existing infrastructures of the organization, and how the new solutions related to the strategic development agenda of other related omnichannel solutions. Retail experts were involved in designing the customer journey, tasks of staff, service solution's visual and content design and internal and external communication required by the service.

2.2 Concept Description

The goal was to develop, trial and adopt a omnichannel retail service concept in a real usage environment. The pilot study was conducted in a small rural store part of the service provider's retail chain, located in the city of Kolari in Northern Finland with a population of 3,836. The study was launched in the end of October 2013, with a goal of scaling up the digital retail service concept eventually to also other small rural stores of the service provider.

The customers visiting the physical store could access the selection of goods otherwise not available through a web store interface. The retail service included *a touch-screen customer terminal* located inside the physical store (see Figure 1). The customers could use the terminal for browsing, comparing and ordering goods from the retail provider's web store selections. The two web stores accessible through the customer terminal were already existing and available for any customers through the Internet connection. In addition, the retailer piloted the marketing and selling of their own campaign products through a new web store interface available on the customer terminal. The customers could decide whether they wanted their product order delivered to a store (the delivery was then free of charge) or directly to their home. After placing the order the customer paid the order to a cash register of the store alongside their other purchases. The customer terminal was also accompanied by a large *information screen* (located on the wall above the terminal) that advertised the new retail service concept and directed the customers for its use.

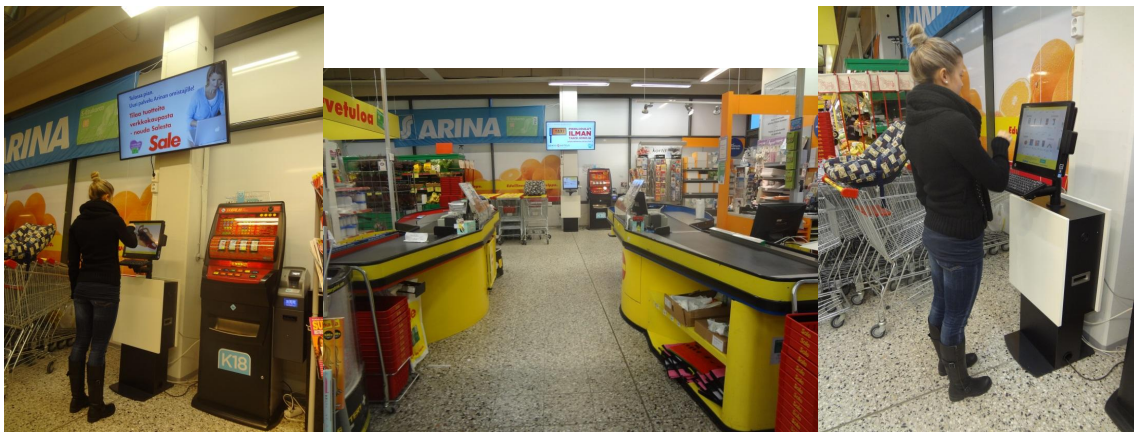


Figure 1: The retail service setup inside the store

3 Research Focus and Methods

The specific research questions of the case study were the following:

- How digital pilot service integrates into retail company's and store's existing processes
- How different service channels can be connected with each other into an omnichannel service
- How the different actors experience the digital pilot service available in the store

The focus of this paper is especially on the last research question, i.e. on more closely investigating and analyzing the store customers' and personnel's service experience and deriving design implications from the gained information for developing and improving the service concept further. The two first research questions have been examined more closely in Rönkä et al. (2013).

3.1 Study Participants

The research study was focused on the two main user groups: store customers and personnel. Altogether 35 *store customers* were interviewed, and of them 10 also experimented with the service hands-on by going through the controlled usability testing. The ages of the study participants among the customers varied from 21 years to 73 years. Altogether 6 members of the *store personnel* participated in the interviews.

3.2 Data Collection

Set of complementary research methods were used to monitor and analyze the retail experience. The interviews were utilized as a primary research method, accompanied by in-situ observation at the store and a questionnaire delivered to customers. These qualitative research methods were complemented with quantitative data achieved through a customer depth sensor tracking system installed inside the store.

Interviews were utilized to research store customers' and personnel's attitudes and expectations towards the novel service concept, motivations for the service adoption and usage, their service experiences, and ideas for service improvement. Two types of structured interviews were done with the customers: a) *General interview* directed for all store customers, and b) interview focusing on the *usability* aspects of the service (done in the context of the usability testing). *Usability testing* accompanied with *observations* was conducted to gain insights into the ways customers used the service.

Paper questionnaires were distributed for the customers who had ordered goods through the service, with the focus on gathering data of their experiences with the service ordering process. Also a *people tracking system* based on depth sensor was used to automatically observe the customers. The special focus of the people tracking was to better understand the in-store customer behavior, and in more detail to collect data of the number of customers using the service through the customer terminal, and of the duration, and timing of the service use.

4 Findings

The findings from the pilot case study are analysed from the viewpoint of two end-user groups, namely the rural store customers and personnel.

4.1 Store Customers

Altogether 35 customers of the store were enquired about their attitudes, expectations, and experiences related to the novel retail service concept.

4.1.1 Interviews

When asked *whether or not the customers were likely to use the novel retail service* on a scale of 1-5 (where 1 = not likely to use, 5 = likely to use), *the average was 2.6*, resulting in 16 interviewees responding not likely to use the service and 19 interviewees responding being likely to use the service. The backgrounds and characteristics of those 16 customers stating not likely to use the novel retail service are overviewed on Table 1.

Table 1: Customers stating NOT likely to use the novel retail service

ID	Gender	Age	Experience with online shopping	Willingness to use the service (on a scale of 1-5)
#2	Male	63	Little experience; orders rarely	2
#4	Female	40	No experience	1
#5	Female	34	Little experience; orders rarely	2
#7	Male	21 and 31	Little experience; orders rarely	1
#8	A couple	37 and 43	Little experience; orders rarely	2
#10	A couple	25 and 30	Little experience; orders rarely	1
#16	Female	51	No experience	2
#22	Male	73	No experience	2
#24	Male	38	No experience	1
#25	Male	22	Experienced; order often	1
#27	Female	50	Little experience; orders rarely	0
#29	Male	70	No experience	1
#30	Male	69	No experience	1
#31	Female	29	Experienced; order often	2
#32	Female	59	Experienced; order often	1
#34	Female	58	No experience	2

The age distribution was large, as this customer group consisted of persons aged between 21 and 73 years, the average age being 44 years. Whereas the gender distribution was very even; 10 men vs. 9 women (some responders comprised of couples who answered to the researchers' questions together as one household). Except for one person, all the interviewees told they visited quite regularly the nearest-located (over 150 kilometers) bigger cities for shopping purposes. 13 out of 16 responders had either no or only little experience with online shopping. This customer group gave the following reasons for not being so eager to adopt the novel retail service in use (direct quotes translated from Finnish):

"I do not need this kind of a service."

"Everyone has an Internet connection at home. It is easier to order [products] *from home."*

"Might be good for someone else…"

Respectively, 19 responders stated that they were likely to use the retail service in the future (see Table 2 for more detailed characteristics of these customers).

Table 2: Customers stating YES likely to use the novel retail service

ID	Gender	Age	Experience with online shopping	Willingness to use the service (on a scale of 1-5)
#1	Male	72	No experience	*"Could be really handy indeed."*
#3	Female	30	Experienced; order often	5
#6	Female	60	No experience	3
#9	Female	37	Experienced; order often	4
#11	Female	38	Experienced; order often	3 *("More towards five.")*
#12	Male	50	Little experience; orders rarely	2-3 *("I think I could use* [the service]*.")*
#13	Female	59	Little experience; orders rarely	5
#14	A couple	50	No experience	5
#15	Male	35	No experience	3
#17	Female	55	Little experience; orders rarely	3
#18	A couple	65	No experience	3
#19	Male	60	No experience	3
#20	Female	50	Little experience; orders rarely	4
#21	Male	60	Experienced; order often	3
#23	Male	61	No experience	3
#26	A couple	53 and 55	No experience	4
#28	Female	29	Experienced; order often	3
#33	Male	50	Experienced; order often	5
#35	Male	47	Little experience; orders rarely	3

Also in this customer group the gender distribution was very even as the responders consisted of 10 men vs. 11 women. The age distribution was respectively diverse, from 29 to 72 years, the average age being 51 years. In addition, everyone regularly made shopping journeys to closest bigger cities. In this customer group, 11 responders had some experience with online shopping, 6 responders stating they often ordered products

online. These customers justified their interest towards the novel retail service for example in the following way (direct quotes translated from Finnish):

"Everything [new services] *that comes need to be utilized so that the services also stay here* [in Kolari]*."*

"We do not have much [product] *selections here."*

"Really good… No need to visit [bigger cities] *if we do not have other businesses/chores there."*

"Sounds quite nice… If there would be some product offers."

"If there [in the digital retail service] *would be some specific product that I would need, then I could use this."*

To conclude, age or gender did not seem to have an effect on the store customers' willingness to use the retail service. Neither did the shopping journeys to bigger cities influence the willingness for service adoption, as most of the customers made these shopping journeys regularly. However, previous experience with online shopping appeared to have a direct effect on the customers' willingness to use the retail service. If the customer did not have, or had only little previous experience with ordering products from web stores, the person in question often also stated as not likely to adopt the retail service into use. However, if the customer was experienced with online shopping, s/he also had a more positive attitude and greater willingness to use the novel retail service. Thus, the following aspects appeared to positively contribute to customers' interest and willingness to use the service:

- Previous experience with online shopping
- Irritation with the limited product selections at hometown stores
- Pleasure with the recognition of reduced future needs to make shopping journeys to bigger cities
- Desire to support new services in their hometown
- Interest towards product offers and campaigns

4.1.2 Usability Testing

10 store customers participated in the usability testing. The customers were directed to go through a set of pre-determined tasks with the retail service interface, and they were asked to "think aloud" and give any comments, feedback and thoughts that came to their mind during the interaction with the service. Their task performance was observed by the researchers and notes were taken during the customer's experimentation with the service. The tasks included 1) browsing the product selections available through the web stores, 2) looking for more detailed product information, and 3) ordering a product from two different web stores. See Figure 2 for the user interface view of the retail service on the customer terminal.



Figure 2: An overview of the retail service user interface (UI) on the customer terminal

The biggest difficulty the customers encountered was related to the touch-based interaction with the service terminal. The terminal's touch-screen appeared not enough sensitive, resulting in 6 out of 10 customers experiencing difficulties in interacting with the touch-screen. In addition, it was not right away clear for the customers that it indeed was a touch-screen, as 6 customers hesitated at first and asked aloud from the researcher whether the terminal had a touch-screen: *"Do I need to touch this? / Should I touch this?"*

However, interestingly 4 customers out of 10 changed their initial answer regarding their willingness to use the service (asked before actually experimenting with the service UI) in a more positive direction after having a hands-on experience with the service. Thus, after usability testing, the average raised a bit from the initial *2.6 to 2.7* (on a scale of 1-5). None of the customers participating in the usability testing changed their response in a negative direction. Other valuable usability findings included observation on the font size on the service UI, insufficient service feedback to the customer, and unclear customer journey path.

4.1.3 Paper Questionnaires

Paper questionnaires were distributed for the customers who had ordered products through the retail service (either at home or through the store's customer terminal), with the goal of researching customers' experiences with the ordering process. These customers identified as the most positive aspects of the service the following:

- Wider product selections
- Unhurried [order process]
- Easy to compare the products and their prices
- Fast delivery
- Free delivery

4.1.4 Automatic Customer Tracking

A depth sensor based system was used for detecting and tracking objects (in this case people) in the scene, i.e. inside the physical store. Depth sensors are unobtrusive, and as they do not provide actual photographic information, any potential privacy issues can be more easily handled. The people tracker software enables detecting people movement in a given space with 32hZ (32 frames per second) within an accuracy of ±10 cm. The system used one Asus Xtion Pro sensor with an opening view of 70° and a range of about 7 meters. The sensor was positioned so that it could observe the customer traffic

at the store's entrance hall where the service terminal was positioned. Sensor implementation is described in more detail in Mäkelä et al. (2013).

The purpose of the implementation of the depth sensor tracking was to better understand the in-store customer behavior, and to gather in more detail data of 1) the number of customers using the service terminal, and 2) the duration of the service use. The data was recorded between the beginning of November 2013 and the mid-February 2014 during altogether 64 days. Most of those days contain tracking information from all the opening hours of the store. Some hours are missing due to the people tracking software instability. From the recorded data all those store customers that came to the near-range of the service set-up were analyzed. The real-world position of the customers using the service terminal was mapped to the people tracker coordinates and all the customers that had come into the 30 cm radius of the user position and stayed still more that 3 seconds were accepted. The radius from the user position was kept relatively small in order to minimize the distortion of data resulting from confusing the users of the slot machine as service terminal users (see Figure 1). The service users were categorized to 6 different categories according to time they spent in the region of interest (ROI). The percentage of all users for each category was calculated over the all data. The division of different user categories and the summary of the results can be seen in Table 3. The results show that most of the users used the service relatively short time.

Table 3: Average usage duration of the customer terminal

User category based on usage duration	3-10s	10-30s	30-60s	60-120s	120-180s	>180s
Proportion of all users	30.1%	28.4%	15.6%	12.1%	6.1%	7.7%

On average *0.54 store customers per hour* used the service terminal based on the data gathered from 64 days. It is reasonable to assume that most likely a proper usage of the service system would take more than 120s. The shorter the usage period, the less serious or determined the user session has been. Average usage period was *58.4 seconds*. Thus, the service usage appeared as quite short-term, indicating that in most cases the service usage was not so "goal-directed", but more like sessions where store customers briefly familiarized themselves with the novel service. During the store opening hours from 7am to 9pm there were on average *7.56 service users/day*. During the week, *Saturday and Sunday* turned out to attract most service users, and during the store opening hours, there were most service users *at 1-2pm and 6-7pm.*

4.2 Store Personnel

The goal of the group interviews was to investigate store personnel's attitudes and expectations towards the novel service concept, and ideas for service improvement and further development. In addition, the store superior was contacted every other week with a phone call for the purpose of enquiring about the in-store service experiences both from the viewpoint of the store customers and personnel.

4.2.1 Group Interviews

Two group interviews with 6 members of the store personnel were carried out on the same occasion as the personnel was introduced and familiarized with the service concept alongside with their new service-related work tasks. In general, the personnel's attitudes towards the novel service appeared as enthusiastic and positive:

"I think it is really good that this kind of a thing [the service] *comes here!"*

"Really nice when we get new things, then you can also learn something new."

Naturally, the novel service also invoked some doubts, mostly related to its employing effect on the personnel, the clearness and learnability of the order processes, and formation of the new routines related to the service adoption that would also streamline their new work duties and thus ease personnel's work load:

"Since we also need to do our work at the store and are needed at the cash register... How do we have time for this?"

"We need to have a clear system and routines, otherwise this won't work."

"Brings always more challenge when more and more side-services."

In addition, the following comments illustrate the personnel's general thoughts and expectations regarding the service:

"This is [indeed a useful service], *since we have these long distances* [to bigger cities]. *Now a customer can buy the washing machine from us."*

"Always the adding of more services should be a positive thing."

"More services also always mean more customers."

"When we get our own routines and set-up for this, I'm certain this will succeed!"

"…Should have distribution of [personnel's] *work with this."*

4.2.2 Phone Calls

During the first two months of the case study, inquiry calls were made in every two weeks to the store superior in order to keep records and get information regarding the progress of the service adoption at the store, in addition to possible encountered problems from the viewpoint of both the customers and the personnel. In general, the novel retail service appeared to have soon well integrated into personnel's work processes:

"This is quite handy, we have good instructions."

"Very simple system."

"But now we already can [cope with the new service], *as we have now received over twenty orders. This already goes well!"*

5 Discussion

Brick-and-mortar stores both as a place and their role in the everyday life of consumers is changing. Increasingly sophisticated customers and intense competition force the retailers to add little more innovation in their store's format (Ahmed, 2012). Money is tight and shopping around is easier, so physical stores need to work harder to avoid being reduced to the role of expensive showroom for its products or services (Aubrey and Judge, 2012). Consumers' experience of shopping online leads to higher expectations of what traditional bricks-and-mortar stores should offer; the physical stores must provide a distinctive service and experience that drives consumer preference over price-led, Internet-only competition (ibid). The social aspects and the significance of personal service will be emphasized in brick-and-mortar stores (Deloitte, 2009).

Technology should be utilized in the purpose of developing the shopping experiences (cf. Sandberg, 2010); nothing should be done only for the sake of technology itself. In

the future retail concepts technology should be used as a tool, to deliver a seamless and enhanced experience across channels where customers can trial, research, compare, review, order for home delivery or buy in-store, thus easing everyday life by making simple solutions (cf. Sandberg, 2010). The technology should also be utilized to increase the importance of an expert salesperson as a customer servant and support the salespersons in their new role (Maestro, 2012). In-store technology needs to be integrated and meaningful, and relevant to customer needs (Aubrey and Judge, 2012). It is about nurturing a symbiotic relationship between digital and physical channels, so that they work together side-by-side, supporting each other (ibid).

The next steps in our pilot case study will involve the second iteration cycle for the refinement of the service concept based on the understanding achieved through the customers' and personnel's service experiences and the derived service design requirements. The following key service improvement needs were identified:

- Adding more privacy
    - The customers hoped to have the in-store service terminal better defined from its surroundings, as they longed for more privacy from other customers' sights when interacting with the service
- Refining the UI of the retail service
    - Ensuring higher level and better precision of feedback given to the customer e.g. related to the completion and success of the product order
    - Enlarging and clarifying the instructional and information texts
- Improving the touch-based interaction with the customer terminal
    - Changing the customer terminal to a better-quality touch-screen in order to ensure the smoothness of interaction between the customer and the service terminal UI

6 Conclusions

The pilot case study was done in the context of developing and piloting a novel omnichannel service concept for a Finnish retail chain. A starting point for the new service was a need to provide wider selection of goods for the customers of a small, distant rural store. This was practically done by integrating an e-commerce solution within the service of the brick-and-mortar store. The research focused on investigating and analyzing the store customers' and personnel's service experiences and thereby deriving design implications for developing and improving the service concept further. Several research methods were utilized to monitor and analyze the retail experience.

Over half of the interviewed store customers stated they were likely to use the novel retail service in the future. Previous experience with online shopping appeared to have a direct and positive effect on the customers' willingness to adopt the service into use. The most influential way for introducing the new service to the potential users proved to be the hands-on demonstration as nearly half of the usability test participants changed their initial answer regarding their willingness to use the service in a more positive direction after having a hands-on experience with the service. By using the service themselves the customers noticed (often against their initial doubts) that they mastered the technology well, and could have some personal experience about the possibilities of the service. Usability testing provided also valuable findings related to the touch-based interaction with the service UI, observation on font size, lack of service feedback, and unclear customer journey path.

In general, the store personnel's attitudes towards the service appeared as enthusiastic and positive. But the novel service also invoked some worries, mostly related to its employing effect and addition on the workload due to the new service-related work duties. The personnel also clearly understood and appreciated the positive effects and value this kind of a new retail service brings to their store and its customers.

The retail company's future plans include scaling up the novel retail service concept to other small rural stores part of their national co-operative retail chain. Creating a seamless retail experience by a fusion of web and physical retail channels should be supported by careful design, also one of the driving design principles of our case study. Service experience needs to be consistent, smooth and based on the right information – in every channel and device. After refinement of the service concept, in order to develop a more scalable service and to improve its adoption conditions, the solution will become more standardized and automated, thus enabling better integration into the retail company's services.

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"Digital Newspaper Makes My Home Tidier" – *Evaluating User Experience with User-Defined Attributes*

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Abstract

User experience (UX) evaluation is typically based on either open evaluation or predefined measures. In our study, we tested a new UX evaluation method by combining both approaches in a collaborative evaluation. When evaluating a digital newspaper over six weeks, the users were asked to describe the reading experience in their own words on an online platform shared among the test participants. General statements were formulated based on user-defined attributes and rated by all users on a numeric scale at different stages of the test period. This method resulted with quantitative data of even entirely new experience measures that would not have been found in predefined sets of UX categories.

Keywords: User experience; digital newspaper; open evaluation; user-defined attributes; online platform; empirical study.

1 Introduction

User experience (UX) has achieved an important position in product and service design and evaluation both in industry and academia. However, the concept of user experience is neither unambiguously defined nor well-understood, which leads to challenges in UX evaluation. On one hand, there is a need to understand and investigate the phenomenon and build theories around it. On the other hand, there is a need to develop successful products cost-efficiently, which requires UX evaluation methods that fit the fast pace of product development cycles. (Väätäjä & Roto 2009)

UX evaluation can be based either on open evaluation by users or predefined measures that can be quantified. Many UX researchers prefer open, qualitative evaluation, as predefined metrics do not often embrace all aspects of user experience (Vermeeren et al 2010). However, data analysis becomes harder with qualitative data, which reduces the applicability of open evaluation in industrial settings.

To utilize the benefits of open evaluation and overcome some of its challenges, we developed and tested a collaborative UX evaluation method that combines user-defined, open evaluation and quantitative measures on an online platform. In this paper, we

describe the evaluation method and compare the user-defined UX attributes with pre-defined categories for UX evaluation. We discuss the benefits and challenges of the UX evaluation based on user-defined attributes and conclude with recommendations for further development of the method.

2 Background

The concept of 'user experience' (UX) has many definitions due to its multidisciplinary nature. Different definitions are based on some common building blocks of user experience, which include characteristics of the designed system such as usability and utility, user's internal state including emotional aspects, and use context including social aspects such as self-expression and relatedness (Hassenzahl & Tractinsky 2006) According to Hassenzahl (2003) product features, such as content, presentation, functionality and interaction, affect pragmatic and hedonic attributes of product character, which, together with the context of use, can lead to an appealing, pleasurable and satisfactory experience.

Many researchers have tried to categorize the different aspects of experience in order to take them all into account in UX evaluation. Desmet and Hekkert (2007) have categorized three levels of experience: aesthetic experience, experience of meaning, and emotional experience. Buccini and Padovani (2007) divide the experiences into six categories: experiences related to the senses, experiences related to the feelings, social experiences, cognitive experiences, use experiences, and motivational experiences. Olsson (2012) has used these categories for defining 16 smaller classes of experience, such as empowerment, intuitiveness, surprise and inspiration.

The UX categories may serve as a basis for creating UX evaluation methods with predefined measures. AttrakDiff, presented by Hassenzahl & Tractinsky (2006) and HED/UT, presented by Voss, Spangenberg & Grohmann (2003) are examples of methods that use predefined measures generated by experts. Predefined measures can also be used in the form of statements based on earlier research like in studies of Kaasinen (2005) and Olsson et al (2012), or derived from the results of field studies or interviews like in the study of Väätäjä & Roto (2009).

The other alternative for UX evaluation is open evaluation, in which participants are asked to describe their feelings freely. According to Vermeeren et al (2010) it allows a more comprehensive picture of UX in comparison to predefined measures that cannot cover all aspects of UX in a specific case study. However, according to Väätäjä & Roto (2009) the predefined measures are more practical for industry applications, as they produce quantitative data that can be easily analyzed.

The goal of our research was to create a method that efficiently combines the benefits of open evaluation and quantitative measuring. We explored if quantitative measures could be generated case-specifically by the users and if the user-defined attributes covered the different UX categories that had been defined in previous literature. We chose the categorization of Buccini and Padovani (2007) and Olsson (2012) as a basis for comparison, since they divide UX in small enough elements in order to check the similarities and differences with user-defined attributes.

3 Method

We tested the new UX evaluation method in a case study where a Finnish media company tested the digital edition of a newspaper in two rural areas. The publisher of Lapin Kansa wanted to provide better service for readers living in rural areas of Finland by providing them with a digital version of the newspaper. The product was already on the market, but the company wanted to explore how the users in new target groups experienced it in comparison to the traditional paper edition of the same newspaper.

The test was made in two areas, where the daily newspaper is normally delivered in the afternoon instead of the morning. The discussion topics were chosen in co-operation with the publisher, and they were focused on usage and the experienced benefits of the digital newspaper, in order to learn how to market the digital product to people that are unfamiliar with digital devices and services.

3.1 Context

In order to understand the motivation for this study, it is relevant to note that the daily newspaper has an important role in the everyday life of an average Finn. Finns are the third most enthusiastic newspaper readers in the world, and daily newspapers have a circulation of 396 per 1,000 adults. Only 13 % of newspapers are bought separately, with most readers (69%) having their newspaper delivered at home usually before 6.30 a.m. (Sanomalehtien liitto 2013). Reading the newspaper at home in the morning is an important part of the daily routine for many Finns.

While Finns living in densely populated areas receive their newspaper early, the same level of service cannot be offered in remote areas. Long distances in the rural areas of Finland make it impossible to deliver the paper version of the newspaper early in the morning, when people often prefer to read news. Therefore the opportunities for digital delivery were investigated.

3.2 Data Collection

The test was conducted during a six-week period in April – May 2013. 60 people participated in the test, during which they got a tablet device and free access to the digital edition of the newspaper, which is a facsimile version of the printed newspaper. They also got free access to the Internet. Some of the participants had had an Internet connection in their village only for six months, so they didn't have much experience with any digital services.

The test participants gave feedback through an online platform by answering weekly questions, commenting on discussions, giving feedback on the content of the daily paper, and taking part in polls. Discussion topics were added on a daily and weekly basis; the journalists got instant feedback on the daily news topics and new research questions were added on Mondays. Table 1 presents the discussion topics for each week.

Week	Discussion Topics
1	Preferences for the time of newspaper delivery. Situations where the traditional newspaper is read. Preferred device for reading a digital newspaper. Experiences of reading a digital newspaper for the first time.
2	Expectations towards the digital newspaper.
3	Reading habits of the traditional newspaper. Situations where the digital newspaper is read.
4	Effects of the experiment on daily routines. Comparison of reading habits between traditional and digital newspapers.
5	Obstacles preventing the use of the digital newspaper. Pros and cons of the digital newspaper. Recommending the digital newspaper to others. Interest in local news.
6	Willingness to pay for digital news.
7	The arrangements of the experiment. Experiences of the collaborative testing process.

Table 1: The topics of the weekly questions.

In addition to the weekly discussions, there were more specific questions about the user experience. During the second, fourth and sixth test weeks users were asked to describe their reading experiences using their own words (See Table 2).

Week	UX Questions
2	What kind of feelings does the digital newspaper evoke? Describe your experiences.
4	Write at least three adjectives that describe your reading experience with the digital newspaper.
6	Think back to how it felt to read the digital newspaper for the first time. How has your experience changed? How would you describe it now?

Table 2: The questions for the experience attributes.

Every other week (weeks 3, 5, 7) researchers formulated statements based on the users' answers. At first, all expressions describing the reading experience were identified. These expressions were then grouped based on their meanings, and the eventual statements were formulated to represent these expression groups. The wording of all statements was chosen carefully in order to ensure their unambiguity and general tone. All users were asked to rate the statements on a scale from 1 to 5 (I don't agree at all – I totally agree). Based on these evaluations researchers were able to discover how important and meaningful the participants found the attributes. After giving own answer on the online platform, the users saw how others had rated the same attributes. Users

could also comment on the attributes and those comments were visible to other users already before they gave their rating. Each attribute received between 4 and 11 comments that were generally very short but clearly indicated the opinion of the comment author.

The challenge in this kind of iterative approach is how to proceed efficiently in a reasonable time frame. In our study we utilized a sophisticated online tool for interacting with users. We found this or a similar tool as a prerequisite for efficient user experience evaluation. The method used is essentially an online focus group, and in comparison to a traditional focus group interview it has the distinct advantage of allowing everyone to have an equally loud voice.

3.3 Data Analysis

After the study, the researchers categorized the statements using the categories of Buccini and Padovani (2007) and Olsson (2012). All four authors of this paper participated in the categorizing process, during which it became apparent that there were only a few statements that could be unambiguously mapped with the predefined categories. Most of the statements could belong to multiple categories and some new categories were required as well.

4 Results

Most of the UX attributes derived from the users' own comments could be matched with the predefined attributes by Buccini and Padovani (2007) and Olsson (2012). Users mentioned several instrumental experiences that were related to the usability of the device, reliability of the service and efficiency (connection speed). Sensory experiences were related to the device and its outlook (e.g. "The digital edition looks to be of higher quality than the paper one"). Cognitive and epistemic experiences were mostly related to the content of the newspaper (interesting news, visibility of ads). Behavioural or motivational experiences consisted of statements such as "The digital newspaper inspires me" and "For me it is important that I can take the tablet with me and read the digital newspaper when doing other things".

Emotional experiences consisted of being positively surprised with the digital edition and enjoying the reading experience. The aspect of feeling privileged was new in comparison to the UX elements defined by Olsson (2012). Some users felt privileged to be able to read the newspaper in the morning, which was not possible with the paper edition that was delivered to many of the participants only in the afternoon. The opportunity to receive fresh news in the morning led also to changes in the users' daily routines. Some users woke up earlier, to have more time in the morning with the newspaper. Users' media habits changed as well; more time was spent with the newspaper, less time with TV morning programmes and other news services. They felt they were more equal with people living in cities.

Some of the UX statements related to the users' lifestyle and could be seen as user characteristics that affect the experience but are also a part of the experience. Examples of these are "For me it is important to receive fresh news" and "I don't have time to read news in any form".

The digital edition also caused changes in the daily life and the surroundings, such as "My home is tidier thanks to the digital newspaper". Users thought it was convenient that there were no longer piles of old newspapers on the table. The digital format also led to expressions such as "For me it is important that the digital edition does not cause allergic reactions" and "The digital newspaper is more ecological". These can be seen instrumental (caused by the technical device), sensory (experienced reactions) or emotional (felt effects) experiences.

This shows that many of the user-defined attributes can be interpreted in multiple ways in relation to the predefined UX categories. For example, "Digital newspaper is part of the future" can refer either neutrally to the change in technology or, in a more evaluative way, to the benefits of a modern reading device (instrumental); or to the new habits of readers (behaviour). "I spend more time reading the digital than the paper edition" may be either positive (it is more interesting to read) or negative (it is slow to use). The notion that the digital edition is more ecological can be seen either as an emotional or cognitive experience, depending on whether the user has enough information about the real state of affairs or whether the feeling is based on a subjective emotional reaction.

5 Discussion

User-defined experience attributes contained not only service-related aspects, but also aspects covering a wider context with the devices, users' habits and lifestyle. Researchers were surprised by some of the user-defined attributes, such as non-allergic, tempting, fresh, uncomplicated, and clean home, seeing as they wouldn't have chosen those from a predefined set of questions.

In addition, it was impossible to place some of the user-defined statements into the categories Buccini and Padovani (2007) and Olsson (2012) used. The results indicate that new categories are needed for different application areas. This research suggests adding a category such as "experience influenced by the service", which stands for experiences that are due to the service but do not happen while using the service. Our example is the tidy home; the new service made the home tidier, because there were no more newspapers on the table. The experience was influenced by the service but not during usage. This indicates that user experience is context-specific and some important aspects of experience might be ignored if we concentrate solely on predefined measures.

Another new category could be described as "lifestyle", and it stands for user characteristics affecting the user experience. For example the statements "Digital newspaper is a good fit for me" and "For me it is important to receive fresh news" refer to some characteristics of the user based on which the certain service is suitable for her.

An example of a statement that does not directly refer to user experience is the sentence "I miss the paper edition of the newspaper". Even if it does not directly state the reasons for preferring either way of reading the news, for the service provider it gives more concrete information about the actual behaviour and possible changes in consumer choices than many predefined measures, such as pleasure of the reading experience.

It is important to note that the user-defined attributes in this study were not totally unaffected by the researchers. The researchers initiated the discussion by choosing the weekly discussion topics. It is possible that the users would not have mentioned certain adjectives if there hadn't been any previous discussion related to them.

6 Conclusions

The predefined categories used for example by Buccini and Padovani (2007) and Olsson (2012) are good guidelines for planning UX evaluation, because they force the researchers to take all the views of experience into account. Our study, however, shows that the users defined UX attributes that didn't fit into any of the categories used in previous studies, or the attributes were more practically oriented and combined many different aspects in one sentence. If we hadn't asked users for the experience attributes, we would have missed relevant aspects of how the new service influenced the users' daily life and how it had a positive effect on their daily life even when they weren't using the service. Reading the news is an integral part of many people's daily life. People don't divide their life and routines into neatly separated slots that contain individual activities happening in succession. Most people are experts at multitasking but don't necessarily realize it. If we had asked only predefined questions about news reading habits, we wouldn't have been able to see all the changes the experiment brought about in the everyday life of our participants. If we use only predefined measures in our research, we easily end up excluding all things that fall outside the scope of those measures. Our results suggest that user-defined attributes are a good approach for generating context-specific UX measures that can be evaluated quantitatively. In our study, we did not use the predefined UX categories at all, but focused only on user-defined attributes in the evaluation. According to our view, participants of a collaborative experience research study must have the same role in the value chain and have a similar relationship with the service that is evaluated, i.e. the object of the experience. This ensures that the participants speak the same language, and the discussions are productive and lively. If the participants have very different roles in the value chain (a user and a developer, for instance), there is a risk that real experiences will not emerge from the discussion and the developers will act based on their preconceptions of the service and how it is supposed to work. In our opinion, best results are achieved when developers take more passive role as followers while researchers or some other objective party facilitate the discussions as well as interpret the results to other parties of the value chain. Further experimentation is needed to compare the UX evaluation results when using either user-defined or predefined sets of attributes. Another remaining research question is about the effect of collective evaluation. The influence of other participants' comments on the users' own reported experiences should be further examined.

Social technologies suggest that more public forms of participation are becoming the norm. Studies have shown that content posted by other people is often used as a source of inspiration. More contact between the users during the research process is expected to contribute to a better user involvement and participation in the study as well as richer user feedback, because users can comment on others' comments and discuss these among themselves. Using social media tools in the design processes also make users more willing to contribute their time. Even normally shy people can participate more freely online, when they have time to really reflect on what they are saying, edit their comments carefully and participate anonymously

The online platform enabled a cost-efficient way of combining open evaluation and quantitative measuring over a longer period of time. However, it required a lot of researcher work to choose and formulate the sentences to be evaluated by all users. The

method could be further developed so that it would be more straightforward to formulate the experience statements from the users' free-form text.

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A Literature Review on Digital Transformation in the Financial Service Industry

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Abstract

It is often stated that IT is able to transform entire industries. The emergence of digital technologies enables, among other things, new business models and therefore, obviously constitutes an industry transformation potential. However, IS research that actually deals with digitally enabled industry transformation is still rare. Motivated by its IT intensive nature, the research focus of this paper lies within the financial service industry. Prior research that deals with individual units or sectors is synthesized with the aim to draw inference on the financial service industry. The identified research articles are categorized into business, customer and technology relationship. The results include that digital technologies enables new business models, cause (dis-)intermediation and customer centricity becomes increasingly important for financial service providers. Additionally, the interaction between user and technology changes and information is increasingly digitized. Finally, possible future research questions are named.

Keywords: Literature Review, Financial Service Industry, Industry Transformation, Digital Technologies, Information Technology, Business Relationship, Consumer Relationship, Information and Technology Relationship

1 Introduction

An industry is an important construct for many stakeholders. Some examples among many others are regulations that affect whole industries, industry statistics are common in media, career path of individuals often show an affinity for a certain industry, specialized products and services from companies e.g. consulting firms are specialized on certain industries (Chiasson & Davidson, 2005). Out of this importance, it is obvious why classification schemes such as the "industry classification benchmark" or the "standard industrial classification" exist. In the IS field, it is frequently said that information technology can transform entire industries, but only little research addresses this claim (Crowston & Myers, 2004). According to a recent Gartner (2012) report, the banking sector spends $445bn on IT measured in percent of the revenue in 2012. On average, this is approximately three times as much IT spending compared to all other industries. Therefore, the emergence of digital technologies i.e. "the combination of information, computing, communication and connectivity technologies" (Bharadwaj & Sawy, 2013, p. 471) affect especially IT intensive industries like the financial service industry.

The purpose of this paper is to identify, analyse and synthesise the diverse aspects of IT-enabled transformation in the financial service industry discussed in the literature. The findings will contribute to a better understanding of industry transformation in general. Moreover, another contribution is to reveal potential research gaps in the domain of IS that require further investigation. The corresponding research question is: *how do digital technologies shape the landscape of the financial service industry?*

2 Methodology

The following paragraph provides details on how the relevant literature is identified. The approach is mainly based on the suggestions of Webster & Watson (2002). At first, the appropriate search strings for the subject "digital transformation of the financial service industry" are considered. Since the subject addresses the aspect digital transformation and the financial service industry the search strings are developed independently. For digital transformation the following search terms are identified: for digital: digital*[1] and IT to include the IT context. As a transformation can also be seen as change or be part of a strategy, the following search terms are derived for transformation: transform*, change* and strateg* (Kotter, 1995). For the financial service industry, the Standard Industrial Classification (SIC) and Industry Classification Benchmark (ICB) provide a detailed classification. By considering both classifications (SIC codes 6000 to 6700 and ICB sectors 8350 to 8990) the search terms for the financial service industry are: bank*, insurance*, real estate*, fianc*, invest*, depositor*, broker*, dealer* and exchange*.

Table 1 below shows the derived Boolean search string that is used for the search in the databases. In total, the Boolean search leads to 54 permutations of search strings.

Industry context		**IT context**		**Transformation context**
("bank*" OR "insurance*" OR "real estate*" OR "financ*" OR "invest*" OR "*depositor*" OR "broker*" OR "dealer*" OR "exchange*" OR "insurance*" OR "real estate*" OR "invest*")	AND	("digital*" OR "IT")	AND	("transform**" OR "change*" OR "strateg*")

Table 1: BOOLEAN search string applied

1 The asterisks were set to cover plural forms and variations of a word e.g. by searching for bank* the results contain bank, banks, banking etc.

The search was performed in the "Association for Information Systems electronic Library" (http://aisel.aisnet.org/do/search/advanced) and the "AIS Senior Scholars' Basket of Journals"[2]. This guarantees a broad selection of relevant IS journals and latest conference proceedings. The search strings are used on the title, abstract and key words.

In total, 1525 articles are found. However, this number contains a large amount of irrelevant results caused by the general search strings like ("invest*" AND "IT" AND "strateg*"). Therefore, the abstracts are read to eliminate articles that do not deal with the subject at all, narrowing the number down to 168 pre-selected articles. Since the phenomenon of digitization is still an emerging research field, only articles from this millennia are considered. To decide whether an article is relevant the pre-selection is read by two researchers independently. Each article is either categorized as relevant or non-relevant. The classification results are compared and mismatches discussed to achieve a higher objectivity within the selection process. The final sample consists of 17 research articles. The last step is to sort the articles according to their similarities to create emerging categories (Agarwal et al., 2010; Gregory, 2010). In summary, three major categories emerged from the identified literature: the business relationship, the information and technology relationship and the consumer relationship. For the general setup of this literature review, a narrative review is selected. Figure 1 displays the most common review methodologies in IS research on a qualitative/quantitative continuum (King & He, 2005).

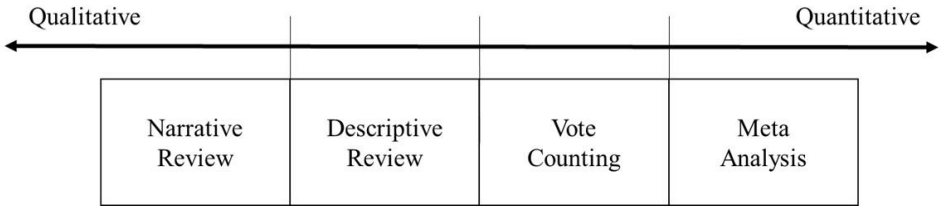


Figure 1: Review methods on a qualitative-quantitative continuum (based on King & He, 2005)

Narrative reviews are usually qualitative by presenting verbal descriptions of previous research. They are suited when it comes to e.g. guidance of future research in a domain. There is no common procedure of how to conduct a narrative review. Therefore, authors conducting a narrative review are relatively independent in the setup i.e. article selection and categorization process in their research paper. Descriptive reviews have some quantification in it. A common approach in descriptive reviews are frequency analyses. Thereby, authors are able to reveal e.g. the extent and patterns in a particular research stream. Generalizability can be achieved for example by using the grounded theory methodology. In summary, descriptive reviews present the state of the art of a domain. A vote counting review is conducted when an author wants to draw quantitative inferences. This is done by examining the outcomes of multiple studies that deal with a similar problem. For example, by looking at the reported p-values of the different studies. If the outcomes are similar in direction and significance the

2 The AIS Basket of eight consists of the following journals: European Journal of Information Systems, Information Systems Journal, Information Systems Research, Journal of AIS, Journal of Information Technology, Journal of MIS Journal of Strategic Information and Systems MIS Quarterly.

overall support for a hypothesis is more powerful. Obviously, homogeneity of the sample articles is a crucial requirement for vote counting. A meta-analysis is a statistical review tool that synthetizes prior quantitative studies. Therefore, it is relatively more objective than other review methods and in line with the positivist view. A meta analyses can lead to a greater understanding and completes a picture on a certain topic (King & He, 2005).

Since the transformational influence of digital technologies in the financial service industry is a relatively new phenomenon discussed in the IS literature, it requires a synthesis of the existing knowledge and an identification of gaps in the literature. Therefore, a narrative review is the first choice since the methodology is especially suitable when it comes to future development in a domain.

3 Results

The categories emerged out of the content similarities of the identified articles. One category that emerged is the business relationships. It deals with any transformation of business relationships caused by digital technologies. For example the disruption of a traditional value chain. Another major similarity is the change of the relationship towards the customers. Digital technologies enable new ways of approaching the customers and allows companies to be more intimate with them. The third category is the information and technology relationship. It contains the change of the human-technology interaction and digitization of information.

Table 2 provides an overview on the articles identified by author and year. Furthermore, the sector, research type and positioning in the categories is given. One can easily see that the majority of the articles in the IS literature deal with the banking sector, followed by exchanges. Brokers, real estate and electronic markets are the least covered sectors in the sample. Comparing the results with the keyword search, insurances do not appear in the sample at all. The dominant type of research is of quantitative nature.

Author(s)	**Year**	**Sector**	**Research Type**	**Information and Technology Relationship**	**Business Relationship**	**Consumer Relationship**
Bakos et al.	2005	Brokers	Quantitative			x
Banker et al.	2009	Banks	Quantitative		x	
Banker et al.	2010	Banks	Quantitative		x	
Crowston & Myers	2004	Real Estates	Quantitative / Qualitative		x	
Ende	2010	Exchanges/ Institutional Investors	Quantitative		x	

Gharavi et al.	2005	Exchanges	Qualitative		x	
Grandos et al.	2006	Electronic Markets	Qualitative / Case Study	x		
Gsell & Gomber	2009	Exchanges	Quantitative	x		
Lucas Jr., Oh, & Weber	2009	Exchanges	Qualitative / Case Study	x	x	
Möwes, Puschmann, & Alt	2011	Banks	Framework Development			x
Nüesch, Puschmann, & Alt.	2012	Banks	Framework Development			x
Pole et al.	2011	Banks	Qualitative/ Design Science			x
Sachse, Puschmann, & Alt.	2012	Electronic Markets	Quantitative		x	x
Setia, Venkatesh, & Joglekar	2013	Banks	Quantitative			x
Tallon	2010	Banks	Quantitative			x
Wang et al.	2009	Banks	Qualitative		x	
Zhang & Rhiodan	2011	Exchanges	Quantitative	x		

Table 2: Summary of the analysed articles

3.1 Business Relationship

It is evident that the real estate sector is undergoing an IT enabled change. A real-estate agent is a typical intermediary profession because agents seek to reduce the transaction costs and perceived risk for their customers. Typical tasks are listing services, standardized contracts, monitoring services, transaction support i.e. specialized knowledge. Since IT can provide the majority of these tasks at lower costs, the existence of real estate agents can be questioned. For example, internet platforms enable buyers and sellers to bypass real-estate agents. Over the years, the "for-sale-by owner" figures increased which goes along with the disintermediation of real-estate agents (Crowston & Myers, 2004). The effect of disintermediation is also noticeable in the brokerage sector. Institutional investors make use of algorithmic trading, smart order routing or direct market access. These technologies enforce self-directed trading and mean lower costs for institutional investors. Therefore, they tend to skip the traditional broker in the value chain. Trading control, urgency and anonymity

are further intentions for institutional investors to adopt these technologies (Ende, 2010). Additionally, e-brokers are offering self-service brokerage services like trade execution for a lower price than traditional retail brokers. This challenges the business model of traditional retail brokers, too (Bakos et al., 2005; Gharavi, Love, & Sor, 2005). The case is similar for exchanges. New alternative electronic trading platforms attack incumbent exchanges. Lucas Jr., Oh, & Weber (2009) conducted a case study of the New York Stock exchange. A key finding is that at some point incumbent companies have to radically modify their business model or adapt the one of the new entrant to survive. In the end, the superior technology and business model becomes dominant. IT-enabled business models like person-to-person lending platforms challenge banks and credit card companies. These intermediary functions were traditionally a competency of banks and credit card companies (Wang, Greiner, & Aronson, 2009). In this context, Moewes, Puschmann and Alt (2011) raise the term "open point of banking". Non-banks starting to compete with traditional players in the financial service industry. In a survey-based study among digital natives, already half of the participants are willing to use financial services from non-banks. This underlines the trend towards a more heterogeneous market with further disintermediation of traditional banks (Sachse, Alt, & Puschmann, 2012).

3.2 Customer Relationship

People become more and more familiar with digital technologies. Especially with the existence of digital natives, i.e. the future customers, this trend will continue. Digital natives is a term that describes people that are born after 1980 and show an affinity towards technology (Prensky, 2001). "With the growing recognition of the customer's role in service creation and delivery, there is an increased impetus on building customer centric organizations" (Setia, Venkatesh, & Joglekar, 2013, p. 565). It becomes inevitable for financial service providers to co-create value with customers to respond to the change in customer behaviour and needs, which is topic in the customer relationship category.

In a survey based study among CIO/IS executives in the US, Tallon (2010) finds support for the banks' desire to become more intimate with their customers i.e. the strategic move from operational excellence to customer intimacy. The author differentiates between small and large banks and finds that large banks' IT focusses more on transaction efficiency and costs, which obviously is at odds with a more service-oriented strategy. Therefore, "for customer intimacy to succeed, the primary locus of alignment needs to move to other parts of the value chain" (Tallon, 2010, p. 243). One way to become more customer-centric is the use of web 2.0 technologies. Nüesch, Puschmann and Alt (2012) develop a framework for assessing the web 2.0 adoption of banks. Their findings indicate that only a few companies use web 2.0 to support the interaction with their customers. Pole and Puschmann (2011) develop a classification framework for web 2.0 applications in private banking. The framework dimensions are application fields, potentials, relevance and risks. All in all, their findings are similar to Nüesch, Puschmann and Alt (2012). Banks are starting to explore the potentials of web 2.0 technologies in customer-related processes in order to become more customer intimate. But most banks only provide basic services such as instant messaging, wikis, blogs and rating applications. This means fewer risk but also fewer business potentials e.g. client acquisitions, bank-client relationship, loyalty and cross selling products. Moewes, Puschmann and Alt (2011) call the trend to use web 2.0 technologies the "interactive point of banking".

Further trends towards an increased customer centricity are the mobile point of banking, configurative point of banking, integrated point of banking, multifunctional point of banking and open point of banking. Mobile point of banking refers to the increased number of mobile devices used by the customers. The customer does not only want to do banking anytime but also anywhere. The configurative point of banking allows customers to customize their banking products. Integral point of banking is the increased transparency for the customer. That means the same information is provided for the customer and for the advisor. Multifunctional point of banking can be understood as the trends towards multifunctional devices i.e. paying with mobile phones. In a survey based study about banking, Sachse, Alt and Puschmann (2012) find that the electronic channels gain in significance. At the same time, services like advisory are still important for the customers. Obviously, this is an additional challenge for banks. They are expected to provide their services electronically but, at the same time, customers want to choose from different channels. Moreover, the results show that a web 2.0 presence is expected. However, customers are not willing to use this channel for banking activities like money transfer. The effect of IT-based service channels on firm performance is analysed by Banker et al. (2009). The results show that internet banking adoption increases cost efficiency but not revenue efficiency. The gain is not able to compensate for the loss, which leads to an overall negative effect. In contrast, the traditional branch-based channel leads to higher operating costs but, at the same time, higher revenues are documented. The revenues are able to cover the extra costs, resulting in a positive overall effect. The same applies for IT investments in ATM networks. Moreover, the traditional channel and Internet banking channel are both positively associated with market share in the loans and deposits business. Further research confirms these findings and shows that Internet banking is important for a long-term competitive advantage. Therefore, due to channel complementariness and customer centricity, banks should consider these insight in their channel strategy (Banker et al., 2010). Setia, Venkatesh and Joglekar (2013) examine the impact of digital technologies on the customer service performance. They study the local Indian banking sector and introduce a theory to "understand the effectiveness of a customer-side digital business strategy focused on localized dynamics" (Setia, Venkatesh &,Joglekar, 2013, p. 565) . The authors present two constructs, customer orientation capability and customer response capability that companies need to consider in order to respond to the customers' needs. Customer orientation capability is the ability to monitor the customers' needs and enable a business strategy that focusses on the customers' needs (Slater & Narver, 1994). Customer response capability is the ability to respond efficiently and quickly to the customers' needs (Jayachandran, Hewett, & Kaufman 2004). Both capabilities can be subsumed under customer service capabilities. They are hypothesized to influence the overall customer service performance that means the customers' evaluation of the services offered (Fornellet al., 1996). Information quality as a part of digital design is hypothesized to have an impact on both constructs. Process sophistication is expected to act as a mediator. The results show that information quality has an impact on the customer service capabilities. Additionally, the more sophisticated the customer service process are, the stronger is the relationship between information quality and customer service capabilities. The findings indicate that there is a direct impact of digital technologies on the customer service performance.

3.3 Information and Technology Relationship

Another category is the information and technology relationship. First, the technology and the interaction between user and technology is changing. For example, the competition between financial investors shifted from trading floors to electronic trading venues (Lucas et al., 2009). Furthermore, humans are not only competing against each other anymore, they are facing sophisticated technology innovations such as high frequency trading and algorithmic trading, too. Algorithmic trading is "the use of computer algorithms to automatically make trading decisions, submit orders, and manage those orders after submissions" (Hendershott, Jones, & Menkveld, 2011). High frequency trading can be viewed as a subcategory of algorithmic trading, that is considered to be more complex and especially targets at connection and processing speed (Zhang & Riordan, 2011). Gsell and Gomber (2009) prove that algorithmic trading behaves differently concerning the positioning of limits, order types and the order modification or deletion. The authors conclude that algorithmic trading has an advantage over human trading in terms of the processing speed of data feeds. Humans cannot compete with these instantaneous order submission or modification. In the US the trading volume for high frequency trading makes accounts for 60% of all orders in 2009 (Tabb, Iati, & Sussman 2009). Second, information becomes increasingly digitized. For example, a bank account is almost completely digital and one does not rely on the local branch for banking services anymore. This transformational impact applies especially for the financial service industry because in most cases the value-creating component of a financial product or service can be displayed via 1s and 0s i.e. it can be digitized. Consequently, there is a shift from a physical to a digital nature in the financial service industry. The digitization of information can also be observed in the real estate sector. The obvious difference is that the product real estate is physical. Nevertheless, the information about real estates can be digitized. This means that it is "[…] impacted by information technology and resulting change, including the assembly, analysis and transfer of information." (Crowston et al., 1998, p. 288). Granados, Gupta and Kauffman (2006) suggest a continuum where one can classify products based on their digital product characteristics. At one end, there are physical goods and at the other end, there are information goods. The authors state equity markets and bond markets as an example for information goods. Both security types are easy to display electronically but the nature of equities is less complex relative to bonds. Hence, it is easier for non-traditional firms to enter the equity market e.g. the brokerage company E*Trade. Ultimately, the equity markets are relatively more transparent than bond markets.

4 Conclusion and Discussion

For the business relationship, one insight when comparing the different sectors of the financial service industry is, that nearly every traditional business model of companies in the financial service industry is challenged by the increasing digitization. New players, financial but also increasingly non-financial companies enter into incumbent's markets and offer services at a cheaper rate and/or better service quality. Moreover, whole business models become obsolete by bypassing an intermediary financial service provider in the value chain. Eventually, we can observe an increasing rate of disintermediation of traditional financial companies. Another finding is that the lines between IT and business become more and more blurred. In the past, the role of IT had a rather business supporting function. Today, IT often

acts as an enabler of new business models like person-to-person lending. With the further increase of digital technologies, one can assume that these trends will continue.

The category customer relationship shows that there is strong evidence towards customer centricity by using digital technologies in the banking industry. It is also evident, that digital technologies have an impact on customer service performance. However, the pace at which banks approach customer centricity can be describes as rather reluctant and cautious. This may have several reasons. For one, IT is not set up to support customer centric solutions in every company. Additionally, becoming customer centric is obviously involved with up-front expenses but the payoff remains uncertain. Implementing low cost solutions such as low intensity level applications can be interpret as a risk averse way of becoming more customer-centric. However, these findings are limited to the banking sector. The inference for other sectors is limited due to the different business model. However, research on this topic is emphasized.

The conclusion for the information and technology relationship is that there is a trend from "physical to digital" in the financial service industry. To be able to digitize a product or service means the cost for information processing decrease. Markets tend to become more transparent in a digital environment. Additionally, there is some evidence that the interaction between user and technology changes. Therefore, further research could for example take a closer look at the change in human-machine interaction.

A literature review should not only be limited to analysing the past, it is also supposed to identify possible research gaps and outline corresponding questions that can be helpful for future research (Webster & Watson, 2002). Given the findings in this research article above, the following possible research questions are derived in table 3.

Business Relationship
How do companies in the financial service industry handle the various challenges caused by digitization? For example, how do incumbents react to new business models entering the market and the threat of disintermediation?
How and where can digital technologies enable new business models?
How does the digitisation affect processes and internal structures of certain organizations? For example the differentiation between business and IT departments (especially in digital technologies enabled business models such as p2p-lending)?
How much should be digitized and where are the limits of digitization in terms of the return on invest?
Consumer Relationship
How do different approaches of becoming customer centric e.g. the adoption of web 2.0 technologies affect the customer service performance and ultimately the firm performance?
How do financial service providers deal with the changing demands of their customers?
How do financial service providers react to the challenge to provide digital services for people with an affinity for technology and satisfy "traditional" customers at the same time? And how do does this challenge impact their business models, internal structures and processes?

Is the trend towards customer centricity evident for other financial service sectors aswell, besides banking? Is customer-centricity a business-to-customer phenomenon, or is it also observable in business-to-business, why or why not, what do they have in common, where do they differ?
Technology and Information Relationship Which characteristics (e.g. complexity) make a product or services suitable for digitization? How does the digital transformation affect physical and information goods? What do they have in common where do they differ? How and where do digital technologies affect the human-machine interaction, and why? What are the consequences? What are the effects of an increasing digitization? For example, equity markets tend to be more transparent, but how does digitization influence other sectors?

Table 3: Possible Future Research Questions

Limitations. Clearly, this research article has its limitations. One limitation lies within the presentation of the results. The categories emerged from a sample that only represents a snapshot from the time the research was conducted. Therefore, the categories cannot be treated as rigid and it is likely that future research alters the content of the categories or the categories itself when new sample data is available. Additionally, the categories should not be treated as distinct but rather be seen as complementary to each other. For example, the digitization of products (technology and information relationship) can lead to new business models, which can results in possible disintermediation of incumbents (business relationship). The narrative review style certainly has its advantages when creatively conducting a review on an emerging topic. But at the same time the author has to handle the given freedom cautious with respect to the reproducibility of the results. Independently selecting the sample articles by two researchers aims to keep this issue at a minimum. Finally, the proposed research questions envision potential future research directions but do not claim to be complete.

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SleepCompete:
A Smart Bedside Device to Promote Healthy Sleeping Habits in Children

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Abstract

We outline SleepCompete: a bedside device that encourages and promotes healthy sleeping behaviour in families, with a particular focus on children, in a fun and useful way. SleepCompete encourages children and their parents to monitor sleeping habits by introducing a 'sleep score'. By sharing this score with others we propose that SleepCompete persuades its users to improve sleeping habits. We outline the concept of our device and the preliminary study we conducted.

Keywords: Bedside device, Sleep patterns, Gamification, Human-computer interaction

1 Introduction

Sleeping behavior is an important factor that affects a person's health and well-being. While good sleep can positively affect people's performance, a lack of sleep can negatively impact the memory (Maquet, 2001), health [1], immune system (Bryant, Trinder, & Curtis, 2004) and cognitive functioning (Wagner, Gais, Haider, Verleger, & Born, 2004), etc. Sleep monitoring can contribute to raising people's awareness about their sleeping routines, which may change their sleeping behavior and lead to improvement of the quality of sleep. The relevance of this topic is emphasized by the major role sleep takes in our everyday life: young children (4-12 years old) require between 9.25 to 11.5 hours of sleep every night (NHS, 2013). Even by adulthood, we

spend more hours sleeping (on average 2500 hours per year) than at work (Schmidt, Shirazi, & van Laerhoven, 2012).

The prevalence of different apps and gadgets on the market (e.g., FitBit One, Jawbone Up, Sleepbot) indicates popularity and demonstrates interest in sleep monitoring among the public. Additionally, sleep monitoring plays a prominent role in research about sleep. In the medical domain, researchers have investigated numerous technologies and approaches in sleep labs in order to monitor individuals' sleep behavior (e.g., Ayas, White, Manson, Stampfer, Speizer, Malhotra, & Hu, 2003, Morillo, Ojeda, Foix, & Jiménez, 2010). In recent years, new technologies have also been leveraged to monitor sleep behavior in people's natural environment at home (e.g., Sahami Shirazi, Clawson, Hassanpour, Tourian, Schmidt, Chi, Borazio, & van Laerhoven, 2013).

Within the field of Human-Computer Interaction (HCI), most approaches focus on adults to use technology in order to increase awareness of their sleeping habits with the aim of persuading them to adopt healthier sleep routines (e.g., Schmidt, Shirazi, & van Laerhoven, 2012, Sahami Shirazi, Clawson, Hassanpour, Tourian, Schmidt, Chi, Borazio, & van Laerhoven, 2013). However, little work has been done leveraging technologies that promote healthy sleep patterns especially for children (e.g., Ozenc, Brommer, Jeong, Shih, Au, & Zimmerman, 2007).

In this work, we propose a bedside device called "SleepCompete", which has been designed to promote healthy sleep patterns in a fun and useful way for children. At the same time, SleepCompete aims to support parents who are trying to promote healthy sleeping habits in their children: providing transparency about children's sleeping behavior and reducing occurrences of children waking up their parents in the middle of the night.

2 Related Work

Our research draws upon related work that investigated how to efficiently monitor sleep behavior. Choe, Consolvo, Watson, & Kientz (2011) highlight relevant design concerns when using technology to improve sleep behavior. Mhóráin & Agamanolis (2005) derive sleep patterns from monitoring a person's eye movements; they use a wearable solution in the form of an eye mask. van Laerhoven, Borazio, Kilian, & Schiele (2008) use wrist-worn sensors (a combination of light and simple motion and posture sensors) and focus on body posture and movements during sleep as indicators for sleep quality.

In contrast to the aforementioned sleep monitoring systems, the social alarm clock app "Somnometer" (Sahami Shirazi, Clawson, Hassanpour, Tourian, Schmidt, Chi, Borazio, & van Laerhoven, 2013) requires the user to interact with the app on the smartphone in order to set the status of "awake" or "sleeping" respectively. Additionally, they add a social functionality to the app by allowing users to share their sleep ratings with friends on Facebook. The results of their study show that their app raises awareness of sleeping behavior and that sharing sleep information with others has the potential to positively affect sleeping behavior.

The "Reverse Alarm Clock" (Ozenc, Brommer, Jeong, Shih, Au, & Zimmerman, 2007) promotes healthier sleep patterns for children and parents alike. The clock communicates whether it is time for sleep or for getting up in a way that children understand. As a result, the clock keeps children from getting out of bed in the middle of the night and interrupting their parents' sleep.

While previously published research has looked into different sleep related aspects separately, we aim to integrate the findings of these works into one package; creating a gamified application that will monitor and share sleep behavior with others in order to promote and encourage healthy sleep behaviour in children.

3 SleepCompete

3.1 The Concept

Our work targets families who wish to improve the sleeping behavior of children in their household: data gathered during sleep monitoring must interest and appeal to both children and their parents. Our intelligent device, which we call "SleepCompete", monitors children's sleep habits and then presents this information in a simplified (and even fun) way to children, which they can easily understand. This information is shared not only with parents, but also with friends or siblings as part of a competitive game (gamification) that persuades and encourages healthy sleep patterns. More concretely, SleepCompete allows children to play a game while they are sleeping. The objective is identifying and facilitating healthy sleep patterns: providing parents with transparency about children's sleeping behavior.

Whilst a child sleeps, they participate in the SleepCompete game. The goal of the game is to get a high 'score' by accumulating as many 'points' as possible: points are only awarded during phases of 'sleeping soundly'. The real-time score is shown on the SleepCompete device using an LED matrix. Additionally, children are able to compare their scores with friends' scores in (near) real-time, which is shown on a LCD touch display on the device. Moreover, parents can access and monitor their children's scores via a web interface: accessible both as a web portal and through an app for smartphones.

3.2 Objectives

SleepCompete aims to support parents who wish to improve their child's sleep routine and reduce stresses at bedtime. Its particular purpose is keeping children from getting out of bed in the middle of the night and interrupting their parents' sleep (Ozenc, Brommer, Jeong, Shih, Au, & Zimmerman, 2007). In addition, parents may use a dedicated web portal to monitor their child's sleep behavior (over days, weeks or months) as well as receive reliable information relating to their child's sleep. Additionally, we propose that SleepCompete may prompt parents to provide feedback and rewards to children beyond the scope of the device.

With the gamification concept, we expect children to enjoy and participate with SleepCompete on different levels. Firstly, children collect points as a reward for a good night's sleep, generating a 'sleep score'. This allows children to enjoy monitoring their own sleeping behaviors whilst also introducing a level of competition: children can try to beat their own or a friend's sleep score. This form of enjoyable competition with friends may encourage healthier sleep patterns. Children will benefit from the positive reinforcement that the device offers (better performance means better sleep scores).

The introduction of SleepCompete to reinforce positive, healthy sleep behaviors at bedtime may benefit the family as a whole. Children, engaged by SleepCompete, are expected to improve their sleeping habits. Parents may benefit as occurrences of nightly waking will likely decrease, the increased knowledge of healthy sleep habits may influences their own sleep behavior. We propose that positive attitudes to sleep will (1) reduce agitation at bedtimes and (2) improve overall household relations.

3.3 The Prototype

We designed SleepCompete as a cube shaped bedside unit; the outside of our prototype can be seen in Figure 1. The design of the device should allow the user to be able to choose which 'face' of the unit they can see.



Figure 1: SleepCompete prototype. The LED Matrix displays the score visualization

Whilst the LED dot matrix offers at-a-glance score information, those that find the light distracting can turn this side away from view. The LCD touch display of the device has two settings: a default setting which shows the time (like an alarm clock) and a numerical display showing the sleep score of the user and selected friends. We believe that this approach satisfies important practical considerations: the cubed design caters for preference for those who may find the light and information displays of SleepCompete an impediment to sleeping.

The Sleep Compete device operates by 'sensing' sleepers' movements. This information is stored and displayed on the device and shared with selected friends' devices as well as with parents' analytical platform.

We built the prototype using the Microsoft Gadgeteer platform (Microsoft, 2013). Gadgeteer is a rapid prototyping platform, which allows for easy integration of hardware components. Within our device we included: a mainboard (GHI Fez Spider), a USB module with an SD card to provide power and data storage, an LED matrix module to display the sleep score visually, a button to turn the sleep sensing on and off, a Wi-Fi module (GHI Wi-Fi R521) which relays the data gathered to a web server, an LCD display (GHI T35 Display) to display time and score information textually, an accelerometer and a motion sensor (GHI PIR module) to sense sleepers' movements.

4 Pilot Study

For the pilot study, we created two fully functional SleepCompete devices to conduct an overnight experiment with adult participants from the development team. Each participant slept next to a SleepCompete prototype with an accelerometer module placed on their bed and the PIR module facing their sleeping position. Points were awarded if little or no movement was sensed during allocated time periods (for simplicity we divided each hour into 8 time segments in order to record a total of 8 hours of sleep). Additionally, to verify the effectiveness of the motion sensing, we used cameras to track the participants' movements as they slept. Analysis of these images in

combination with gathered accelerometer data suggest that the accelerometer readings were mappable to physical movement: an example is shown in Figure 3.

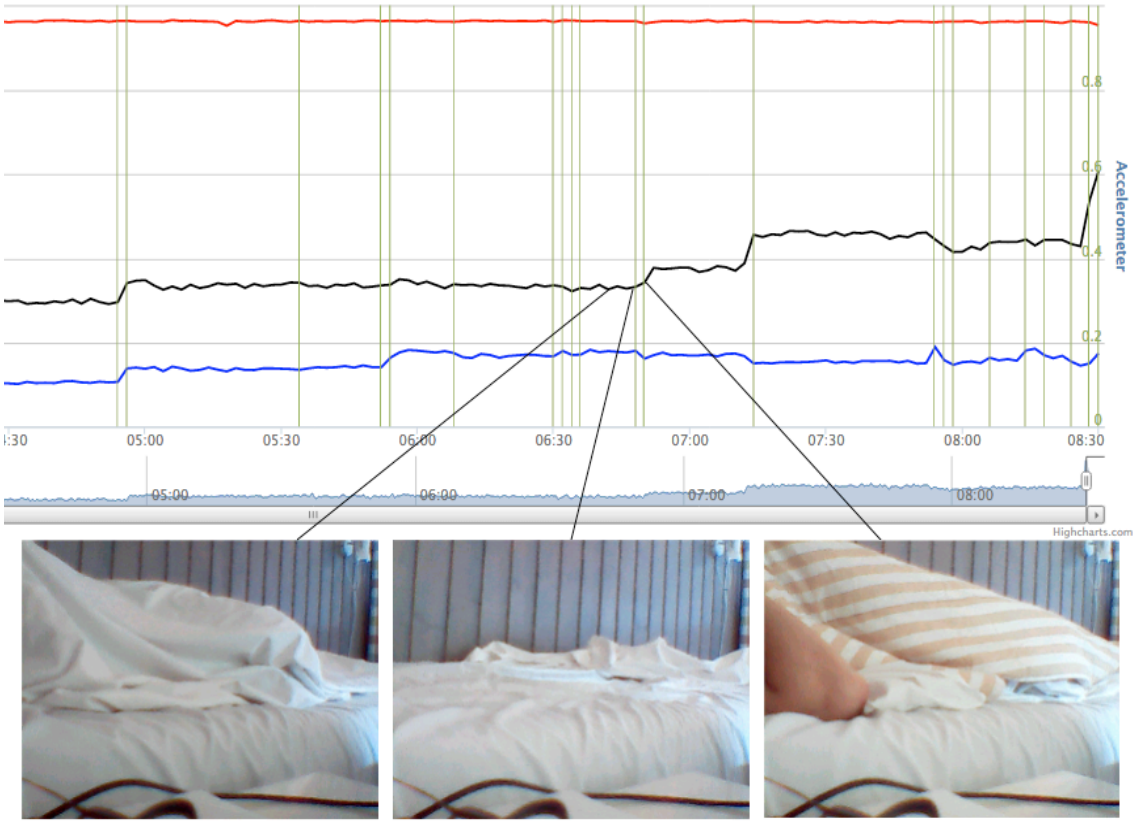


Figure 3: Camera images captured related to movements recorded from accelerometer during implementation

5 Ongoing and Future Work

We have described the design idea, objectives, and our pilot study with a fully functional prototype of SleepCompete. However, there are still open questions with regard to the suitability, effectiveness and feasibility of the design.

Through ongoing work and further pretests, we aim to improve the prototype system. This includes improving the robustness and accuracy of our prototypes and evaluating the effectiveness of the device in general and specifically establish how reliable the relationship between movement and quality of sleep. Further, we will develop the web portal for parents (a mock up is shown in Figure 4) including easy to understand visualization of data analysis. Additionally, we intend to incorporate further game features (such as levels) to improve motivations for children long term. We shall achieve these by running long-term trials with families and children, conducting semi-structured interviews with participants and surveys with larger user groups.

A limitation of our concept is that, in the case of sleep, more is not always better, as health recommendations provide an upper limit for daily sleep. Analysis of long-term effects should provide insights into whether upper limits are reached and countermeasures have to be implemented in the game.

Overall, we believe that our work on SleepCompete can contribute to a better understanding of technology use in family environments that support healthy sleep behaviors, and explore how playful and social interaction with technological devices can positively impact health in a way that supports children and parents alike.



Figure 4: Mockup of SleepCompete Analytical Web Portal

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Music Piracy Neutralization and the Youth of the 2010's

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Abstract

In this qualitative research, music piracy among the youth was studied by applying Sykes' and Matza's neutralization theory. The key objective of the study was to find out how youths view music piracy, and how they give accounts for it using techniques of neutralization. According to the conducted semi-structured interviews, youths do acknowledge the ethical and economic problems of music piracy. However, piracy is still exercised, and in order to justify this, multiple neutralization techniques are used. The most characteristic of the employed techniques was "claim of normalcy", with "denial of victim" and "justification by comparison" also appearing frequently. In order to prevent piracy, these techniques need to be countered. The industry needs to effectively voice that "common" does not equal "right". Recognized artists with reasonable "victim status" should relay the message.

Keywords: Interview, Music Piracy, Neutralization Theory, Youth

1 Introduction

This study explores the ethical and behavioral aspects of music piracy, more precisely defined as copying of a music recording without proper permission from the copyright holder (Gartside, Heales, & Xu, 2006). What do the young pirates of think about downloading, and what can be learned from their arguments and explanations for their behavior?

Digital products such as software, music and video content are characterized by their high initial production costs and very low duplication costs: the cost of creation of an additional digital copy of a music album is practically zero. They are also public goods in a sense that sharing with others does not reduce their consumption utility. With these

qualities, digital content is susceptible to illegal copying and file sharing, or piracy, on the Internet. (Gopal et al., 2004). A large portion of this piracy takes place in peer-to-peer (P2P) networks, in which the users download and share content simultaneously.

It is well known that piracy is most common among the youth (Gopal et al., 2004), especially boys (Chiang & Assane, 2008). According to Salmi (2012), illegal downloading is also the most common crime perpetrated by Finnish 9th grade students (15-16 year olds), with 79 percent having pirated in their lifetime and 71 percent during the last year. However, piracy trends seem more promising: there was no difference in total youth involvement in illegal downloading between 2008 and 2012 (Salmi, 2012). Another survey from Finland, the 2013 issue of the yearly Copyright Barometer (Taloustutkimus Oy, 2013), indicates a significant decrease in illegal downloading of music, movies or games among 15-24 year olds: 61 percent in 2009 versus 33 percent in 2013. However, illegal streaming was on the rise.

Many papers have been published on the subject of economic effects of piracy, with somewhat different findings (Tschmuck, 2010). Regardless of the results of these studies, piracy must be viewed as a major factor in the digital economy. Understanding customers' decision-making processes and ethical thinking should be a top priority for every organization in the industry.

2 Theoretical Background

The theoretical framework for this study is Gresham Sykes' and David Matza's Neutralization Theory (Sykes & Matza, 1957; Matza, 1964). It originated as a criminological theory to explain juvenile delinquency, but has been since applied to a wide array of different norm-breaking behaviors, ranging from shoplifting (Cromwell & Thurman, 2003) to coming to terms with the Holocaust (Hazani, 1991).

At the core of the theory is the notion that juvenile delinquents share the same values as the law-abiding general public. This was directly against the views held by subcultural theorists, who claimed that the subculture of juvenile delinquents has its own shared values that differ from those of the wider society. To alleviate the guilt of violating the values and rules of the society, the delinquents employ certain verbal and mental techniques, which Sykes and Matza termed *techniques of neutralization*. In their article, they distinguished five of such:

- *Denial of Responsibility.* Individuals who employ this technique refuse to accept responsibility for their actions, either by claiming an accident or that they were somehow forced to their illegal actions by circumstances. This is considered to be the most crucial of the techniques.
- *Denial of Injury.* Illegal actions are claimed to be harmless, or that the victim can well afford the losses suffered from aforementioned actions.
- *Denial of Victim.* In this technique, it is recognized that there may be a victim to the crime, but the victim is considered to somehow deserve his fate, possibly as punishment or retaliation.
- *Condemnation of the Condemners.* Behavior is justified on the basis that the victimized are not real victims, because they are hypocrites or that the victims would engage in similar activities were they provided the opportunity.

- *Appeal to Higher Loyalties.* Here, illegal actions are motivated by recognition of the needs of the individual's immediate social group such as their family or a gang.

Subsequent research has identified many additional techniques of neutralization. The present study used the following six additional techniques relevant to digital piracy, compiled by Harris and Dumas (2009): *defense of necessity* ("There was no other choice "), *metaphor of the ledger* ("My good deeds outweigh my bad deeds"), *claim of normalcy* ("This behavior is completely commonplace"), *denial of negative intent* ("I did not mean any harm"), *justification by comparison* or *claim of relative acceptability* ("It's not as bad as…") and *postponement* ("Let's talk about something else"; the action is simply put out of mind). Thus, the uses of a total of 11 techniques were under scrutiny for this study.

3 Neutralization Research on Digital Piracy

Not all neutralization research on piracy has found substantial support for neutralization theory. For example, Hinduja (2007) found neutralization techniques to be only weak determinants of software piracy. He speculates that this was because of respondents did not view piracy as morally reprehensible. However, based on a rare longitudinal study design, Higgins et al. (2008) posit that the level of neutralization utilized affects the piracy that actually occurs - a cogent argument for neutralization theory. In their sample, younger males were most likely to neutralize their behavior.

Certain neutralization techniques have been found to be relevant piracy predictors. Music piracy can be predicted from *denial of responsibility*, *denial of injury*, *denial of victim* and *appeal to higher loyalties* (Ingram & Hinduja, 2008), while the predictors of software piracy have been reported to be *appeal to higher loyalties* and *condemnation of the condemners* (Siponen, Vance, & Willison, 2012).

According to Ulsperger et al. (2010), the most common technique among "Generation Y" respondents was *denial of responsibility*, while the least used was *appeal to higher loyalties*. In their quantitative study, all five original techniques appeared. However, the study was limited to these five techniques, and many of the examples cited could have alternatively been categorized as belonging to some of the above presented additional neutralizations.[1] On the other hand, qualitative studies by Moore and McMullan (2009) and Halttunen, Makkonen and Frank (2010) found *denial of injury* to be the most common technique. Moore and McMullan (2009) also reported that pirates simultaneously employed multiple techniques.

Techniques can also be categorized by their temporal relations to the neutralized behavior. Harris and Dumas (2009) reported that *denial of victim* and *appeal to higher loyalties* are primarily used before the action takes place, while *denial of injury*, *claim of normalcy* and *justification by comparison* are more often used as after-action neutralizations, or as they are known in the neutralization literature, rationalizations.

Another variable in the use of neutralizations is the role of culture (Cohn & Vaccaro, 2006; Yu, 2013). A study by Yu (2013) found that Asian students were significantly

[1] An example: the argument "It is done so much it is not a big deal" was interpreted as *condemnation of the condemners*, while *claim of normalcy* would have been a better fit.

more likely to justify digital piracy with neutralizations than others. Yu (2012) also makes a point that neutralization stems, at least in part, from low levels of moral judgment. Morris and Higgins (2009) note that peer behavior may play a special role in the development of neutralization techniques.

In conclusion, there have been multiple qualitative and quantitative studies on neutralization techniques in the digital piracy context. Each of these approaches comes with their own limitations and weaknesses. The studies differ by the interpretation of the free-form written or spoken accounts, some of them related to different numbers of studied neutralizations. In addition, quantitative measures for neutralization tend to rely on artificial situations presented in surveys, which do not capture the narrative properties of neutralization (Maruna & Copes, 2005).

4 Objectives and Methods

The objective of this study was to gain an understanding about digital piracy (especially music piracy) and its neutralizations among the youth of the 2010's: Are techniques of neutralization employed for music piracy (and how, if applicable), or is piracy considered ethically unproblematic? What actions should be taken to combat piracy? What are the defining characteristics of this generation of digital pirates, and what future developments can be expected? Prior studies' samples have consisted of slightly older individuals (college students), this study thus adding knowledge on the behavior on minors.

The conducted study was of qualitative nature. Because of the chosen research approach, results of the study cannot be generalized to a larger population. However, these findings may be used as a base for new approaches to quantitative neutralization studies.

The informants were recruited from a school complex in Central Finland. A preliminary questionnaire was administered with 9th grade students (15-16 year olds) of the secondary school and 1st and 2nd grade students (16-17 and 17-18 year olds) of the high school. The questionnaire consisted of three questions:

1) Have you downloaded or distributed the following copyrighted works illegally on the Internet? (Music; Movies, Television series, other video works; Video games)
2) Do you currently continue to download or distribute content illegally?
3) Would you be interested in participating in an anonymous interview study concerning music piracy among youth? The interview will last for one hour at most. Fill in only if you have experience with illegal downloading or distribution of content.

At the end of the questionnaire, the students were asked to provide their contact information (phone number, e-mail address) were they interested in participating. For some reason, this method of recruiting proved to be highly ineffective, as only three students filled in their contact information, even though the possibility of winning a small prize by participating was announced. After that, additional recruitment was done by some of the teachers of the school. This took the form of simply encouraging potential interviewees to take part.

Finally, eight students with music or other piracy experiences agreed to participate in a personal interview in a private setting. The interviews were conducted in a semi-structured format, i.e., all of them shared common themes and questions, but there were possibilities to discuss topics in free form and in the order most preferred by the interviewee. The length of the interviews varied between 31 minutes and 53 minutes. Every interview was recorded with a voice recorder and later transcribed as text. A typical interview yielded approximately ten sheets of paper (A4 format) and 30 000 characters of text (in Finnish). Anonymity of the participants was carefully preserved, as their real names were never mentioned either during interviews or transcription. The sample size can be characterized as small even for a qualitative study, but there are nevertheless many insights to be gained from these interviews.

5 Findings

Even if the preliminary questionnaire was ineffective for recruitment purposes, it provided some statistics about piracy. Out of 104 total valid respondents, 85 (81.7 %) had downloaded or distributed content illegally, and 67 (64.4 %) respondents were 'active' pirates. While the sample size of the questionnaire was rather small, the numbers corresponded well with earlier studies about prevalence of piracy in Finland (Hietanen, Huttunen, & Kokkinen, 2008; Salmi, 2012). Piracy numbers in the questionnaire were also comparable with those gathered from United States (Gunter, Higgins, & Gealt, 2010).[2]

Out of the final eight interviewees, five were male and three female. At the time of the interviews, the youngest participant was 14 years of age (b. 1997), while the oldest participants were 17 years of age (b. 1994).[3] Two of them, one male and one female, did not consider themselves as currently active pirates. The male had come to a conclusion that what he was doing was wrong, and had not downloaded anything illegally during the last year. For him, a major way of responding was confession of guilt of prior behavior; a concession. The female resorted to her older sister's (probably partially illegally acquired) music collection to seek new songs.

The interviews began with questions about the participants' background information, such as age, family members, first personal piracy activities that they recalled and music consumption habits. Typically the participants had first downloaded content illegally during the middle to late 00's. Many participants mentioned that they learned how to pirate from older relatives or friends. Illegal downloading was not a common discussion topic with parents, even though parents were well aware of their children's piracy. It was also common and accepted among friends of the interviewees, while they personally knew at least some individuals who were strictly against piracy. The majority of participants also used money for legal acquisition of music, typically in physical CD format. The subscription service Spotify was widely used, but the participants often settled for its ad-based free version and were not willing to pay monthly fees. There also seemed to be a noticeable shift from music piracy to piracy of other content, such as video. Some of the interviewees claimed that the need to pirate music has decreased, as legal alternatives have progressed and are more tempting than before.

[2] Data from Delaware School Survey showed that 52.2 % of 8th grade students (13-14 year olds) and 72.3 % of 11th grade students (16-17) had pirated in their lifetimes.
[3] The interviews took place during May 15–29, 2012.

After that, the interviewees were asked about the ethical qualities of piracy. Asked whether piracy was right or wrong, all participants recognized at least some unethical issues. Many claimed not to have thought about the subject before, and had to ponder the issue during the interview. There was a certain threat of social desirability bias in this setting, so the results must be interpreted in that light.

Neutralization techniques could be identified from each of the interviewee's responses to the questions and scenarios proposed by the interviewer. Five out of eight respondents employed multiple techniques during the interview. The most-used techniques were *claim of normalcy* (six out of eight respondents), *denial of victim* (four respondents) and *justification by comparison* (three respondents). It should be noted that the key technique proposed by Sykes and Matza (1957), *denial of responsibility*, appeared only in one interview. This was to be expected considering the nature of Internet use: users have considerable control of their actions and are rarely "forced" to do anything illegal online.

The following contains examples of each of the used techniques in the interviews (translated from Finnish to English). Some of these appeared to be obvious ex post neutralizations, or rationalizations. However, with the present study design, it was impossible to delve deeper into temporal relationships of neutralization and behavior. As a clarification, it should be noted that two of the original techniques, *condemnation of the condemners* and *appeal to higher loyalties*, did not appear in the interviews, and are naturally absent from the following. This is also the case for the additional neutralizations *metaphor of the ledger* and *denial of negative intent*. In the end, seven out of the eleven studied techniques were used by the interviewees.

Claim of Normalcy: six users (M1, M3, M4, F1, F2, F3)

"It's so common and one just can't consider that it was in any way illegal." (Female #3, age 16)

This technique was used to most. In addition to the notion of piracy being common and thus intuitively not that wrong, there was a link between 'easy' and 'normal': because piracy was considered easy, it was also seen as normal. Low level of perceived risk meant that piracy was not a 'real' crime. Social norms also played a role in casual attitudes towards piracy: it is so widely accepted that the individual feels no need to question the situation.

Denial of Victim: four users (M1, M2, M4, F1)

"… I don't know if it makes sense, but I admit that I have such thought in my head that like Sony is so rich that it isn't very much of a loss for them." (Male #2, age 17)

In most cases, denial of victim used was when responding to presented scenarios. For example, the interviewees were asked to pit a media corporation's interests against those of the artists. In these situations, a large corporation is often in a stronger position to negotiate deals, and when interests collide, the consumers are likely to side with the artist, who is much more familiar to them than a 'faceless' corporation. This is highlighted by the interviewees' general opinion that the artist should receive a larger share of the profit from records sales.

The above was also the case when comparing superstar-level artists and bands to their less popular colleagues, and large record companies to smaller ones. Rooting for the

underdog was a rather universal trait in the sample. Piracy was directed towards those that do not suffer (intuitively thinking) as much from its effects. This implies that pirates consider their actions as ethically wrong, but practical matters often take precedence. It should also be noted that none of the pirates considered themselves 'at war' with the music industry (while some resented the industry's anti-piracy or anti-consumer actions), and were not using piracy as a weapon to hurt their business.

Justification by Comparison: three users (M1, M2, F2)

"Yeah like, even though one keeps downloading something, one doesn't think one is a criminal. That there will be no great pain for the conscience, possibly, unlike with some other crime, like stealing an actual physical object. […] So it feels a bit like that an actual physical good, a physical object like a movie that you steal from a store, there is a greater risk of getting caught and it really feels that you have taken it and you're a criminal, you have wronged. Then you keep the copy, but if you download a movie from the net, watch it, you either keep it there, it can stay in the files, or then you can remove it for example, and then it's gone." (Male #1, age 17)

This comparison technique was used moderately often, and appeared in three different setups in three interviews. The first (Male #1) was to compare piracy to stealing physical objects. In this comparison, piracy is viewed as lesser of the two evils, as it does not take away anything from anybody. Illegally obtained files on a computer clearly fail to generate an emotional effect, if compared to stealing physical objects. Similar arguments have been reported earlier in research on ethics of music piracy (Lysonski & Durvasula, 2008). The second (Female #2) compared the volume of piracy. Female #2 considered herself to be a small player regarding piracy, not someone who is "constantly or every day" downloading. The third comparison (Male #2) was between the ages of downloaded content. It was claimed that downloading older copyrighted material no longer available was less wrong than downloading new content available in stores. Expiration of copyright was used as a supporting argument.

Postponement: two users (F1, F2)

"No, I have just thought that I get good music and can listen to it as much as I like." (Female #1, age 16)

Postponement was used in at least two cases to seemingly attempt to 'dodge' the questions regarding the ethics of illegal downloading, thus refusing to deal with the issue. The other possibility is that the respondents had never questioned the justification of piracy. The respondents were nevertheless asked to consider the matter further, and afterwards they indicated that there are certain ethical problems associated with piracy.

Denial of Responsibility: one user (F2)

"Because it's not, in a way, the fault of those downloaders that, if you put it there, then it's like you distribute then, in a way there's a root to all evil from which it starts." (Female #2, age 15)

Female #2 seemed to represent the common downloaders (and herself) as passive entities who would not seek undeserved advantage if there were no supply for it, thus denying responsibility. She blamed the original distributors for making piracy possible in the first place. She also compared her own actions to theirs, thus simultaneously using the technique of justification by comparison.

Denial of Injury: one user (M3)

(Interviewer) So you don't feel responsible?

"Ehh, not really!" (Male #3, age 16)

It should be noted that Male #3 above was referring to the fact that an individual's own piracy is so insignificant in volume compared to the whole phenomenon, that he does not consider his own actions to be very detrimental to the industry. In other words, he was denying the injury caused by his own actions, not the injury caused by piracy in general.

Defense of Necessity: one user (M5)

(Interviewer) Yes then, why do you, what makes you download if you know that there's something wrong about it?

"Well I don't know, I don't get music anywhere else." (Male #5, age 14)

This technique was clearly apart from others employed in interviews. The above example was its only occurrence in the study. The respondent in question tended to answer all the questions with very short answers, and was the most difficult participant to interview. He had never used money to acquire digital music, and was rather unfamiliar with music stores on the Internet. He also had a strong need to own his music, so streaming services did not satisfy his needs. Against that background, the interviewee's claim of "not getting music anywhere else" can be deemed logical, even though legal options are rather universally present.

6 Discussion and conclusion

The objective of the study was to deepen the understanding about music piracy among youth, especially from the perspective of techniques of neutralization. The basic implication derived from neutralization theory is that anti-piracy education should focus on developing counter-arguments to the employed neutralizations. Thus, certain recommendations can be presented.

Based on this study, special care should be given to combating the frequent *claims of normalcy* by voicing "what is common is not necessarily right". Also, given the current availability of digital music, it can be stressed that there is no need to pirate music anymore. One possibility is to attempt to induce negative emotions towards piracy by representing it as an outdated mode of behavior: *"P2P Downloading? That's so 00's!"*[4]

There are dangers in aggressive anti-piracy campaigns by copyright-enforcing organizations, because the organizations are not viewed as 'proper victims' (*denial of victim*). As a consequence, these campaigns are subject to strong backlash effects. The interviewees reported to respond better to campaigns with visible artist involvement, because artists are the ones admired by the public; their victim status is stronger and harder to deny. However, this is not the case with superstar-level artists, as they are perceived to do so well financially. Thus, relatively known artists - not the superstars, but not those too obscure either - could be used to convey the message in campaigns. To minimize the backlash, the message itself should not be overly "anti-piracy", but more about the possibilities of legal options.

[4] Recently, such messages have indeed been aired among Spotify Free advertisements.

Finally, copyright educators should stress that comparisons between different crimes and behaviors (*justification by comparison*) are not always relevant or fruitful.

It has been noted that perceptions of what is considered ethical change when information technology is present (Molnar, Kletke, & Chongwatpol, 2008), and the actions and attitudes of the interviewed pirates confirm that the presence of IT definitely plays a role in what is acceptable. Anonymity of the Internet and the lack of physical presence of stolen objects make piracy much easier to perform than stealing CDs. While claiming that everybody does it, the interviewees admitted that there are indeed problems associated with piracy. At least, these responses tell what pirating youths expect to be a desirable response to the question of piracy; this is what pirates consider to be widely accepted in society. Hence, if they ultimately share the values of the general public as Sykes and Matza (1957) suggest, they actually consider piracy unethical (even if they answered that way simply to please the interviewer).

The group of interest for this study was the youth of the 2010's. These individuals, all under the age of 18 at the time of the interviews (b. 1994–1997), have lived practically all of their lives in a world of networks, operation systems with graphical user interfaces, and mobile devices. These people have come to know the Internet and its possibilities, such as file sharing, from a very early age: for them, these have always existed. While older individuals are also very capable of acquiring the skills and knowledge to commit piracy, they are not as native to this cultural environment as these youths. There is an argument to be made that the group of interest of this study could be called *Generation Z*, in contrast with earlier studies on Generation Y. Their attitudes toward digital consumption may be different, and they may neutralize their behavior in different ways than the pirates of prior generations. For example, given the improving availability of online music and video, related neutralizations are not going to be applicable to the same extent. Those pirates who rely on discredited neutralizations will likely attempt to develop new neutralization techniques in order to continue their downloading.

The current study has its limitations. First, the qualitative nature of the study and the small sample size make it impossible to generalize the findings. Second, the sample consisted of volunteers, who may have been more comfortable with the idea of talking about their piracy experiences and opinions than their peer pirates in general. Thus, the possibility of self-selection bias must be pointed out. Third, there was a threat of social desirability bias associated with information gathering. Even though the interviews were private and anonymous, the nature of qualitative neutralization research often causes the interviewees to feel the need to defend their actions. This may lead to a situation where neutralizations are created artificially.

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Spread like a virus. A model to assess the diffusion of dynamic ridesharing services

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Abstract

Dynamic ridesharing is a derivative of regular carpooling, which enables the formation of carpools on an as-needed basis, usually on very short notice the shared travel purpose also extends to a broad range of activities, beyond work or school. In this paper we propose a model to monitor the adoption of a dynamic ridesharing service, intended here as a mobile service that needs to achieve a critical mass to survive. Our theoretical model is inspired from the SIR model used in epidemiology to control the spread of an infectious virus. We test our model using real-data from two firms offering dynamic ridesharing services. Our model complements the view that innovative services evolve following an S-shaped curve, and it has practical relevance for managers and investors, who want to monitor and compare the evolution of competing firms in the field.

Keywords: dynamic ridesharing, mobile service, diffusion of innovation, SIR model, ouicar, blablacar

1 Introduction

This paper presents a research in progress and it is addressed to managers looking for a tool to assess the evolution of the user base of a dynamic ridesharing service.

Dynamic ridesharing (also known as real-time ridesharing) is a derivative of regular carpooling, which enables the formation of carpools on an as-needed basis, usually on very short notice and whose shared travel purpose also extends to a broad range of activities, beyond work or school (Siddiqi and Buliung 2013, p.480).

On the one hand, the particular nature of dynamic ride-sharing requires a sophisticated way to manage a large number of drivers available on short notice. Indeed, while classic carpooling allows users to define a meeting point some days in advance, dynamic ridesharing allows only few minutes to perform the matching between an interested rider and a potential driver, before the rider gives up and looks for another transportation option. On the other hand, dynamic ridesharing appears to be suitable for all those activities that do not require or allow planning in advance. Indeed, while classic car pooling is restricted to regular trips, such as home-work, or long-distance trips, such as going to a festival, dynamic ridesharing positions itself closer to taxi services, which are available at any time. Therefore, we consider dynamic ridesharing as a mobile service, which offers a new mobility solution and which might be cheaper and more ecological than taxi and private cars.

The website dynamicridesharing.org collects a large number of projects done by startup and companies in USA as well as around the world. Most of these projects have failed in the past, even though the recent examples of Lyft and Uber in USA, allows to be optimistic with respect to future development. Nonetheless, it is known that one of the greatest cause of failure is the lack of a critical mass achieved by the dynamic ridesharing service. Indeed, without a significant amount of drivers available, it is unlikely that a rider will find one driver close by on a short-notice. Consequently, if riders are not going to use the service, there will be no driver interested in declaring himself/herself available and the service will have no reason to exist.

Therefore, the monitoring of the user base appears to be a crucial element to monitor for managers of dynamic ridesharing services. We also believe that such key performance indicator has influenced the amount of money, which dynamic ridesharing startups have obtained in recent years by venture capitalists. Nonetheless, data about user base of dynamic ridesharing services is usually not fully shared with the public. Indeed, a statement like “Service X has 100’000 users” cannot be used for reliable assessments (for example, it would be useful to know when was this number collected and how it relates to the ones collected one month before and one month after).

Hence, it would be relevant to obtain useful metrics and a theoretical model to monitor the diffusion of a dynamic ridesharing service, to predict how many users will start -and how many will stop- using it. Therefore, our research question is: **how can we assess the diffusion of a dynamic ridesharing service among potential users within a target market?**

The rest of the paper proceeds as it follows. Section 2 briefly illustrates the existing literature, which address our research question. Section 3 illustrates our theoretical model and the methodology used to test it. Section 4 illustrates the results obtained. Section 5 summarizes the key elements of the paper and illustrates further directions of investigation.

2 Literature review

In order to address our research question we have defined a “literature search protocol”. We have translated our research question into keywords: *"dynamic ridesharing"* and *diffusion*. We have used the keywords to search on Google scholar any research article

available online, written in English, which proposes a theoretical model to answer our research question.

Our query returned eight results. One article was written in French and it had to be dropped from the list (Bellet and Clavel, 2007), whereas a master thesis written by a French student in English (Arbouet, 2011) addressed mobility in general and did not enter too much into details with respect to dynamic ridesharing. One book (Handke and Jonuschat, 2012) offered interesting insights about how to build a real-time ridesharing service, but it did not offer any significant insight on how to monitor the evolution of the user base. The report of Schiavone (2006), describes a view of dynamic ridesharing as an emerging service in 2006, and that underlines the great improvements that this type of service has done in the last eight years. The recent article of Siddiqi and Buliung (2013) offers a great overview of the evolution of dynamic ridesharing in the recent years by means of cases studies, but it focuses on the complementary relationship between dynamic ridesharing and information and communication technology. It is worth noticing that the authors observe that "there appear to be few success stories, most of the projects were discontinued for reasons ranging from cost inefficiencies (high capital and operating costs), lack of use, poor service levels, usability, and technological limitations. One measure of success for these case studies is the number of rides matched and executed, that is, the number of trips completed after a match between driver and passenger was made« (Siddiqi and Buliung 2013, p 493). The rest of the articles addressed dynamic ridesharing as a technical issue (Knapp, 2005; Lasdon and Machemehl, 2005).

Therefore, we can conclude that there is a gap in the literature with respect to a set of useful metrics and a theoretical model to monitor the diffusion of a dynamic ridesharing service -intended here as a mobile service- to predict how many users will start and how many will stop using it.

Nonetheless, previous research allows us to address this problem in (at least) two possible ways: (1) by monitoring the diffusion of such innovative service and (2) by analysing the change in the structure of the users' network. There is a large amount of literature that addresses diffusion of innovation and adoption of innovation. For sake of simplicity, we cite the seminal book of Everett Rogers (1962), which popularized the notions of critical mass and technology adoption. Most of literature in diffusion of innovation and technology adoption assumes an evolution following the famous "S-curve", which has been used to describe some of most famous innovation of the last century (Moore and Simon, 2012). Nonetheless, scholars in dynamic analysis of networks have used different models to describe the change in the network. Since this study concerns the spread of a new approach to conceive transportation, we refer to the model of Susceptible-Infected-Recovered, which has been used in epidemiology for long time (Norman 1975) and that has recently used by scholars to model Facebook and Myspace users evolution (Cannella and Spechler, 2014).

3 Our theoretical model and chosen methodology

Our theoretical model uses six constructs. The susceptible contacts are named *potential candidates* and their number increase over time thanks to *new potential candidates*, which are acquired through marketing campaigns. The infected contacts are named *user*

base and their number increase following the interaction among users and potential candidates. Indeed, if the probability that a potential candidate will become a user after having seen the service (that is, the *adoption rate* is very high) and if a potential candidate interact with a lot of users (that is, *the interaction rate* is very high) she will be more likely to be become a user. Table 1 shows the detailed formulas used in our model, whereas figure 1 shows the interaction among constructs.

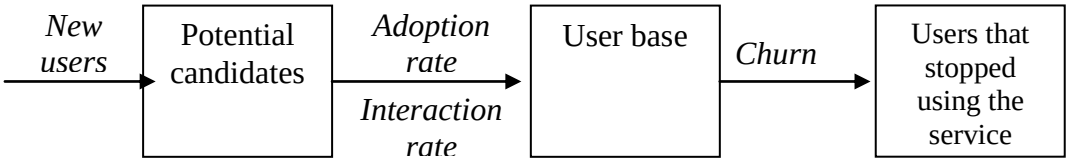


Figure 1: The constructs of our model

To operationalize our theoretical model, we need to have longitudinal data of different ridesharing firms, in order to test it over a certain span of time. Therefore, we have decided to use weekly scores obtained from Google Trends searching for "service x" and restricting the search on the country "Alpha".

Construct	**Description**	**Formula**
User base	Weekly users for service X on the country Alpha	Change in users at time (t) = new users after the interaction among users and candidates - users that left = (Potential candidates at (t-1)*user base at (t-1)* Interaction rate) * Adoption rate - User base * Churn
Potential candidates	Potential candidates to be interested about service X in the country Alpha	Change in potential candidates at time (t) = new potential candidates - new users after the interaction among users and candidates = new potential candidates - Potential candidates at (t-1)*user base at (t-1)* Interaction rate) * Adoption rate
Adoption rate	Probability that a new user will start using the service, once it has discussed with an existing user	Fix parameter defined in the model: [0.0%-100%]
Interaction rate	Percentage of existing users that interact with each new user, with respect to the total amount of existing users.	Fix parameter defined in the model: [0.0%-100%]
Churn	Percentage of existing users that stop using the system, because they have found a better alternative.	Fix parameter defined in the model: [0.0%-100%]
New potential users	Percentage of new users that stop using the system, because they have found a better alternative.	Fix parameter defined in the model: [0.0%-100%]

Table 1: The constructs of our model and the formulas used to obtain them

The choice of Google Trends as a source of data might be challenged. Previous studies have already shown how google trends can be used to predict spread of influenza across the country: Hence, we are wondering if it could apply even to dynamic ridesharing services, which we intend to model as a contagion of a new approach to mobility. On the one hand, Google Trends data might extremely sensitive to marketing campaigns of firms, since they reflect the interest of potential users that have been reached. On the other hand, data obtained from ridesharing firms are rarely available and potentially biased, since they reflect the strategy of each company to communicate to investors and to not communicate to competitors. Accordingly, we state our null hypothesis, which would falsify our model:
H0: The weekly scores obtained from Google Trends searching for "service x" and restricting the search on the country "Alpha" are not a useful representation of the evolution of the user base.

In order to falsify our null hypothesis, we need look for evidences of strong correlation between these data trends and evolution in the success of ridesharing trends.
Assuming that H0 is falsified, we need to proceed and fit the parameters of our model with the data trends obtained. In order to avoid sample selection bias, we intend to split the collected data into two parts: (1) data used to obtain the parameters and (2) data used to test the model. Consequently, we can propose our hypothesis, which concerns the shape of the diffusion trend line. **H1: The diffusion of ridesharing services follows an S-shaped trend line.**
The implications of this hypothesis are significant for managers and investors. Indeed, if the diffusion of dynamic ridesharing does not follow an S-shaped curve, it might imply that continuous investments will be required to sustain the growth of the user base.

4 Test results and discussions

In this section we present a test performed on two dynamic ridesharing firms in France. We have preferred France to USA, since the dynamic ridesharing firms in France have started later in time and their data is less compromised by pivoting choices of the startup (that is, the firm decides to dramatically change the service that it is offering or to change name and brand). Nonetheless, we have compared the data from a new emerging startup (ouicar) with a startup that has existed for many years (blablacar, previously known as covoiturage.fr).

In order to falsify our null hypothesis (H0), we have observed the spread between the scores of the two companies on Google scholar in December 2013 (more or less 3:1) and we have compared it with the amount of money that the two companies have received from venture capitalists, as measured two months later: EUR 4.5 Million for Ouicar VS EUR 12.5 Million for Blablacar.
This result might be due to a coincidence, but if we assume that the final step of negotiation with venture capitalists often takes a couple of months, we can notice the same results in USA, when we compare the total funds obtained in August 2013 by Lyft (USD 83 Million) and Uber (USD 410 Million) and their ratio on Google trend in June 2013 (1:5). Therefore, we have some reasons to believe that score on Google trends might have some predicting power, since they might represent the change in interest of the potential candidates and the interactions with the user base. Hence, we consider that **the null hypothesis is rejected**.

Figure 2 shows the trends of Ouicar and Blablacar, together with the values predicted by our model. As one can see, there are two peaks in the trend of ouicar, which the model cannot predict. We believe that this is a consequence of the sensibility of the Google trends data to the effect of strong marketing campaigns.

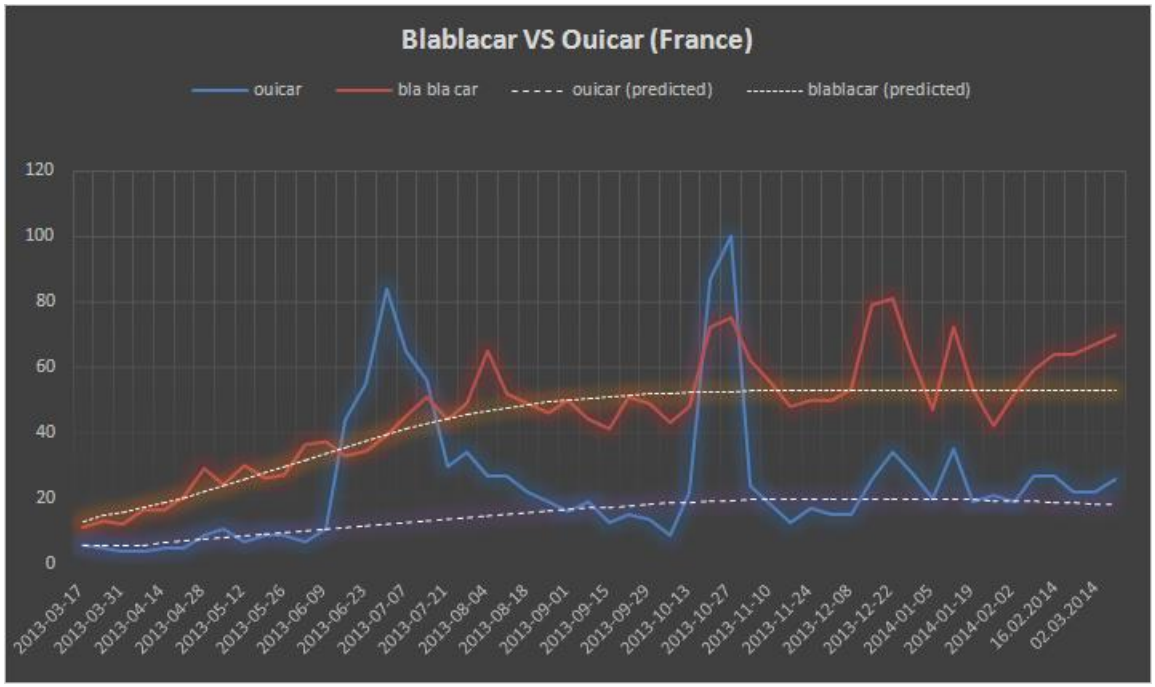


Figure 2: Google trends data for ouicar and blablacar

By fitting our model with the Google Trends data from March, 17th until November, the 24th, we induced the parameters presented in table 2. The detailed set of data is available in the annexes.
We have chosen to stop our training data set at the end of November 2013, since that was the model when the ratio between the two companies was consistent with their evaluations by investors. Nonetheless, as the figure 1 shows, our model appears to be able to represent the evolution of the Google Trends scores for the following three months.

	Potential candidates (Google Trend score)	**Infection Rate**	**Interaction rate**	**Churn**	**New users**
blablacar	64	3%	14%	4%	3%
ouicar	84	6%	3%	4%	50%

Table 2: Chosen parameters for the model

Assuming that the induced parameters shown in table 2 are reasonably close to the real values, some considerations arise. First of all, it appears that the potential target of ouicar is greater than blablacar. This might be due to the sensibility of google trends to marketing campaign and that might not imply that the real amount of potential

candidates is greater. Moreover, the difference between the two infection rates and interaction rate could be a sign of product differentiation, whereas the strong difference between the parameters related to new users is once again, related to the two peaks in the ouicar trend, and it might simply mean that the marketing and communication efforts of ouicar are greater than blablacar.
In the end, it appears that the evolution of the two services follows a S-shaped curve Therefore, **our hypothesis (H1) is partially verified** for the time being, even if the trend is quite volatile at the moment. This might be due to the continuous evolution of the service, which might require a more sophisticated model of diffusion to be represented.

5 Conclusions

In this study we intended to develop a set of metrics to monitor and predict the evolution of the user base to assess the diffusion of a dynamic ridesharing service among potential users within a target market.
By combining notions from the literature about diffusion of innovation and the literature of dynamic network analysis, we obtained a simple model, which treats innovation as a spreading contagion. We tested the model on data obtained from Google trends, which are freely available and that represent an alternative to data offered by firms, which are always torn between the need to rise interest from investors and the urge to not divulge too much to competitors.

The results, which we have obtained for the evolution of two French firms, show that Google trends score might be an alternative source of information to assess the evolution of the user base, and confirm that our model have predictive power to support strategic decisions within the firm. Nonetheless, the units used by Google to define its trends could not be obtained by the authors.
In the future, we intend to test the model with data from other firms and countries, and to address two major limitations of our model, namely (1) the intrinsic assumption that there is only one type of user and (2) the assumption that users will eventually stop using the service.

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6 Annexes: Weekly scores from Google trends

Training data

Week	ouicar	bla bla car	ouicar (predicted)	blablacar (predicted)
2013-03-17	6	11	*6*	*13*
2013-03-24	5	13	*6*	*14*
2013-03-31	4	12	*6*	*16*
2013-04-07	4	16	*7*	*17*
2013-04-14	5	16	*7*	*18*
2013-04-21	5	20	*7*	*20*
2013-04-28	9	29	*8*	*22*
2013-05-05	11	24	*8*	*24*
2013-05-12	7	30	*9*	*25*
2013-05-19	9	26	*9*	*27*
2013-05-26	9	27	*10*	*29*
2013-06-02	7	36	*10*	*31*
2013-06-09	11	37	*11*	*33*
2013-06-16	44	33	*11*	*35*
2013-06-23	55	34	*12*	*37*
2013-06-30	84	39	*12*	*39*
2013-07-07	65	45	*13*	*41*
2013-07-14	56	51	*13*	*43*
2013-07-21	30	44	*14*	*44*
2013-07-28	34	49	*14*	*45*
2013-08-04	27	65	*15*	*47*

2013-08-11	27	52	*15*	*48*
2013-08-18	22	49	*16*	*49*
2013-08-25	19	46	*16*	*49*
2013-09-01	16	50	*17*	*50*
2013-09-08	19	44	*17*	*51*
2013-09-15	13	41	*18*	*51*
2013-09-22	15	51	*18*	*51*
2013-09-29	14	49	*18*	*52*
2013-10-06	9	43	*19*	*52*
2013-10-13	22	48	*19*	*52*
2013-10-20	87	72	*19*	*52*
2013-10-27	100	75	*19*	*53*
2013-11-03	24	62	*20*	*53*
2013-11-10	18	55	*20*	*53*
2013-11-17	13	48	*20*	*53*
2013-11-24	17	50	*20*	*53*

Test dataset

2013-12-01	15	50	*20*	*53*
2013-12-08	15	53	*20*	*53*
2013-12-15	26	79	*20*	*53*
2013-12-22	34	81	*20*	*53*
2013-12-29	28	63	*20*	*53*
2014-01-05	20	47	*20*	*53*
2014-01-12	35	72	*20*	*53*
2014-01-19	19	53	*20*	*53*
2014-01-26	21	42	*19*	*53*
2014-02-02	19	52	*19*	*53*
2014-02-09	27	59	19	53
2014-02-16	27	64	19	53
2014-02-23	22	64	19	53
2014-03-02	22	67	18	53
2014-03-09	26	70	18	53

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Evaluating Business Value of IT in Healthcare in Australia: *The Case of an Intelligent Operational Planning Support Tool Solution*

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Abstract

The healthcare sector is complex and intricate. It consists of a web of players including clinicians, healthcare organisations, regulators, payers, suppliers, patients and their families to mention the major groups. Taken together they form a complex ecosystem made up of multiple and dynamic sub-ecosystems. With the focus on incorporating technology into this context what we find is one of the most intricate and complex of e-ecosystems that must function effectively and efficiently in order to provide superior care and treat patients. The following tries to ascertain the value associated with the application of technology in healthcare; i.e. the business value of IT in healthcare. This is done by synthesising key literature and then applying it to a specific case of a nursing informatics technology solution. In so doing, a unifying framework is established that enables us to understand key activities that occur throughout this e-ecosystem.

Keywords: Information Technology, Information Systems, Value, Business value, Healthcare, Nursing Documentation, ecosystems

1. Introduction

The unremitting quest to improve healthcare outcomes and reduce escalating costs has encouraged decision- and policy-makers in the healthcare industry to invest more in information systems/information technology (IS/IT) (Berner, 2008; Kilbridge, 2008).

This has been driven to a large extent by success stories for such investments in other sectors of the service industry such as retail, education and logistics. The noteworthy international tendency for healthcare to invest more in IS/IT to both enhance healthcare quality and reduce cost (Eysenbach, 2001) has called for further studies and investigations about the role IS/IT may play to improve healthcare outcomes (Lawler, Hedge and Pavlovic-Veselinovic, 2011). Furthermore, because the Internet has created new opportunities and challenges to the traditional health care IT industry, e-health presents both opportunities and challenges (Wickramasinghe and Schaffer, 2010).

Electronic patient records (EPR) are being introduced and used by more and more healthcare organizations nowadays in different contexts of healthcare delivery (De Veer and Francke, 2010). Moreover, nursing documentation is one of the areas where IS/IT is being used, and the shift from paper-based to electronic-based documentation has raised questions regarding the way nursing documentation should be organized and presented in EPR (Krogh, Nåden and Aasland, 2012).

The impact of IS/IT investments on organizational performance (namely 'Business Value of IT') has been a major point of research since 1992 (Weill, 1992) in different industries (Silvius, 2011; Masli et al., 2011 and Frisk, 2007). Business value of IT in healthcare, however, is still yet to be fully investigated. This is largely due to the fact that healthcare delivery is complex and consists of many systems and subsystems (Lubitz and Patricelli, 2007) or one can think of these as ecosystems which must all be considered if a true sense of value is to be established.

In the light of these circumstances, developing a robust and suitable framework to assess the value of these IT investments clearly becomes a strategic imperative and vital step toward designing sustainable e-health solutions.

This paper outlines an exploratory research study that aims to examine the business value of IS/IT in healthcare, especially it focuses on a new IS/IT system developed in Australia for nursing documentation. To do so, this study proposes a framework for the evaluation of cost versus quality outcomes utilizing different layers within healthcare delivery. This proffered framework is based on two well-known conceptual models (Weill and Broadbent, 1998; Rouse and Cortese, 2010) that represent IT portfolio and healthcare delivery as will be described in the following sections.

2. Literature Review

This section mainly aims to give a brief summary of the meaning of "business value of IT" and its applications and prior research. Current healthcare delivery challenges and conditions will be briefly summarized. The two conceptual models used to develop the proposed conceptual model will be given. Then, a few available prior studies to highlight IT-based nursing documentation will be given.

2.1 Business Value of IT in Healthcare:

Investing in IS/IT as a strategy to improve quality of the medical procedures have been appealing (Wickramasinghe and Schaffer, 2010, Gagnona et al., 2003). For example, investing more in health information technology ($10 billion annually for five years) and paying healthcare providers based on quality of care, not quantity of services, were among the few key points of Mr. Obama's healthcare plan declared in his speech delivered in December 11, 2008 (The Hospitalist, 2009). Same trend was taking place in Western Europe, where healthcare IT spending was expected to increase from $9 billion in 2006 to $12 billion in 2011 (IDC Report, 2008). These escalating investments were mainly driven by the success of IS/IT investments, whose impacts were studied in details in different industries than healthcare.

The term business value of IT is commonly used to refer to the organizational performance impacts of IT (Melville et al., 2004). In their review of research on business value of IT (Melville et al., 2004) used different measurements of performance, including cost reduction, profitability improvement, productivity enhancement, competitive advantage and inventory reduction to measure business value of IT. One of the first researchers to study business value of IT was (Weill, 1992) .Since then, studying business value of IT has not stopped (Kohli and Grover, 2008).

Although the business value of IT has long been investigated, the current literature is still to develop better understanding of the relationship between IT investments and firm performance (Masli et al., 2011), especially with the contradicted findings in this area of research, and this could be the reason why researchers believe that a productive approach is to move from the question of whether IT creates value to how, when and why benefits occur or fail to do so (Melville et al., 2004).

The healthcare informatics literature is relatively new (Dalrymple, 2011), and the term business value of IT is still to be studied in this industry, especially that healthcare providers have started to invest heavily in various healthcare IT systems to enhance "quality of patient care," which has therefore been a major criterion for related studies on hospitals (Burke and Menachemi, 2004). To cover this new trend, a number of studies tried to limitedly investigate the impact of implementing specific types of healthcare IT systems, such as electronic patient records (EPRs) using limited sample sizes, with less possibilities to generalize the findings on healthcare industry in total (Das, Yaylacicegi and Menon, 2011).

Investigating business value of IT in healthcare, thus, is a clear void in the current literature, and investigating that would be a key step to help focus IS/IT investments on value generating technologies and systems.

To further clarify the term business value of IT, this paper adopts the IT portfolio conceptualization as described in the next section.

Information Technology Portfolio

The IT portfolio of an organization is its entire investment in IT, including all of the people dedicated to providing IT services, whether centralized, decentralized, distributed, or outsourced (Weill and Broadbent, 1998). Principally, firms invest in IT to achieve four fundamentally different management objectives: transactional, infrastructure, informational, and strategic (Weill and Broadbent, 1998). These management objectives then lead to information, transactional, infrastructure, and strategic systems, which make up the IT investment portfolio, and will be used as a representation of IT whose potential business value will be evaluated in this research. Figure 1 depicts these objectives, and Table 1 describes the four management objectives. The figure and the table both were adopted from (Weill and Broadbent, 1998).

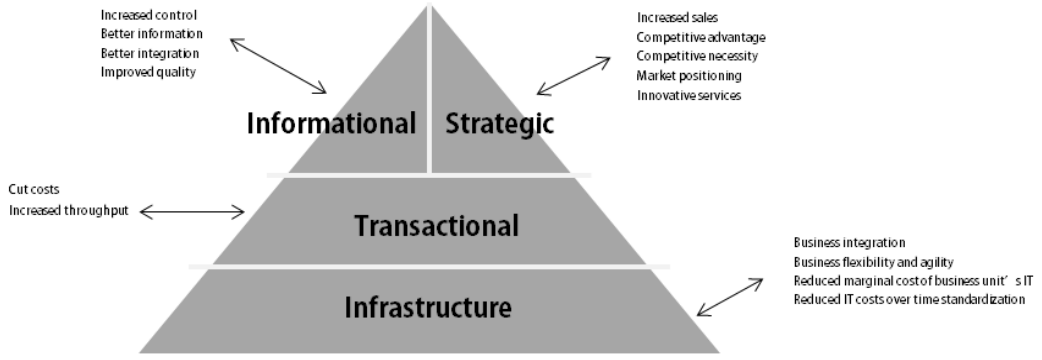


Figure 1: Management Objectives for the Information Technology Portfolio (Weill and Broadbent, 1998)

Table 1: The objectives of IT Portfolio

Objectives	Description
Infrastructure	• The foundation of information technology capacity which is delivered as reliable services shared throughout the firm and coordinated centrally. • Includes both the technical and the managerial expertise required to provide reliable services. • Having the required infrastructure services in place significantly increases the speed with which new applications can be implemented to meet new strategies.
Transactional	• Processes and automates the basic, repetitive transactions of the firm. These include systems that support order processing, inventory control, bank cash withdrawal, statement production, account receivable, accounts payable, and other transactional processing. • Transactional systems aim to cut costs by substituting capital for labor or to handle higher volumes of transactions with greater speed and less unit cost.
Informational	• Provides information for managing and controlling the firm. • Typically supports management control, decision making, communication and accounting. These systems can summarize and report this firm's product and process performance across a wide range of areas. • Two examples of these systems come from Ford Australia (Electronic Corporate Memory), and from the consulting firm Bain & Company which developed Bain Resources Access for Value Addition (BRAVA).
Strategic	• The objective of strategic technology investment is quite different from those of the other parts of the portfolio. • Strategic investments are made to gain competitive advantage or to position the firm in the marketplace, most often by increasing market share or sales. • Firms with successful strategic information technology initiatives have usually found a new use of information technology for an industry at a particular point an time. • Two good examples of theses strategic initiatives are inventing automatic teller machines (ATMs), and designing a system that provides immediate 24-hour, seven-day-a-week loan approvals in car dealerships using expert systems technology. Both of these innovative systems have changed their industries forever.

2.2 Healthcare Delivery: Current Trends and Conditions

(Wolper, 2011) referred to (Reid and Compton, 2010) and used the definition of a system to give a final description for healthcare delivery, as a whole, as a 'fragmented, disorganized, and unaccountably variable. The main reason, we don't hear about a "healthcare delivery system", according to (Wolper, 2011), is that healthcare delivery was never designed as a system and does not operate as one, and according to (Picker Institute, 2000) 75% of patients consider the healthcare system fragmented and fractured, a "nightmare" to navigate, and plagued by duplication of effort, lack of communication, conflicting advice regarding treatment, and tenuous links to the evolving medical evidence base.

The complexity of improving healthcare delivery, on a global perspective can be identified from current statistics. According to (IOM, 2005), for example, more than 98,000 Americans die every year and more than ten times this number injured as a result

of "broken healthcare processes and system failures". These figures are getting worse with time, soaring to 180,000 patients in Medicare alone in a given year (Levinson, 2010) and between 210,000 and 440,000 patients (James, 2013).

The 21st Century healthcare must be: safe, effective, patient-centered, timely, efficient and equitable (IOM, 2001). To meet these six objectives, the committee emphasized the role the engineering community can play to facilitate the complex process of transforming the healthcare delivery systems (IOM, 2001; Reid and Compton, 2010).

(Rouse and Cortese, 2010) suggest architecture for the healthcare delivery enterprise, shown in Figure 2. The efficiencies that can be achieved at the lowest level (clinical practices) are limited by the nature of the next level (delivery operations). For example, functionally organized practices are much less efficient than delivery organized practices that focus on processes. Similarly, the efficiencies that can be gained in delivery operations are limited by the level above (system structure). Functional operations are driven by organizations structured around specialties, e.g., anesthesiology and radiology. And efficiencies in system structure are limited by the healthcare ecosystem in which organizations operate. Healthcare providers in different countries have different healthcare delivery experiences.

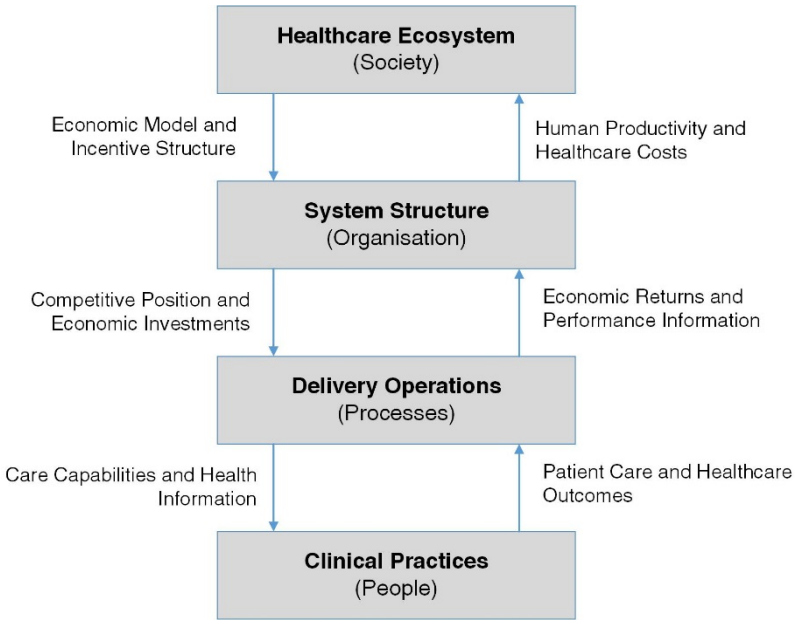


Figure 2: Healthcare Delivery Enterprise (Rouse and Cortese 2010)

Defining Value in Healthcare Delivery

Healthcare commentary often revolves around universal availability and cost control, i.e. access and cost. People are not likely to want the lowest cost; the central issue should really be the creation of a healthcare system that provides the highest value (Rouse and Cortese, 2010).

Value is often defined in terms of the expenditure outcome benefits, divided by the expenditure costs. The healthcare benefits, from a patient's perspective, include the healthcare outcomes quality, the safety of the delivery process, and the services associated with the delivery process, and from society perspective benefits might include the availability of healthy and productive people who contribute to society in many ways. When people are not healthy, their contributions diminish (Porter and Teisberg, 2006).

To examine business value of IT in healthcare, in this research we use a new IS/IT system developed in Australia to facilitate electronic nursing documentation which we give a brief summary of in the next section.

2.3 Electronic Nursing Documentation

Nursing documentation plays a key role in the success of nursing activities, as it supports nursing staff efforts to improve healthcare outcomes by developing customized care plan for patients (Björvell et al., 2003). To further improve nursing documentation, IS/IT has been used to introduce electronic documentation systems, in an attempt to minimize documentation efforts and times and maximise the interaction between caregivers and patients. (U.S. DHHS, 2010).

Nursing Documentation systems are meant to document nursing notes that describe the care or service to that client. Health records may be paper documents or electronic documents, such as electronic medical records, faxes, emails, audio or video tapes and images. Through documentation, nurses communicate their observations, decisions, actions, and outcomes of these actions for clients. Documentation software tracks what occurred and when it occurred (HIMSS, 2009).

This migration from paper-based to electronic-based documentation, which should not be a mere replication of paper forms in an electronic format (Kelley, Brandon and Docherty 2011; Ball, Hannah and Douglas, 2000), have encouraged research in the area of finding the impact of introducing nursing documentation on healthcare outcomes with limited focus on specific parameters, like time consumed for documentation (Munyisia, Yu and Hairly, 2012) and better healthcare outcomes, see for example (Moody et al., 2004; Lee, Yeh and Ho, 2002). A number of studies have focused on time taken for documentation, with contradicted findings and results. For example, time reduction could be monitored and seen after the introduction of different electronic nursing documentation (Bosman et al., 2003; Wong et al., 2003), while this introduction could not make any change in time consumed for nursing documentation (Hakes and Whittington 2008; Menke at al., 2001) and others found that electronic nursing documentation caused documentation time to increase (Saarinen and Aho, 2005).

Another aspect of research on electronic documentation is efficiency. For example (Munyisia, Yu and Hairly, 2012) studied an electronic nursing documentation system in an Australian residential aged care facility and found that introducing this system may not lead to efficiency in documentation, and using both paper and electronic mean for documentation might be a barrier to achieve better efficiency. In general, the impact of the introduction of electronic nursing documentation to improve the patients' outcomes remains unclear, and further socio-technical studies are needed to investigate the daily interaction between nurses and electronic nursing documentation systems (Kelley, Brandon and Docherty, 2011).

3. Research Design and the Proposed Conceptual Model

This research is trying to answer the following key research question:

How can information technology facilitate the generation of business value in healthcare firms?

To operationalize the IT resource, from a technical perspective, we align with (Weill and Broadbent 1998) classification of IT portfolio into infrastructure IT, transactional IT, informational IT, and strategic IT (See Figure 1). From an organizational perspective, this study will depend on The Enterprise of Healthcare Delivery Model (See Figure 2), and adapt it to find the business value of information technology from a socio-technical aspect in four interrelated levels: (i) Clinical practices (people); (ii) Delivery operations

(processes); (iii) System structure (organizations) (iv) Healthcare ecosystem (society). Figure 3 shows the proposed conceptual model for this research with a key that shows the definitions of clinical IT applications.

In this study we will examine the following:

- **Layer 4: Healthcare Ecosystem (Society):**
  - The impact of competition on business value of IT (infrastructure, transactional, strategic and informative)
- **Layer 3: System Structure (Organization):**
  - What is the impact of IT (infrastructure, transactional, strategic and informative) on business value in terms of improving the system structure (internal and external)
- **Layer 2: Delivery Operations (Processes):**
  - What is the impact of infrastructure IT on business value in enhancing recovery processes
  - What is the impact of informational IT on business value in enhancing detection processes
  - What is the impact of transactional IT on business value in enhancing the diagnosis capabilities
  - What is the impact of strategic IT on business value in enhancing the treatment
- **Layer 1: Clinical Practices (People):**
  - What is the impact of transactional IT on business value in enhancing clinical practices, especially CPOE, LIS, OE,
  - What is the impact of informational IT on business value in enhancing clinical practices, especially CDR, CDSS, ND, PD
  - The business value of infrastructure IT in enhancing laboratory and radiology practices (LIS and RIS)

The proposed framework is multi-layered and has been designed to reflect the complexity of the healthcare industry. The research benefits from the existence of the two earlier models, and aims to draw on their strengths to provide a new approach when evaluating how healthcare firms get value from implementing IS/IT in different levels of healthcare delivery like nursing documentation.

Case Vignette: The Case of an Intelligent Operational Planning Support Tool

Case study is a useful method to illustrate critical issues or key points (Yen, 1994). Thus, in this study we use the case of an Intelligent Operational Planning Support Tool (IOPST) to study the business value of this system. IOPST is a new nursing information system being designed and developed in Australia to be used at the point of care in both private and public hospitals. The developers envisage that this IOPST system will replace the paper-based nursing documentation in hospital acute wards.

As Figure 3 shows, nursing documentation (ND) belongs to the first layer of healthcare delivery enterprise (Clinical Practices (People)) and has an interchangeable relationship with the upper level (Delivery Operation (Process)), where care capabilities and health information are being fed between these two layers and patient care and healthcare outcomes are to be determined according to this relationship (Figure 3 and Table 2).

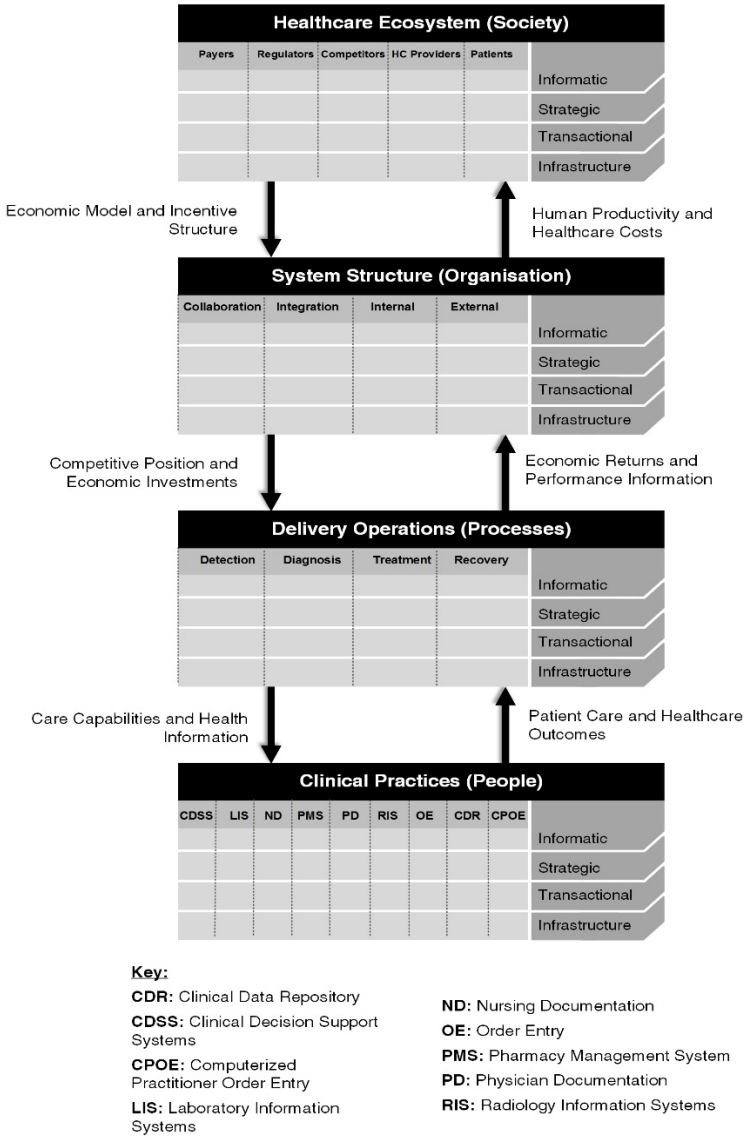


Figure 3: The Proposed Conceptual Model

Table 2: Mapping IOPST to the Proposed Conceptual Model

Healthcare Delivery	**Main components**	**IOPST Case Study**
Healthcare ecosystem	Payers	IOPST is expected to be implemented in both public and private healthcare sectors after its validity, usability and other required tests would have been done and research shows that this system would enhance healthcare outcomes.
	Regulators	IOPST needs to meet the regulatory environments of targeted countries. In Australia, for example the regulator is the Australian Government

	Competitors	Commercially, there is a number of nursing documentation systems. The IOPST's designers, however, introduce this system as a new and unique nursing information system (Wickramasinghe et al., 2014)
	HC Providers	Australian healthcare sector is 2-teir structure (private and public). Thus, IOPST aims to get through both sectors.
	Patients	According to its designers, IOPST aims to allocate more time for patients' care by putting IOPST terminals at patients' bedsides, which would create more interaction between nurses and patients (Wickramasinghe et al., 2014).
System Structure	Collaboration	IOPST is meant to allow higher level of collaboration between ward nurses and other healthcare professionals both within a healthcare organisation and between different healthcare organisations enabling nursing staff to document key information, retrieve and share the documented information with other nursing, medical and allied health professionals to provide safe, continuous and high quality care for the patients in the ward. (Wickramasinghe et al., 2014), which would be investigated in this research.
	Integration	
	Internal	
	External	
Delivery Operations	Detection	The system aims to evaluate, filter and process clinical data to ensure the quality of data entry, to support nursing decision making, to provide alerts and prompts to prevent treatment errors such as errors or omissions in medication administration, to 1) improve nursing information access (real time and flexibility); 2) improve quality (accuracy and legibility); 3) reduce time collecting information from multiple sources (Wickramasinghe et al., 2014).
	Diagnosis	
	Treatment	
	Recovery	
Clinical Practices	ND: Nursing Documentation	Nursing documentation systems Nursing Documentation systems are meant to document nursing notes that describe the care or service to that client. Through documentation, nurses communicate their observations, decisions, actions, and outcomes of these actions for clients (HIMSS, 2009). IOPST aims to meet these requirements electronically according to the designers (Wickramasinghe et al., 2014).

According to (Weill and Broadbent, 1998), this solution would fit in Informational IT, as it typically supports management control, decision making, communication and accounting. To operationalize the case vignette, this study benefits from implementing this solution in an Australian private hospital to highlight the role Informational IT plays in generating business value in healthcare delivery, and more specifically Clinical Practices (People) and Delivery Operations (processes) (See Figure 3), by using field observation, surveying nursing staff and making interviews and focus group with different stakeholders at this healthcare provider.

Examining the potential business value out of this IS/IT system has implications on both theory and practice. In particular it becomes possible to make assessments as to whether or not, specific Informational IT solutions facilitate the generation of business value. Such results would be beneficial for both decision makers and practitioners to better allocate resources and thus ensure better healthcare outcomes.

4. Conclusion

This research contributes to the extant body of knowledge in several ways. First of all, current literature lacks rigorous research on the business value of IT in healthcare, so this exploratory study serves as one of the first detailed investigations in this regard. Second, the research question "How can information technology facilitate the generation of business value in healthcare firms?" and more specifically, the business value of informational IT, the case of IOPST to improve clinical practices and delivery operations from a socio-technical perspective is significant in today's healthcare environment Furthermore, this study provides strategies and methods for service providers who are trying to balance costs (the input) and the quality of service (output).

The stated aim of the study; to provide a framework for research into measuring the most value-generating areas in IT investments (Infrastructure, transactional, strategic and informative) for healthcare has been achieved. In addition, from this proffered framework it is possible now to recommend the best practices to minimize the costs (input) and investigate maximizing the output from four interrelated levels: people, processes, organizations and ecosystem. To examine the proposed framework operationally, the case of IOPST would serve as a testing environment to highlight the breadth and depth of the proffered framework.

This exploratory study has developed the first steps for providing significant and last benefits in the determination of business value in healthcare contexts. Future studies will leverage from this work and test various segments of the proffered framework in various healthcare contexts. The future of effective and efficient healthcare provision is linked to IT in one way or another from electronic healthcare devices through the modern e-health delivery models; thus it is likely that the issue of business value of these IT investments will also becoming increasingly more important. In closing, we note as more and more e-health solutions specifically and IS/IT initiatives generally in healthcare appear we must have a systematic framework to aid in the important assessment of the value of these solutions. The proffered framework is both robust and systematic but another advantage is it is as applicable irrespective of the health system and thus enables us to not just assess value of a specific system but also compare and contrast the value of different systems in a systematic fashion.

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Research in progress

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Abstract

The Dutch healthcare system has changed towards a system of regulated competition to contain costs and to improve efficiency and quality of care. This paper provides: (1) a brief as-is overview of the changes for primary care, based on explorative literature reviews; (2) provides noteworthy remarks as for the way primary and secondary healthcare is organised; (3) an

example of an E-health portal illustrating implemented processes within the Dutch context and (4) a proposed research agenda on various e-health topics. Noteworthy remarks are: (1) government, insurer, healthcare provider and patient are main actors within the Dutch healthcare system; (2) general practitioners (GP's) are gatekeepers to secondary and other care providers; (3) the illustrated portal with a patient oriented design, provides access to applications implemented at care providers resulting in increased electronic availability and increased patient satisfaction; (4) a variety of fragmented information systems at health care providers exists, which leaves room for standardisation and increased efficiency. We end with suggestions for future research.

Keywords: E-Health, healthcare processes the Netherlands, e-health portal, PAZIO, Healthcare efficiency.

1 Introduction

The healthcare sector in the Netherlands is an innovative sector that has undergone some severe changes as a result of the implementation of a healthcare reform plan to contain costs, as costs have been increasing for the past years now (Centraal Bureau voor de Statistiek, 2013; Erkelens, J. v., & Galen, 2012; Rutten, 2004). The Dutch government has launched various programmes to contain costs and it has been advocating an increased utilisation of ICT within healthcare. Therefor the Dutch government has been investing in many ICT initiatives to improve efficiency in health care delivery and supporting processes (Ministry of Health Welfare and Sport, 2012). In this paper we will present (1) an overview of Dutch Healthcare and related stakeholders within primary and secondary care and (2) a good e-health practise: a portal with a focus on primary care and secondary care. The purpose is to illustrate offered services through an E-health portal taking the Dutch health care system into account.

2 Method

The process of data gathering was divided into three phases: (i) an explorative literature review to provide an overview on the healthcare system focussing on primary and secondary care in The Netherlands; (ii) the selection of a good e-health practise in The Netherlands and (iii) gathering data based on documentation illustrating how services are offered by this good practise. In the first phase we explored professional and scientific literature on the Dutch healthcare sector focussing on primary and secondary care. In addition to this a public relations officer of the Dutch healthcare insurer ONVZ was approached to illustrate the process of insurance coverage and reimbursements. In search of a good e-health practise in The Netherlands, an explorative search on e-health cases in The Netherlands was conducted in the second phase (ii). As search results on Dutch e-health cases were limited, further exploration was justified. An inquiry at the chamber of commerce in the city of Utrecht on successful e-health initiatives around Utrecht (NL) resulted in a referral to the e-health portal PAZIO (Pazio.nl). In the third phase we contacted the developers of this portal, with a request to share information on this portal. PAZIO was developed by the University Medical Center Utrecht and it is a portal that provides access to electronic applications which the care provider has

implemented. This is accessible to various stakeholders such as patients, general practitioners and pharmacists. PAZIO shared existing available documents and referred to published documents available on their website. A live demonstration on this concluded this phase.

Next we consider the organisation and related stakeholders within the healthcare system in the Netherlands (section 3) with a focus on primary and secondary care and the use of the e-health portal PAZIO (section 4). Finally, a research agenda is proposed in section 5.

3 Organisation And Stakeholders In Dutch Primary Healthcare

The Dutch healthcare system has been reformed in 2006 mainly from income based insurance, with a national health insurance and healthcare schemes provided by private insurers, to a system with regulated competition (Helderman et al, 2005; Okma, 2008). This system entails a mandatory basic health insurance for each citizen, purchased through private insurers; annual consumer choice of insurer and products; insurers are obliged to accept all consumers for the basic insurance and they are compensated via a risk equalization system; a mandatory deductible of Euro 360 for 2014; insurers are expected to contract competing healthcare providers; quality information is released to the government by healthcare providers; Diagnosis Treatment Combinations (DTC's) were defined and implemented to enable provider competition and General Practitioners serve as gatekeepers (Enthoven & Ven, 2007; Ikkersheim & Koolman, 2012; Ministry of Health Welfare and Sport, 2014; Tuijn et al, 2011). For this system to work efficiently key stakeholders are healthcare consumers or patients; general public; healthcare providers; healthcare professionals; governmental agencies and inspectorates; health insurance companies; centres of excellence (Lamping, Raab, & Kenis, 2013). For the purpose of this paper key stakeholders are limited to healthcare consumers (patients), healthcare providers, healthcare insurers and the government. These stakeholders fulfil a vital role in the care process. In figure 1 an example of a particular care situation and care process is visualised.

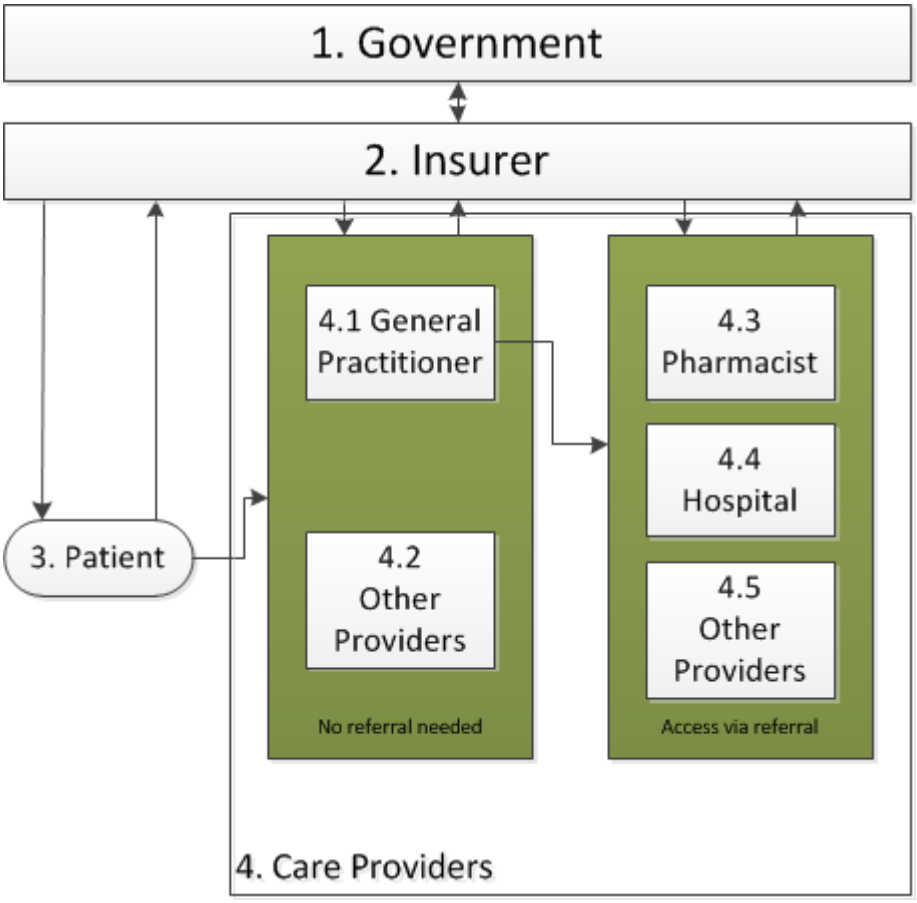


Figure 1 Healthcare process and stakeholders

The government, the Dutch Ministry of Healthcare, Welfare and Sport, annually decides the coverage of the basic and mandatory health insurance scheme. Healthcare consumers or patients choose a healthcare insurer with the mandatory basic insurance policy and based on their preference a non-mandatory supplementing insurance (Ikkersheim & Koolman, 2012). Insurers provide data to the government and to other (public) entities such as the inspectorate of health (Delnoij, Rademakers, & Groenewegen, 2010). The Dutch healthcare system distinguishes primary healthcare and secondary healthcare. Primary healthcare is care that is available without a referral from a general practitioner (GP). Examples of primary healthcare are the dentist, general practitioner (GP), physiotherapist or social worker. The government considers it important that primary healthcare is available to everyone and it is described as a short term general treatment (Bos, Koevoets, & Oosterwaal, 2011). GP care is generalist medical care which is accessible for all people close to their homes, resulting in a dense network of GP's (Groenewegen, 2013). Secondary healthcare is specialised care that a patient receives after referral by a GP. Secondary healthcare distinguishes medical care or cure, nursing, social and pedagogical care. Medical care or cure consists of diagnosis and therapy for instance hospital or specialist care. Nursing care consists of nursing care, observation, coaching and personal care. Social care in a specialised facility consists of lodging, food, clothing, offering employment or education, cultural and welfare activities and other intangible assistance. Pedagogical care consists of teaching and education in the context of mental, physical or sensory disability (Boot, 2010).

Figure 1 implies a relation with care providers and insurers: sourcing contracts between parties are negotiated regarding volumes, the level of service and prices for delivered services according to DTC's (Ikkersheim & Koolman, 2012). Generally health care providers send their invoices including Diagnose Treatment Combinations (DTC's) for provided care per patient to contracted insurers.

Care providers and insurers use specific systems that support care processes (figure 1), information processes and financial processes. In general, healthcare providers use their own local patient records and information systems. To facilitate standardisation in information systems and processes within the healthcare chain, the government proposed an initiative to parliament to implement a national electronic patient record (EPR) as an open infrastructure to access source systems at care providers. Medical data, treatment data and patient information would be recorded in this EPR. Data was supposed to be owned by the care provider and the ambition was a secure exchange of data among care providers and patients. This initiative of a *national* EPR was voted down by the Dutch Senate. This initiative is now being picked up as a *standardised* EPR and it is being introduced by private entities with an opt-in enrolment for patients. The private entities, the Association of care providers and care communication (VZVC) and its Country wide Switchpoint (Landelijk Schakelpunt) (VZVZ.nl, n.d.), are partly reusing the previously developed infrastructure (Smits, 2013). Opt-in enrolments via pharmacies have picked up from 0.8 million records in august 2013 to 2.3 million records in January 2014 (Dorrestijn, 2014). Noteworthy remarks are:

- GP´s are gatekeeper in the healthcare chain. After their assessment patients can be referred to specialised care.
- Standardised diagnosed treatment combinations (DTC) have been implemented, addressing and facilitating care processes;
- Although a system of regulated competition is implemented, the government still defines the coverage of the national and mandatory insurance scheme;
- The introduction of sourcing contracts between care providers and insurers is boosting the drive for (cost) efficient care processes by providers;
- Effective use of ICT, standardised applications and standardised EPR's across the healthcare chain contribute to standardised processes.

4 A Good Practise: PAZIO E-health Portal

PAZIO (Patient Oriented Healthcare Information Environment) is an e-health portal that was developed by the University Medical Center Utrecht (UMCU) in cooperation with innovative ICT partners. It was partly funded by the municipality of Utrecht with the vision to provide access to e-healthcare processes from healthcare providers (Pazio, n.d.). PAZIO fits Osborn's definition of a secure internet based platform which enables patients to view their personal health information and interact with health care providers (Immink, 2013; Osborn et al, 2013). This portal (figure 2) provides access to a range of patient centred services for primary and secondary care and it offers access to basic applications and additional applications The portal enables customers to interact electronically with their care provider. (A-tjak et al, 2012; Pazio, n.d.).

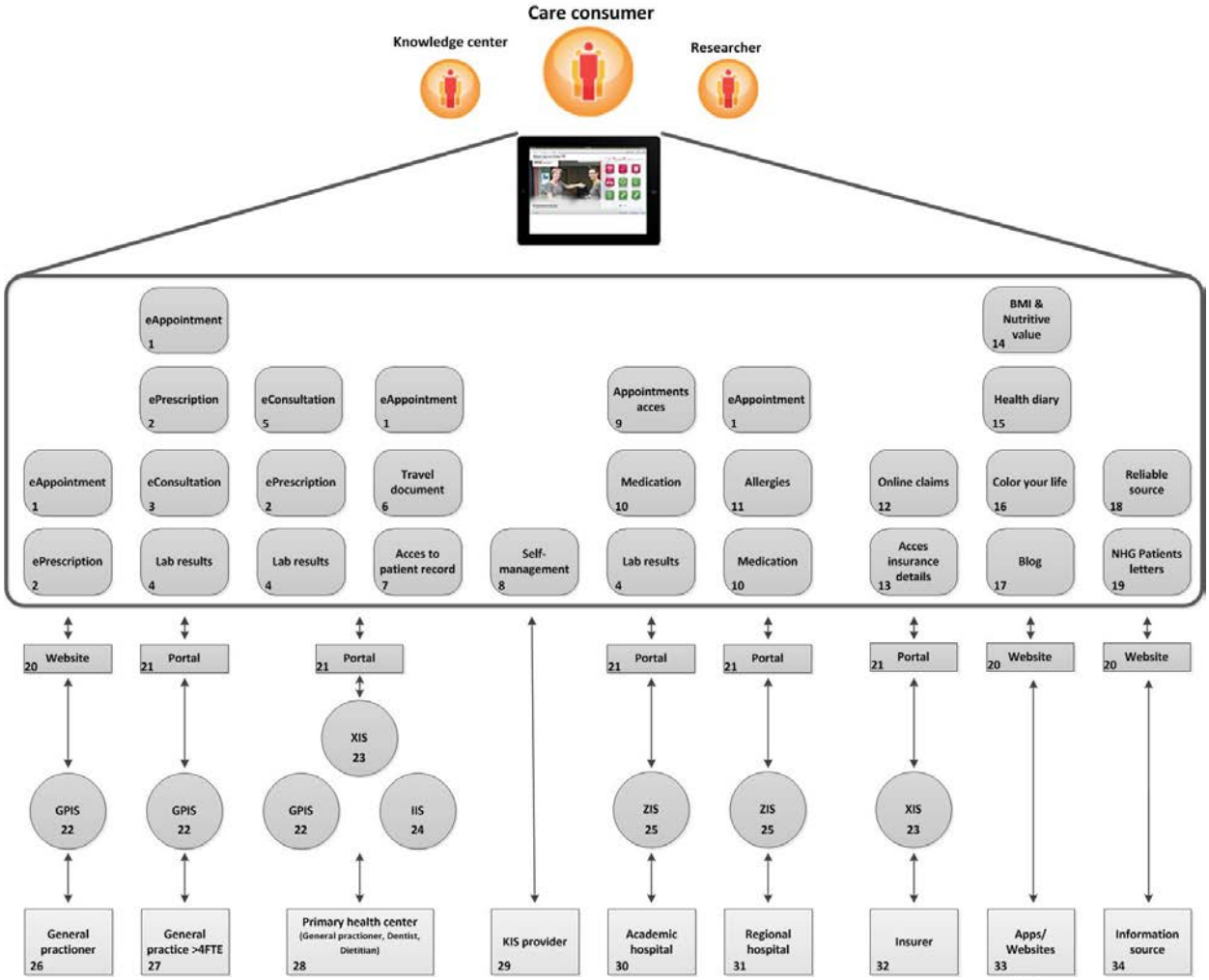


Figure 2 Pazio E-health Portal (Pazio, n.d.)

PAZIO enables access and provides interaction with basic applications:

- Scheduling appointments (1)
- Prescription refills (2)
- Online Lab results (4)
- Online consults or e-consult (3,5)
- Self-management for certain chronic illnesses (8)

Additional applications are prevention programs, research tools, self-management and self-help programs(14-17) (Pazio, n.d.). These applications can fully be integrated with information systems within the general practice or hospital (22-25), entailing that information submitted in an e-consult is saved and is accessible in the GP's information system (Immink, 2013). During the implementation of the portal, the type of interaction between care provider and patient will be determined depending on the application. Electronic interaction at any given time is facilitated when electronic consults are scheduled and lab-results are accessed by the patient. Single Sign On (SSO) to available applications via the portal is enabled with the secure Digid with text message authentication (A-tjak et al, 2012; Zorgvoorinnoveren.nl, n.d.). Digid, abbreviation for Digital Identification, is a national authentication service for citizens, that can be used

by all public organisations and nongovernmental organisations to authorise access to their systems. All Dutch citizens are issued a citizen service number (BSN) and this number is linked to the Digid-account. This Digid consists of a username and password and security to the authentication procedure can be increased with the use of text messaging services (SMS) during log on (Digid, 2014; Janssen, Kuk, & Wagenaar, 2008). After successful log on, patients get access to a secure portal area (PAZIO) with a look and feel that is preferred by the care provider. Based on figure 2, when a patient logs on at the portal accessible via the website of the General Practitioner, s/he gets access to the available functionalities. Patients are able to schedule an appointment or look for information, access their health record or request for a (non-urgent) electronic consult. These basic functionalities are generally applications that the care provider has implemented within its practice. Depending on the patients query, responses can be sent to the patient and/or additional requests filed to other care providers. In case of a request for a prescription refill, the GP assesses this request within his information system (GPIS) and after approval the prescription is electronically transmitted to the contracted or related pharmacist. The pharmacist processes this request in its own information system and the patient can pick prescribed medicaments up at the pharmacy. Advantages of the use of this portal are: increased electronic availability of the care provider, self-service applications increase efficiency at general practices (A-tjak et al, 2012).

Immink´s (2013) use, usability and persuasiveness study to PAZIO at a General Practise shows that when this portal is implemented about 70 percent of registered users used this portal and that the respondents positively valued the separate services, the simplicity, velocity (response time), clarity, support and practical outcome (Immink, 2013). Noteworthy elements from PAZIO are:

- A variety of different information systems and e-health applications are available and being used, displaying fragmentation (A-tjak et al, 2012);
- It is a personalised, white label and interactive portal with main functionality to connect securely to a variety of e-health applications and information systems.
- Secure access and secure portal areas have shown to be key to the success of the portal (A-tjak et al, 2012);
- Processes are logically modelled according to patients care pathways (Zorgvoorinnoveren.nl, n.d.);
- Increased electronic availability of the care provider for patients and increased practise efficiency (Immink, 2013);
- Recognisable services for patients, simplicity, quick response times, clarity and support are valued highly (Immink, 2013).

5 Proposed research agenda

In this paper we have provided an overview of the health care sector with a focus on primary and secondary care based on an explorative literature review. With the brief description of an e-health portal we illustrated the possibilities and functionalities within the Dutch context. Based on these overviews limitations to this paper are: (1) the used method entailed an explorative research on secondary and tertiary literature rather than an in-depth review using primary literature on the Dutch Healthcare system and portal; (2) one case within the Dutch context is briefly described based on existing material and demonstrations and (3) other international perspectives are not included in this research.

Based on the presented notable remarks and taking these limitations into account, we propose the following research agenda:

(1) The government, insurers, providers, care consumers and other entities are more and more interlinked and interdependent stakeholders within the healthcare chain. This may require a new ways of organising, new services and business models within the healthcare chain. Research on changing interorganisational business models on these aspects may be of interest;
(2) A large diversity on health applications are implemented at care providers. Figure 2 shows a fragmentation of applications at one care provider. A portal as a good practise shows the need of standardisation within enterprise architectures. Research on available (e-health) applications is suggested to contribute to solutions for standardisation and preferably dominant designs for healthcare and e-health applications;
(3) As sourcing contracts between insurers and care providers are increasing, the need for efficiency and efficiently running interorganisational and intraorganisational processes increases. Research on standardisation of processes within the healthcare chain, while delivering care according to DTC's is proposed;
(4) The illustrated portal demonstrates patient orientation; processes are logically modelled according to patients' needs. The healthcare system with all stakeholders and providers seems less patient oriented, as the role of the government is dominant in coverage and financial issues. Research on shifts from the current situation to a more patient oriented healthcare system or chain is suggested;
(5) During the demonstration of the portal, aspects around security, secure access to data and secure exchange of data were pointed as important success factors for e-health initiatives. We propose further research on security aspects within the healthcare chain.

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Abbreviations

BSN:	Unique citizen service number issued to everyone registered in the 'Basisregistratie Personen' (BRP, formerly the GBA), or the Municipal Personal Records Database.
Digid:	National authentication service for citizens
DTC:	Diagnosed Treatment Combinations
E-consult:	Online electronic consult with an healthcare provider
EPR:	Electronic Patient Record
FTE:	Full-time equivalent
GP:	General Practitioner
GPIS:	General Practitioner Information System
ICT:	Information and Communication Technology

IIS:	Internet Information Service
KIS:	Chain information providers
NHG:	Dutch Association of General Practitioners
SSO:	Single Sign On to available applications
SMS:	Short Messaging Services
UMCU:	University Medical Center Utrecht
VZVC:	Association for care providers and care communication
XIS:	Other system suppliers
ZIS:	Hospital Information System

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Adoption of RFID microchip for eHealth according to eActivities of potential users

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Abstract

This paper investigates the possibility of introducing subcutaneous microchip radio frequency identification device (RFID) as a substitute for personal documents and credit cards. Microchips are used for many years for different purposes in production and sale, medicine and also to identify some domestic animals. In the study we were interested in whether people in Slovenia would be willing to use subcutaneous microchip and under what conditions. As an alternative solution multisystem smart card was suggested. This paper presents the preliminary results of study carried out from January 21 to February 16 2014. The results show that there is potential for commercial use of RFID implantable microchip also in Slovenia. The attitude of respondents toward adoption of microchips depends on their characteristics, characteristic of microchip and field of usage. Most of respondents would use RFID for healthcare issues, personal identification, and their home environment and at least for shopping and payments. Some discussion for future development of RFID is given.

Keywords: eHealt, eCommerce, implanted microchip, RFID, identification

1 Introduction

Two years ago we were attending 25th Bled eConference in Slovenia where we discussed about smart health care cards suitability in Australia (Cripps et al., 2012). Many pros and cons were discussed and then the idea of RFID (radio frequency identification device) microchip implants was raised. We fantasize about our vacation at sea in the future where we wouldn't need a wallet, since we could be identified, make payments and unlocked the doors of hotel rooms with the help of the subcutaneous microchip. If we would need health assistance, they would simply read our health care

security number from microchip and checked our prior health issues. Is it possible? Why not?

At the end of last year we notice announcement from Dangerous Things (2014) that they want to introduce the first fully NFC (Near Field Communication) compliant implantable RFID tag. NFC is used as a set of short-range wireless technologies, mostly used in smartphones, typically requiring a distance of 10 cm or less. The owner of campaign Amal Graafstra implanted his first microchip in 2005. They claimed that they successfully prototyped and tested the world's first implantable NFC technology - they call it the xNT. The xNT is a 2mm x 12mm, fully NFC Type 2 compliant RFID tag encased in a cylindrical Schott 8625 bio-glass ampule and sterilized in ethylene oxide gas. The price for pre-loaded xNT into injection system is 99$. The campaign gets their goal of 8000$ in one week. Till March 2014, they gathered 30,619$. Recently, May 2014, first comments on successful shipment of the xNT were posted. We should wait for a while to see if this is yet another scam or indeed will these individuals be able to push the use of the RFID implantable devices in private field.

What about the problem of daily used payment cards, credit cards, club cards, profit cards, parking cards, business cards for identification etc. Why must we have on average more than ten cards in our thick wallet? Can all that be replaced by one microchip? Or at least, can all that be replaced by one multifunction card? This and similar questions from eHealth, eGoverment, eCommerce inspired us to conduct research in Slovenia on use of the RFID microchip implant in human for various fields of use.

2 Literature review

2.1 RFID

The first use of RFID technology is considered in the Second World War, when the Allies in this way recognize allied aircraft (Smith, 2008). Later, the use of RFID was used for tracking of radioactive materials and animals. This was followed by the extensive use of RFID systems for tracking products and raw materials in the systems acquisition, sales and storage.

The first subcutaneous microchip was in August 1998 tested by the researcher Prof. Warwick of Reading University, USA (Witt, 1999). It was a small RFID microchip in a glass capsule size 23 x 3 mm inserted in his left arm above the elbow. In this way, with the help of computer and automation, he opened the doors without touching it, activated lights and broadcast messages. The test lasted for 9 days in order to avoid possible health complications due to the time of battery life.

In medicine the use of microchips has led to incredible opportunities. Already in 1998 biosensors based on microchips were able to operate with specialized devices by thought (Bauer, 2007). They allowed persons who are unable to communicate (disabled speech, movement of the limbs), to communicate through these devices.

As early as 1997, the control of blood pressure and heart function due to the small size wireless biosensor directly in the heart was possible. Of course, this also allows

monitoring its status remotely via an Internet connection. The use of microchips and GPS system for tracking lost pets is known for many years.

Similar system was used as the possibility of locating elderly or children in the case of their uncontrolled departure from home (Alzheimer's disease, kidnapping,..). RFID system is also used in hospitals for tracing the distribution of medicines, equipment, healing procedures, patient movements, but in these cases the RFID labels were attached or fixed to observed item (Mehrjerdi, 2011).

The latest discoveries are really extraordinary. It is no longer science fiction (Baker, 2013) that the child who was born deaf, hears again with the help of cochlear implants, a microchip implant, which stimulates the auditory nerve inside the ear. We know that there exist microchip devices that can take brain signals and send them to robotic limbs. So can amputees' thoughts control their movements. We read news about the first success in the introduction of computer-assisted vision by the attachment of microchips in the retina, according to which some blind perceive light (Baker, 2013).

Otologic surgeon Konstantin Stankovic at the Massachusetts Eye and Ear Infirmary, and others from MIT, have succeed in building a device 'bio-battery' that could power implants from the inside. They tested the device in guinea pigs, which has hearing hardware functions similar to humans. Electrodes on either side of a natural membrane powered an on-board chip that was able to transmit a signal of indication of the inner ear potential (Hewitt, 2012). The development is still in the beginning phase so many years of research is still needed to take its full potential.

Bio-batteries are useful in the brain (glucose fuel cells) and as pacemakers supplied based on the movements of the heart.

Burke and Rutherglen (2010) discuss the possibilities of RFID system based on a single microchip. According to their paper, at least three companies managed to produce built-in glucose and blood pressure sensors based on single microchip. Hitachi company with Usama and his colleagues have in the year 2007 succeed in development of technology for nano RFID microchip production size of 0,05mm X 0,05 mm (Burke in Rutherglen, 2010). Currently, the problem is the size of the antenna, which is required in such a system and is sized 1 X 1 mm.

In the year 2012 first results of wirelessly controlled drug delivery microchip testing were published (Farra et al., 2012). The test was conducted with eight female patients with osteoporosis who have received medicine by implanted RFID drug delivery microchip device with twenty doses of medicines size 53mm X 31mm X 11mm. Dates and quantities of drugs are programmed and controlled using a wireless metering device management. In this way, patients are deprived to 20 painful stitches of classical injection.

The U.S. Department of Food and Drug Administration (FDA) in October 2004 approved the company Applied Digital Solutions use of implantable RFID microchip in a glass capsule for identification even in humans (Swartz, 2005). This is a company that previously produced VeriChip, the size of a grain of rice, to identify the lost domestic animals and livestock. This is for the first time in the United States that the use of the device was approved on humans for medical purposes. The microchip was inserted in the arm or hand of the patient by use of a local anaesthetic in a few minutes. The patient has been allocated 16 digit identification code which can be together by appropriate

scanning equipment used to identify and gain an insight into his medical recorded data such as known allergies, blood type, previous treatments. The advantage of this system lies in the case of patient critical health situations when he is not able to provide the necessary information. According to the press in Mexico microchips were inserted in more than 1000 patients. Of course, such microchip can be also used for other purposes. Mexican Attorney General, Rafael Macedo de la Concha and his 160 law enforcement officials was inserted microchips in their hands in order to increase safe access to the premises to confidential documents on the drug cartels in Mexico (Atkins, 2004, Swartz, 2005).

The use of microchips also brings some risks such as safety of device, privacy of patients' records and coercion to consent to the implantation of the devices. Additional there is a social and ethical risk. There are several groups of mostly catholic people that see the devil in the microchip (Monahan and Fisher, 2010). They are afraid of unauthorized human control and tracking of people and their actions. In addition, there are also possibilities of discrimination between patients during medical procedures and reduce of the patient's confidence in microchips and the health system.

In the empirical research of Monahan and Fisher (2010) in 23 U.S. hospitals between March 2007 and December 2009, patients were monitored with embedded microchips during medical procedures. They found that the patients with microchips had advantages over others, because they avoided queuing, since the data on patient were transferred by reading the microchip. During interviews of patients they found out that some patients have inserted the microchip based on misconceptions about the benefits of them. They also detected the danger of bureaucratization, where data in microchip system, despite potential human errors in the entry, were more relevant as a statement of the patient them self. This could lead to a health risk of patients (Monahan and Fisher, 2010).

2.2 Smart cards

Smart cards with embedded microprocessor were developed in the early 1970s (Cripps et all. 2012). They used them mostly for transportation, secure buildings access and offices, and for electronic payments. One of the distinct features of smart cards is integrated encryption key that help prevent fraud. The smart cards are also equipped with limited memory that can be manipulated.

Memory cards can be seen as small data storage devices with optional security that can be read, while smart cards with microprocessor can add, delete or change data in its memory on the card (Mohammed et al., 2002). Contact smart cards are inserted into reader while contactless smart cards have an RFID microchip with antenna in it that can communicate in short distance with the reader. Combo card is a combination of aforementioned cards in one with a very high level of security. The available memory and microprocessor on board allows also use of biometrics. That means that biometric features can be used for user identification by fingerprint, retina, voice etc. As stated by Mohammed et al. (2002) decade ago, smart cards could handle multiple tasks for their owners in the future, from providing access to company networks, enabling electronic commerce, storing health care information, providing ticketless airline travel and car rentals, and offering electronic identification for accessing government services such as benefit payments and drivers licenses etc.

3 Methodology

Based on the literature review web questionnaire on adoption of RFID systems and subcutaneous microchips was constructed. We try to examine the opinion of Slovenians on personal use of subcutaneous microchips for healthcare, identification, shopping and payment, and home use purposes.

We expected that the awareness of microchip usage would be low and that its acceptance would depend upon the several factors:

- personal characteristics of participants in the study (age, gender, education, consumer habits, personal specifics, etc.),
- technical characteristics of the microchip (the possibility of tracking, remote control, security, etc.),
- confidence to the provider (state, health care, banks, shops),
- area of the microchip usage (identification, health care, payment, home use).

We set three main research questions:

- R1: Is it possible to introduce commercial use of the RFID subcutaneous microchips in Slovenia?
- R2: What factors influence the decision of subcutaneous microchips use?
- R3: Would a multisystem smart card be accepted as alternative to subcutaneous microchips?

Data for the study were collected through the structured online questionnaire, which was equipped with some facts and image materials about the possibilities of the use of microchips. In order to determine the impact of provided information on the response, we repeated the same questions from the beginning also on at the end of the questionnaire. The questionnaire was fulfilled in about twelve minutes. Invitations to the survey were sent via emails to members of our own social networks, our students and to the several societies and media houses. Invitation to the questionnaire was posted also at the faculty web page.

In the questionnaire, mostly closed-response questions were used. Except for demographic data, respondents either rated statements on a scale from 1 to 5, or responded by grading items according to their importance.

In the time period from January 21 to February 16 2014 we received in total 626 surveys where 21.1% (132) were partially completed surveys and 78.9% (494) were completely fulfilled.

4 Results

4.1 Sample characteristics

The current sample consists of 56,9% of females and 43,1% of males. The majority of respondents (29,4%) have a secondary school, vocational level have 3,7%, while primary school or less have 17,0% of respondents, where we have to emphasize that we include in the research also pupils of the highest grades of primary school. 22,1% of respondents have graduate level within 1st and 2nd Bologna level and 8,9% of the respondents have a title of MSc or PhD.

Among the respondents 6,8% are unemployed, 5,4% are pensioners, 38,5% are students of primary school, high school or university and 49,2 % of them have a status of employed person. The youngest respondents were 12 years old, while the oldest were 90 years old. The average age is 32,5 years with standard deviation 14,9 years. Almost half of the respondents (311 or 49,8%) already heard of RFID. Those respondents were asked to estimate their current knowledge of RFID technology on 5 point scale from very bad (1) to very good (5). The majority of respondents (31,9%) select the neutral answer that their knowledge is neither bad, neither good, while the mean of knowledge estimation of RFID is 2,88 with standard deviation 1,21, therefore we can conclude that self-estimation of RFID knowledge is rather poor.

Number of debit, credit, prepaid and profit cards could be a useful guideline to outline the involvement of a respondent as an active or well-informed eConsumer. We have to emphasize that all data regarding bank and purchase habits presented below are reported with excluded students. Respondents have on average 2,3 debit cards (s=0,72), while only 4% of respondents said that they have no debit card. Average number of credit cards (e.g. Mastercard, Visa, Diners Club,…) is equal to 2,04 (s=0,91). Majority of the respondents (45,9 %) reported that they possess one credit card, while 27,9% do not have any credit card. Prepaid cards such as parking cards, cinema cards, etc. are not so widespread, while 63,0% respondents have no such card and average number is equal to equal to 1,5 (s=0,80). On the other hand the profit cards of food and clothing retail chains, construction shops, pharmacies, and gas stations are much more popular, while respondents reported on average 5,2 profit cards (s=4,37), 7,1% of respondents reported that they have 10 prepaid cards or more.

Questions on intention to adopt microchip were raised both at the beginning and at the end of the survey in order to investigate the effect of information and pictures presented during the questionnaire. Results are presented as mosaic plots in Figure 1. Among respondents who said that they would use microchip for healthcare issues (upper left part panel in Figure 1) at the beginning of the survey 89,4% respond positively also at the end of the survey, while 10,6% of respondents changed their opinion. Positive shift in the opinion of adoption for healthcare issues was found for 17,5% of respondents (at the beginning they said no and at the end they say yes). The highest negative shift in the opinion of adoption of microchip was found in the case of identification issues where 22,1% of respondents said that they have no intentions to adopt the microchip at the end of the survey, although their opinion at the beginning was quite the opposite (upper right part panel in Figure 1) 5,0% of respondents positively changed their opinion on

usage of microchips as shopping and payment gadget (lower left part panel in Figure 1) and 7,3% respondents positively change their opinion on home usage of microchips (lower right part panel in Figure 1).

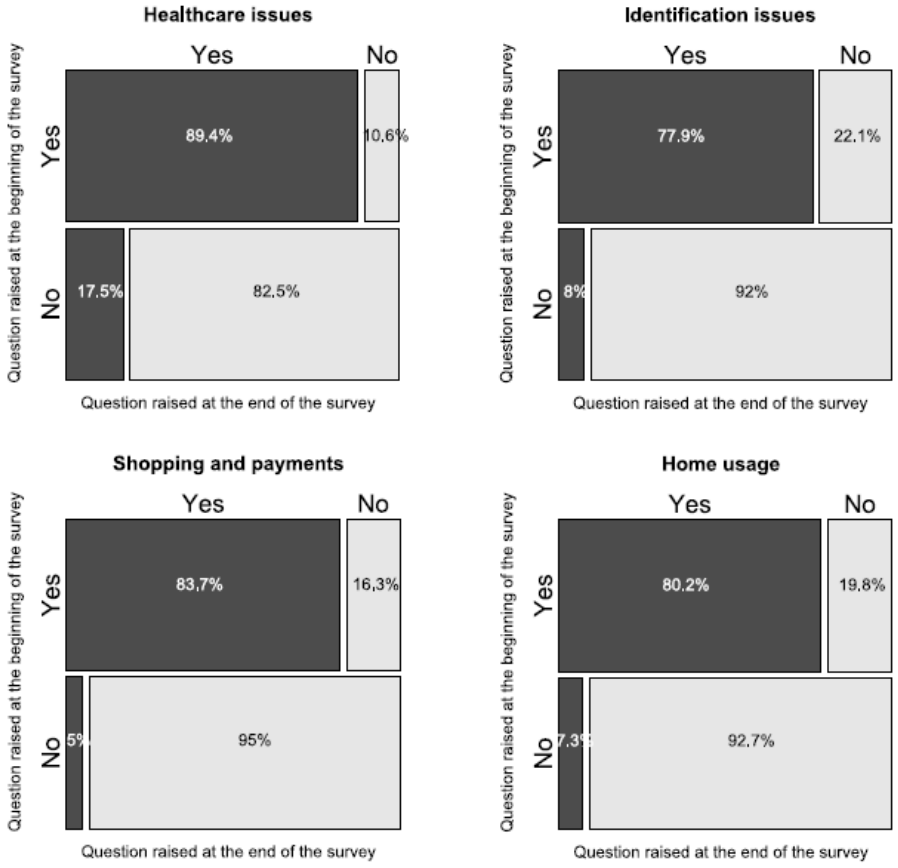


Figure 1: Intentions of adoption of microchips for four different usages according to the time of raised questions

Next we try to find out how characteristics of the respondents influence the intentions for adoption of microchips. Figure 2 presents positive response on seven questions on microchips and smart card adoption according to the status of the respondents. Students are more prone to adopt microchips, while 56,7% would have microchips for healthcare issues, 40.1% for identification purposes, 38,0% for simplified shopping and payments, and 40,1% for usage in home environment. If assurance will be given that microchips do not allow GPS tracking then 46,5% of students will adopt them. 37,8% of students reported that they would adopt a microchip if it will combine of four main scopes of usage; healthcare, identification, payments and home usage. If assurance will be given that microchips do not allow GPS tracking then 46,5% of students will adopt them (Figure 2), while 37,8% of students reported that they would adopt a microchip if it will combine of four main scopes of usage; healthcare, identification, payments and home usage. To understand the level of these results we can compare result of similar research by Smith (2008). Students from Mesa State College, Colorado, were asked "Would you get implanted with an RFID Chip?" and 23,33% of them reported that they

would implanted it. If we take into account that there are no big differences in leaving conditions between USA and Slovene students, then we can conclude that in 6 years the number of students who are prepared to use microchips increased almost for twice (37,8%).

Students have the most positive attitudes towards the adoption of smart cards which would combine all four previously mentioned scopes, while 70,3% reported a positive attitude for adoption (Figure 2). Somewhat unexpected is relatively positive attitude toward adoption of microchips of pensioners, especially in comparison with (un)employed respondents, where 42,3% of pensioners would have a microchip for healthcare issues. One of the possible explanations for those results is that we got answers only from pensioners that are users of internet and are more in favorite of technical innovations than others.

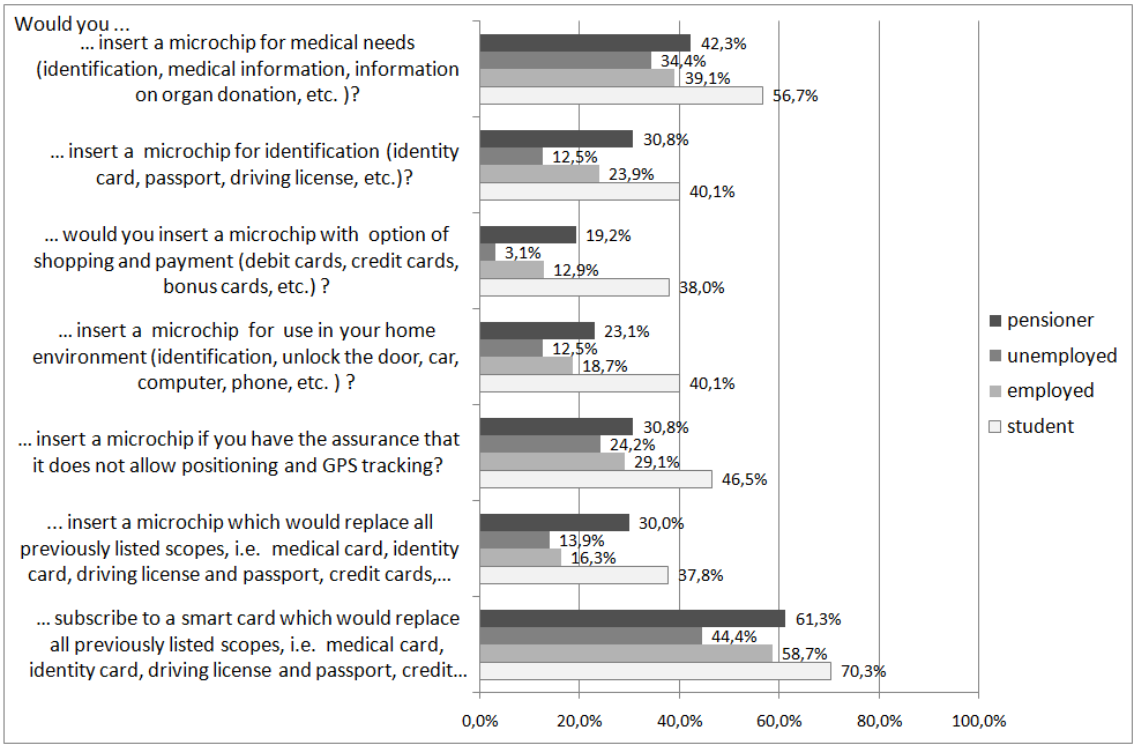


Figure 2: Intentions for adoption on microchips according to respondents' status

Investigation on opinion of microchips adoption according to gender reveals that men have more positive attitude toward their adoption than women (Figure 3). The highest percentage of men would have a microchip for healthcare purposes (47,1%), while among women 42,2% express positive opinion on that question. Around 60% of men and women would have a smart card combining all for main areas of use, while microchip would have 22,7% of men and 18,4% of women. Comparison to Smith (2008) shows similar differences between male (23,91%) and female (11,76%) respondents in favor of male.

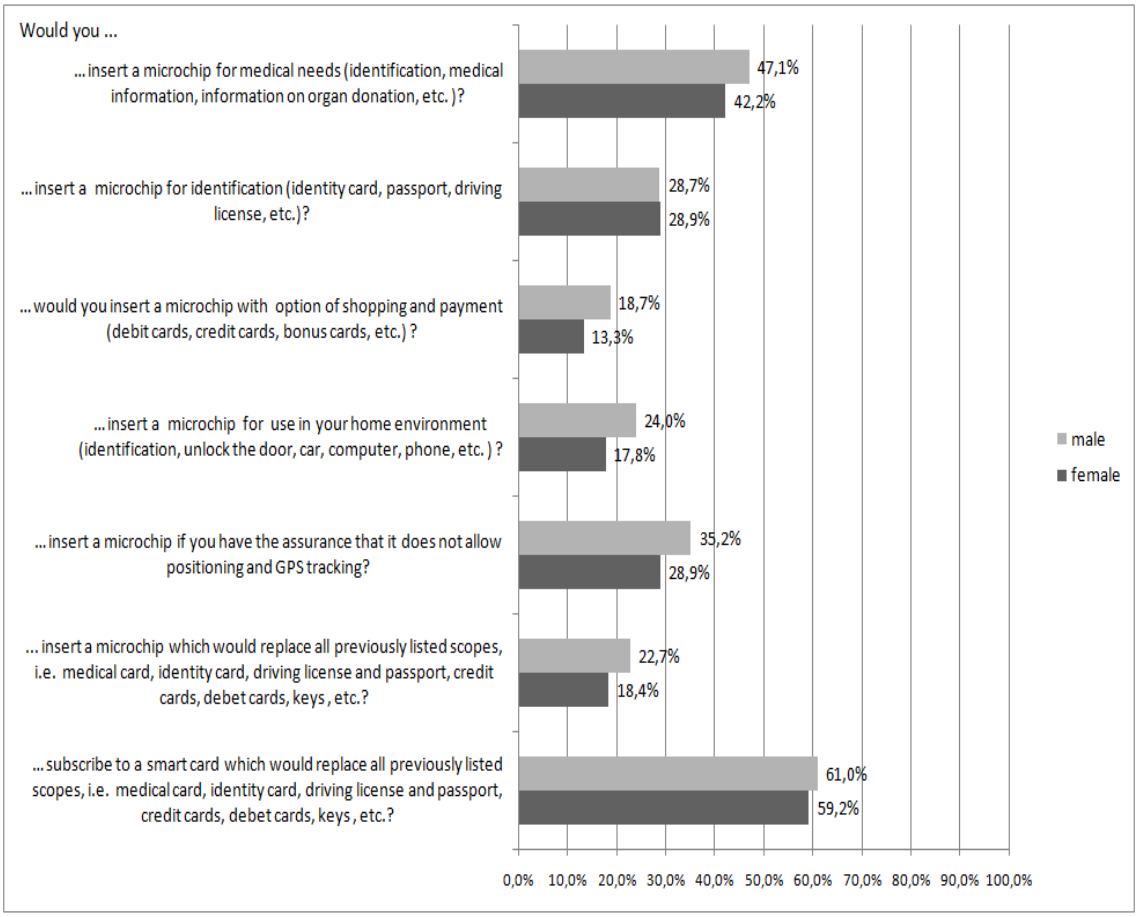


Figure 3: Intentions for adoption on microchips according to gender of the respondents

In addition we combined the answers on four questions (from the end of the questionnaire) on adoption intentions (healthcare, identification, shopping and payments, home usage) into three categories: respondents who do not intend to use microchip in any area, respondents who selected one or two scopes and respondents who selected at least three different fields of microchip usage.

The ANOVAs

In order to find differences in several personal characteristics payment and purchase habits of the respondents according to three categories of microchips usage ANOVAs were performed (Table 1).

There exist statistically significant differences in number of different social networking services (e.g. Facebook, LinkedIn, Twitter, Youtube, etc.) among three groups of respondents according to adoption intentions of microchip (F=5,15, p=0,06) at 5% significance level. Post hoc analysis with Hochberg's GT2 reveals that statistically significant differences in average number of usage of different social networking sites are between group of respondents who would have a microchip for at least three different areas ($\bar{x} = 2{,}20$) in comparison with other two groups ($\bar{x} = 1{,}78, \bar{x} = 1{,}73$) where it can be seen that respondents who would use a microchip for at least three different scopes use on average more social networking sites.

	Number of microchip usages	Descriptive Statistics			Test of Homogenity of Variances				ANOVA or Robust Tests[2]	
		N	Mean	Std. Dev.	Levene Statistic	df1	df2	Sig.	F	Sig.
Num. of different social networking services	none	227	1,78	1,33	2,707	2	470	,068	5,15	,006
	1 or 2	137	1,73	1,15						
	3 or 4	109	2,20	1,27						
Age	none	238	35,18	13,78	2,963	2	482	,053	9,52	,000
	1 or 2	136	30,84	14,28						
	3 or 4	111	28,38	15,98						
Stolen/lost wallet in last 5 years	none	240	0,12	0,37	41,604	2	487	,000	10,70	,000
	1 or 2	138	0,20	0,44						
	3 or 4	112	0,43	0,78						
Car/home/office keys lost in last five years	none	239	0,28	0,81	21,481	2	486	,000	15,96	,000
	1 or 2	138	0,62	1,01						
	3 or 4	112	0,95	1,23						
Number of (personal, work,...) e-mails	none	239	3,67	1,48	,109	2	486	,896	1,06	,348
	1 or 2	138	3,57	1,42						
	3 or 4	112	3,84	1,45						
Proportion of daily purchases paid with debit cards	none	173	55,0	32,8	1,145	2	295	,320	2,71	,068
	1 or 2	77	65,5	31,7						
	3 or 4	48	57,5	34,0						
Num. of group purchases in 2013	none	71	4,76	3,22	7,751	2	139	,001	,52	,595
	1 or 2	42	4,31	2,24						
	3 or 4	29	4,83	2,25						
Number of debit cards	none	172	2,30	0,70	,272	2	294	,762	,32	,730
	1 or 2	77	2,35	0,70						
	3 or 4	48	2,25	0,67						
Number of credit cards	none	173	1,92	0,82	4,744	2	295	,009	4,38	,014
	1 or 2	77	2,30	1,05						
	3 or 4	48	2,21	1,01						
Number of prepaid cards	None	173	1,48	0,83	1,088	2	295	,338	,83	,436
	1 or 2	77	1,42	0,66						
	3 or 4	48	1,60	0,87						
Number of profit cards	None	167	4,62	4,25	,228	2	287	,796	4,65	,010
	1 or 2	76	6,09	4,47						
	3 or 4	47	6,30	4,12						
Amount of stimulative discount to replace debit cards with microchip	None	211	57,63	42,02	43,218	2	272	,000	10,90	,000
	1 or 2	137	45,93	28,92						
	3 or 4	111	34,59	25,11						

[1] Analyses on purchase and payment habits are performed with excluded students (shaded with gray).
[2] If the variances among groups are not statistically significant at 5% significance level ANOVA, otherwise Robust Test of Equality of Means is performed.

Table 1: Differences in personal characteristics, eActivities, and purchase/payments habits among three groups with different intentions of microchips adoption

Similar as seen above when we compare status of the respondents the average age differ statistically significant among three groups of respondent according to the intentions of

microchips usage (F=9,52, p=0.000). Respondents in the group who refused to use all microchips is statistically significant older ($\bar{x} = 35,18$) than respondents in other two groups ($\bar{x} = 30,84, \bar{x} = 28$,38 at 5% significance level.

Stolen or lost wallet with documents and stolen or lost car, home or office keys influence the individual's intentions to use microchips, while there exist statistically significant differences in number of lost/stolen wallets in the last 5 years and number of lost or stolen car, home or office keys in the last 5 years. Respondents who intend to use microchips for at least three different scopes have on average highest number of lost or stolen wallets ($\bar{x} = 0,43$) and keys ($\bar{x} = 0,95$) in the last five years.

Previously we showed that number of networking sites differ among three groups based on number of intended uses of microchips. On the other hand, number of e-mails do not differ statistically significantly among three groups of respondents (F=1,06, p=0,348).
The analyses on purchase and payment habits in Table 1 are presented with excluded students. We found out that there exist no statistically significant differences in proportion of daily purchase paid with debit cards (F=2,71, 0,068), number of so called group purchases (F=0,52, p=0,595), number of debit cards (F=0,32, p=0,730) and number of prepaid cards (F=0,83, p=0,436) at 5% significance level. On the other hand there are statistically significant differences in average number of credit cards (F=4,38, p=0,014) at 5% significance level, where respondents who have no intentions to adopt microchip have on average the lowest number of credit cards ($\bar{x} = 1,92$).

Respondents who are more prone to adopt microchips have on average more prepaid cards ($\bar{x} = 6,09$ and $\bar{x} = 6,30$) than respondents who do not want to adopt any of microchips ($\bar{x} = 4,62$).

Respondents were asked also what amount of discount would be stimulative enough to replace debit cards with microchip. Respondents who decline the use of microchips reported on average higher percentage of stimulative discount ($\bar{x} = 57,63$) than respondents who are more in favor of microchips usage ($\bar{x} = 45,93$ and $\bar{x} = 34,59$).

5 Conclusion

The results of the study show that there is potential of commercial use of RFID implantable microchip also in Slovenia (R1). According to diametrical opinion of respondents, while some of them see this as opportunity and others as threat to their human integrity, no mandatory can ever came in question. When we distinct between different kind of usage in all categories the order of categories is equal. Most of respondents would use RFID for healthcare issues, personal identification, and home environment, and as least for shopping and payments. The number increases when we were searching for those in favorite of untracking RFID. This shows the fear that exists among respondents that microchips will enable tracking their position, movements, shopping habits etc. One of the main results of our research study, as expected, are the findings on multisystem smart card acceptance (R3). It should be viewed as a preparation for the later use of RFID system since the architecture is the same for both. In some USA hospitals the negative aspect or discriminations as result of RFID system

use was observed when patients with RFID implantable microchips were processed before regular patients who have to wait in queues before their personal data was found and the details on the form were filled in. When we examined the age of respondents it was expected that younger will be more open to use RFID microchip. As expected additional information and knowledge about RFID usage provided during the questionnaire arise the amount of possible RFID users. Similarly, as we expected respondents that are using different internet possibilities such as social networks are more likely in favorite for RFID use. Also persons with bad experiences with stolen wallet or lost keys see the RFID as opportunity. Women tend to be more cautious than their male colleagues. RFID adoption according to gender reveals that men have more positive attitude toward their adoption than women (R2).

What are the preconditions for new system? Technically there are no limitations at the moment. Smart cards and RFID devices are used for decades so no questions should be on their side. The biggest problem we see is in national and international collaboration and corporations' interests. Strict laws and government regulations must be accepted for personal protection of users and to prohibit potential misuse by government, institutions, banks or traders. The beginner of the new initiative has to be European Union and then the Slovenia and other member states will follow it. Until then, partial solutions will be sold and lot of unnecessary money will be spend for synchronizations of different unnecessary systems. And of course, owners of recent system will be the hardest obstacle to unified system for personal identification, security and health insurance and commerce.

Implication for practice

The main results of our research could practitioners used as market research and study. It seems that there is a large group of potential RFID user whether as implantable microchip or as multifunctional card. The use of the latter was tested in some towns (e.g. EZ-Link in Singapore, Urbana in Ljubljana, Slovenia) where single card if used for multiple purposes (transportation, parking, identification, payment, …). The fears of potential users are known, so the product should not allow position tracking or any other tracking of personal habits. The production cost should not be much higher than from those of recently used smart cards that have already RFID included. It seems that whole new field of RFID and smartphones market will arise. There exist applications for smartphones that can replace RFID cards. For those more conservative users, that do not want to implant microchip under the skin, many alternatives exist in shape of rings, bracelet or pendants with included RFID microchip.

In health care there are numerous examples of RFID good practices varying from inventory, drugs to patient systems that are used for several years' in different countries. The biggest challenge of such system is how to change our rigid systems which are usually even not fully IT supported to new technology which do not allow improvisations.

Limitations

This article presents preliminary and partial results due the time lack between conduction of research and the finalization of presented paper and due the limitation of the paper length. The gathered sample of partially or fully fulfilled questionnaires is

adequate, but the numbers of responses from some groups is insufficient. Especially group of unemployed persons and group of pensioners are a little bit poorly represented and probably in further analyses their responses should be weighted to obtain more representative sample. On the other hand those groups are not the main target groups of potential microchip users. Further work is needed in order to answer all questions raised during the discussion in this paper..

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Microlearning mApp to Improve Long Term Health Behaviours: Design and Test of Multi-Channel Service Mix

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Abstract

Work place health support interventions are relevant: to support our aging work force and to help reduce the private and social burdens of preventable disease. Moreover, healthy living has become a priority in Dutch society. Previous research showed that health apps should offer enough newness and relevance each time they are used. Otherwise the 'eHealth law of attrition' applies: 90% of users are lost prematurely.We developed a hybrid health support solution that uses a mix of electronic and physical support services for improving health behaviours, including a mobile micro-learning health quiz. This solution was tested in a multiple-case study at three work sites. The research question was whether a mobile health quiz can provide added value for users within a hybrid service mix and whether it promotes long term health readiness (awareness, motivation, plans and behaviours)?We found that both the mobile health quiz and the overall hybrid solution contributed to health readiness and health behaviour improvements. Users indicated that the micro-learning health quiz courses provided new and relevant information. We also observed relatively high utilization rates of the health quiz. Participants indicated that health behaviour insights were given that

were directly applicable and that fitted well within the overall service mix. Moreover, even after 10 months they indicated to still have increased health awareness, -motivation and -behaviours (food, physical activity, mental recuperation). A design analysis is conducted regarding service mix efficacy; the mobile micro-learning health quiz helped fulfil key requirements for designing ICT-enabled lifestyle interventions, largely in the way it was anticipated.

Keywords: mobile Health, mApp, service design, multi-channel services, healthy lifestyle intervention

1 Introduction

Work place health support interventions are very relevant: to support our aging work force and to help reduce the private and social burdens of preventable disease. There are two design challenges there: increasingly more support is required, and this has to be delivered at lower costs. Hence, there is an urgency to develop automated eHealth solutions to improve user's health.

Previous research highlighted the following requirements in the work context: solutions need to be efficient; they should limit their intrusion on the other work tasks (Bruck, Motiwalla, Foerster 2012); they should offer enough newness and relevance (Simons, Guldemond, Hampe 2013) each time the mobile health application is used. Otherwise the eHealth law of attrition applies: 90% of users are lost prematurely (Eysenbach 2005).

This eHealth law of attrition is an important design challenge. On the one hand, we know that many health plans of people fail and that with extra support, success rates improve. On the other hand, automated eHealth support is often the economically preferred way (especially in the future, given our aging population). But if eHealth applications generally lose 90% of their users within several usage instances, we are not adding enough value with eHealth.

In previous research (Simons, Hampe, Guldemond 2012) we showed that various mobile health applications, even when they are popular mApps from the App stores, still face challenges in delivering added value to existing health coach relationships. In several of our real world user tests, the 'eHealth law of attrition' applied (Eysenbach 2005). In other words, a large majority of users (>90%) stopped using the mApps within two weeks and judged that they added little new information or value after a few initial usage events. Very similar patterns were found for a food choices app (CalorieTeller), physical activity (Runkeeper) and a stress management app (Pranayama). Two main design lesson conclusions were (Simons, Hampe, Guldemond 2013, 2014): First, part of the attractiveness of an mApp appears to be the 'newness factor': do I learn or experience something new? Second, it helps when the mApp is a core element of a larger service mix within an existing health coach relationship, see also Jimison 2008.

Moreover, as part of qualitative user feedback, we found a continuous hunger from health coach participants for new health information. It was decided to create a health coach service mix, where the processes of health education would be supported with a mobile health education system in the form of a micro-learning Health Quiz on multiple health behaviour themes (food, physical activity, mental energy, long term sustainable health behaviours).

The overall research question is: Can a mobile health quiz provide added value within a hybrid (electronic and face to face) health coach service mix and does it promote long term health readiness (awareness, motivation, plans and behaviours)? We conducted a multiple-case study in three different work site environments (employers) and addressed the research question via four sub-questions: First, does the mobile health quiz provide added value (usefulness, fun, positive triggers) with low barriers (ease of use, limited time burdens)? Second, can the mobile health quiz be integrated in effective health coach processes and overall service mix? Third, do the mobile health quiz and the overall service mix improve health readiness (awareness, motivation, plans and behaviour experiments)? Fourth, do the mobile health quiz and the overall service mix improve health behaviours, short term and long term?

2 Theory

For health coach solutions to be effective, they need to help improve health readiness as indicated in the HAPA (Health Action Process Approach) model (Schwarzer 2008, Lippke 2009) and i-change models (De Vries and Mudde 1998). Three important phases are distinguished. Barriers or motivators for change can reside in each of these phases, which are: awareness, motivation/intention, and practice (including planning, experiencing, coping, improving). And as an underlying theme self-efficacy is important in these models: can we support people in developing skills to live more healthily and with tactics to deal with challenges?

If we look at the design challenge of persuasive technology (Fogg 2002, 2009) for health, it was theorized and tested elsewhere that this challenge is not just located in the ICT design, but also in the design of the overall service scape, including health effects and coach relationship (Simons, Hampe, Guldemond 2014). It should generate positive, mutually reinforcing service experiences across communication channels and activate long term health motivation and -behaviours, in order to deliver long term results. This is reflected in the following design evaluation framework for health improvement ICT solutions (Simons, Hampe, Guldemond 2014), see Figure 1. It evaluates the impact of the ICT-enabled intervention on health effectiveness, coaching performance and ICT value adding.

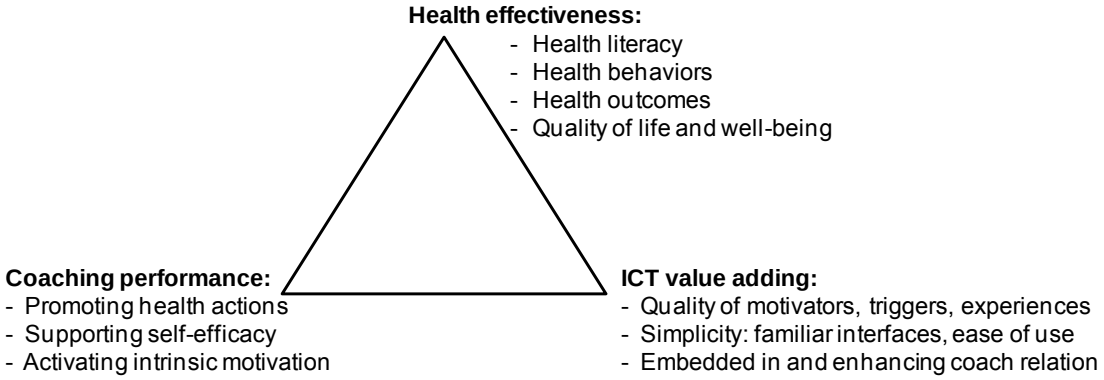


Figure 1: Basic requirements when designing ICT-supported healthy lifestyle interventions

To increase solution impact, a hybrid or multi-channel service mix is recommended (Sperling, Simons and Bouwman 2009, Simons, Steinfield and Bouwman 2002, Simons 2006, Simons

and Hampe 2010, 2010b), combining electronic and face-to-face interactions. For example, face to face 'on site' coaching had as benefits: a richer service experience with the coach, with other participants and with a health focused 'service scape'; group support experiences (obtaining additional social support and co-creating service experiences together); learning from each other; health experiences in healthy food-, sports- and relaxation exercises. Disadvantages are: more (travel) time needed; less flexibility regarding when and where; and not everyone likes group sessions (Demark-Wahnefried 2007). Electronic and (semi-)automated coaching has as benefits: more time-efficient; more flexibility in when and where to have contact; very explicit monitoring of your own progress online; having status reports including 'next steps' commitments always online. Disadvantages are: the sensory-, emotional- and group experiences are more limited. Also, the 'service scape' in which people are immersed is only virtual, not physical. In summary, often a hybrid service mix has most to offer.

In such a hybrid service mix, mobile micro-learning could potentially offer a number of advantages: it uses a personal device that is available any time any place, it is efficient and can use idle time that is otherwise lost, and it is suited for just in time learning (Bruck, Motiwalla, Foerster 2012).

3 Methods and Materials

Regarding our design research approach, we follow the design cycle of (Vaishnavi & Kuechler, 2004): from problem awareness and solution suggestion to development, evaluation and conclusion. After reporting our multiple-case study results in section 4, we will discuss design lessons in section 5.

3.1 Intervention: Hybrid lifestyle intervention with mHealth App

The mHealth Health Quiz App was used within a hybrid (face-to-face and digital) service mix. The healthy lifestyle support service mix consisted of:

- Digital health behaviour surveys 'BRAVO' with automated personal feedback (on physical activity, smoking, alcohol, food and energy/recuperation), at 0, 1, 3 and 10 months.
- A 3-hour start up workshop (with about 30 participants)
- Personal action plan drawn up at the start workshop
- Asking participants to use weekly buddy contacts
- The mHealth Health Quiz App (available for Android, iOS, blackberry and laptops)
- Supporting health education materials via email
- A 2-hour repeat workshop after 1 month for answering questions and for (peer) education
- Twelve times a weekly health tip email to help maintain awareness and motivation

The Health Quiz App was based on the micro-learning principles and technology platform as outlined previously (Bruck, Motiwalla, Foerster 2012). Hence, education is conducted via brief learning cards, each containing a question, (mostly) multiple choice answer options, plus a brief explanation after each answering attempt. The learning cards are organized in a number of courses and participants can see how much they progressed within a course. The

course content was designed in the following way. It consists of seven courses of about 20 questions each. The first three courses educate participants on the 'what' or basic knowledge of healthy food-, exercise- and mental energy behaviours. The fourth course provides education and examples on what determines long term health behaviour success. Courses five through seven educate participants on the 'how' or daily tactics of healthy food-, exercise- and mental energy behaviours.

Within the course content design, questions are ranked in a certain order to address consecutive learning objectives. First, basic knowledge and awareness are increased, then motivation and plan making, next there is support for daily activities and coping strategies, plus seeking new self-norms and self-identity. Participants are free to switch between courses in order to support 'just in time' learning based on their needs. The Health Quiz Apps were downloaded and activated for all users during the 3-hour start up workshop.

3.2 Multiple-Case Study in three employer organizations

From Feb to Dec 2013, a multiple-case study was conducted with three employers to evaluate real world impacts of the healthy lifestyle intervention in Dutch work settings. The employers were: a Municipality (n=30 participants), an Advocacy organization for Dutch senior citizens (n=26 participants, half of them volunteer workers) and a Care Provider (n=30 participants).

From the perspective of these three organizations, an important question was: does this lifestyle intervention generate health behaviour improvements in the short and longer term? This was assessed with a standardized Dutch online 'BRAVO' survey (on physical activity, smoking, alcohol, food and energy/recuperation), at 0, 1, 3 and 10 months. Moreover, at months 1, 3 and 10 several additional health behaviour and health readiness (according to the stages of awareness, willingness, plans and actions) questions were asked on top of the brief BRAVO question set.

Next, a design evaluation survey was added at month 1, and the findings from this survey were discussed in the 1-month group workshops at each organization, to obtain qualitative insights into the why and how of the survey data and user experiences. The design evaluation survey addressed: 1) an evaluation of health promotion value of the different elements in the service mix, including the Health Quiz App, 2) the micro-learning mApp usefulness and ease of use. Besides, logging was conducted of use and progression in the micro-learning mApp environment.

4 Results

The overall patterns were rather similar across the three employer organizations regarding: adoption, evaluation and effects of the healthy lifestyle intervention. Hence, we first describe the generic outcomes. After that, we report cross-case differences.

At the start, there were 86 participants (n=30/26/30 for Municipality, Advocacy and Care Provider respectively). The survey response rates were 74% (n=64) at 1 month, then 55% (n=47) at 3 months and 56% at 10 months (n=48 for the BRAVO questions, n=47 for the rest).

4.1 Generic outcomes across the three employer organizations

From the perspective of the three employer organizations, the main result is that health behaviours improve, as measured with the standardized Dutch BRAVO survey (on physical activity, smoking, alcohol, food and energy/recuperation). As expected, the main improvement in health behaviour patterns occurs in the first month. After that, the new pattern is relatively stable, at least for 10 months period we measured. This pattern was observed within each organization. Table 1 provides the behaviour distribution accumulated for the three organizations at the start and 10 months. Table 2 summarizes the number of worsened and improved scores at months 1 and 10, compared to the start. Green means: compliant with Dutch health norms, yellow is nearly compliant and red is the rest.

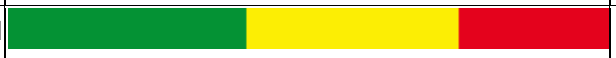
Health Behaviours:	**BRAVO survey results at start (n=86)**	**Percentages**
Moderate Physical Activity		(40% - 9% - 51%)
Intensive Physical Activity		(22% - 26% - 52%)
Smoking		(83% - 0% - 17%)
Alcohol		(64% - 0% - 36%)
Food, Vegetables		(21% - 21% - 58%)
Food, Fruits		(26% - 15% - 59%)
Food, BMI:		(42% - 34% - 24%)
Recuperation/Relaxing		(42% - 50% - 8%)
Energy		(8% - 21% - 71%)
Health Behaviours:	**BRAVO survey results at 10 months (n=48)**	**Percentages**
Moderate Physical Activity		(63% - 13% - 25%)
Intensive Physical Activity		(40% - 35% - 25%)
Smoking		(85% - 0% - 15%)
Alcohol		(81% - 0% - 19%)
Food, Vegetables		(44% - 25% - 31%)
Food, Fruits		(48% - 19% - 33%)
Food, BMI:		(52% - 29% - 19%)
Recuperation/Relaxing		(67% - 27% - 6%)
Energy		(23% - 23% - 54%)

Table 1: Health behaviours distribution at start and 10 months. Green = health norm compliant. Yellow = nearly compliant. Red = the rest.

	Number of people, at 1 month (n=64)		Number of people, at 10 months (n=48)	
Health Behaviours:	**Worsened:**	**Improved:**	**Worsened:**	**Improved:**
Moderate Physical Activity	4	19	4	14
Intensive Physical Activity	4	21	4	18
Smoking	2	2	1	3
Alcohol	4	8	1	8
Food, Vegetables	2	23	3	16
Food, Fruits	5	32	1	18
Food, BMI:	2	4	1	5
Recuperation/Relaxing	5	16	3	14
Energy	5	17	5	14

Table 2: Summary of worsened and improved behaviour scores at 1 and 10 months (irt start)

Additional behaviour improvements reported in the surveys were (we list how many of the n=47 respondents (strongly) agreed at 10 months): I am physically active more often during the day (72%), I take a relax moment more often (47%), I more structurally reduce my stress sources (51%), I eat fewer sugars and refined carbohydrates (55%), I eat more whole meal plant foods like nuts, mushrooms, olives etc (81%), I eat less red and processed meat (57%), I eat fewer butter fats (60%). Next, the health readiness indicators improved (awareness, intentions and plans), plus health effects in terms of improved physical or mental fitness. The scores at 1, 3 and 10 months were very similar. Table 3 provides the 10 months results (n=47).

Realize importance of health		(0 / 0 / 5 / 28 / 14)
More awareness of health choices		(0 / 0 / 4 / 29 / 14)
Want to live healthier than before		(0 / 2 / 7 / 25 / 13)
Made specific plans for healthier choices		(1 / 6 / 7 / 22 / 11)
Feel more fit, physically		(0 / 4 / 18 / 19 / 6)
Feel more fit, mentally		(0 / 6 / 21 / 16 / 4)

Table 3: Health readiness and fitness improvements after 10 months, n=47. Green = (highly) agree. Yellow = neutral. Red/orange = (highly) disagree.

Next, a question was: how did the Health Quiz App and other service mix elements contribute to the results above? This question was part of the 1-month evaluation. In the survey data as well as the workshops observed that not everybody had preferences for the same service elements. Still, most service elements were judged to be helpful for improving health behaviours by a significant part of the users, see Table 4. The lowest helpfulness scores as

percentage '(strongly) agree', n=64, were given for: doing it as a group (20%), having a buddy (25%) and the weekly health tip mail (36%).

The highest helpfulness scores as percentage '(strongly) agree', n=64, were given for: having a second workshop at 1 month (52%), feeling better (53%), the Health Quiz mApp (53%), making my own health activity plan (66%), knowing what my own influence is (75%) and the start workshop (77%).

Start workshop		(0 / 2 / 6 / 38 / 11 / 7)
Micro-learning health quiz		(0 / 7 / 20 / 25 / 9 / 3)
My own health activity plan		(0 / 7 / 12 / 35 / 7 / 3)
That I had a buddy		(7 / 13 / 18 / 14 / 2 / 10)
Weekly health tip mail		(2 / 9 / 30 / 18 / 5 / 0)
Start survey		(2 / 9 / 25 / 20 / 4 / 4)
Surveys at 1 and 3 months		(2 / 12 / 23 / 21 / 3 / 3)
Follow up workshop 1 month		(2 / 8 / 20 / 28 / 5 / 1)
That I feel better		(0 / 6 / 26 / 26 / 6 / 0)
That I now know what my own influence is		(0 / 3 / 11 / 36 / 12 / 2)
Doing it as a group		(6 / 11 / 31 / 11 / 2 / 3)

Table 4: Service elements that stimulated healthier behaviours (n=64, at 1 month). Green = (highly) agree. Yellow = neutral. Red/orange = (highly) disagree. Grey = not applicable.

A next set of evaluation questions at 1 month regarded usefulness, added value and ease of use of the micro-learning Health Quiz mApp. The majority of respondents indicated that it was efficient, useful, fun, that they would have learned less without it and that they now made healthier choices thanks to the micro-learning Health Quiz mApp. Likewise, the majority also indicated that it fulfilled a desire to learn more after the start workshop, that it was low effort, that the (smaller) mobile screens were no hindrance, that most learning cards were relevant, that things were learned that were directly applicable and that the courses provided regular stimuli to make healthy choices. These findings were confirmed in the feedback during the 1-month workshops.

Moreover, the qualitative findings were corroborated via the micro-learning logging data, in the sense that the majority of participants who started the micro-learning Health Quiz mApp also completed all 7 available courses. In contrast with the eHealth law of attrition (Eysenbach 2005), completion rates were relatively high. On an intention to treat basis, 66% of the courses were completed that were made available for the n=86 starting participants. In the Municipality case (n=30), 14 participants completed all 7 courses, five completed several courses and 11 completed none (of which 7 participants never started the micro-training). The total completion rate was 53% of all available course material. In the Advocacy case (n=26), 18 participants completed all 7 courses, and 8 completed none (of which 5 never started the micro-training). Their total completion rate was 69% of all available course material. In the Care Provider case (n=30), 21 participants completed all 7 courses, four completed several

courses and five completed none (all of them did start the micro-training and completed multiple questions, mostly sampling them across multiple courses). The total completion rate was 75% of all available course material.

4.2 Cross-case differences

There were a few case-specific characteristics that had an impact on adoption patterns and compliance and response rates. However, the overall design evaluation findings were very similar across cases. In Table 3 we highlight the differences.

Employer case	Case-specific characteristics and findings
Municipality	- Relatively lower start- and completion rates, partly due to the fact that several participants were sent by their managers and did not participate on a voluntary basis. - For those who did participate, the relative improvements in eating vegetables and adding moderate intensity physical activity was larger than in the other cases.
Advocacy	- About half of the group were (senior) volunteers and the average age in this group was highest. Several sudden events happened in the lives of these participants, hampering workshop participation and course completion for several of them. -Initial health behaviour scores were highest in this group: for daily physical activity, for fruit and vegetables consumption. However, their energy was lower and stayed low. - About 50% were retired: some were more busy than ever. Others reported that the topics of work related stress and energy were less relevant for them.
Care Provider	- The regional director was a strong health advocate, participant and initiator in this group. Start- and compliance rates were highest is this group. - This group had the lowest fruit consumption start, but the highest final score. - The improvements were largest in energy and recuperation behaviours were largest in this group, as well as the reported gain in mental fitness (at 1, 3 and 10 months).

Table 5: Cross-case differences

5 Discussion and Conclusion

In conclusion, the short answer to all four research questions in this paper is yes, and we will discuss them in relation to the evaluation framework of Figure 1. First, the mobile health quiz provides added value (usefulness, fun, positive triggers) with low barriers (ease of use, limited time burdens) Second, according to the participants the mobile health quiz is well integrated in the overall service mix. Hence, the 'ICT effectiveness' factor of Figure 1 appears to be sufficiently addressed. The mobile health quiz also increases the 'coaching effectiveness' factor of Figure 1 by providing regular triggers for health awareness, coping strategies and useful health behaviours. In answer to the third research sub-question, health readiness is improved: awareness, motivation, plans and behaviour experiments. Fourth, the various health behaviours are improved from the Dutch BRAVO survey (on physical activity, smoking, alcohol, food and energy/recuperation).

The answers to the third and fourth research sub-questions demonstrate the contribution to the 'health effectiveness' factor of Figure 1, both of the overall hybrid service mix and of the

mobile micro-learning health quiz within that mix. Besides explicit participant feedback, we have the indications from the course completion rates of the mobile health quiz, which were 66%: well above the Eysenbach (2005) 'law'. Given the fact that these courses were not mandatory for these participants, but only additional support for health self-management, and given the fact that each course easily takes 20 minutes to complete (in a context of time scarcity, Bruck, Motiwalla, Foerster 2012) we regard course completion rates as a sensible proxy for perceived usefulness.

Health behaviours not only improved at 1 and 3 months, but also 10 months after the start. The latter finding is relatively special, in the sense that most healthy lifestyle interventions, whether at work sites (Verweij, Coffeng, Mechelen, Proper 2011) or not (Seidell and Halberstadt 2011), tend to generate only short term results (3 or 6 months), after which people generally fall back into their old patterns.

Our main *contribution to theory* is twofold. In this empirical test of our proof of concept with three organisations we see a tentative confirmation of the two propositions on which we have built our design research. First, a mobile micro-learning health quiz appears useful for fulfilling the three key design requirements when designing ICT-supported healthy lifestyle interventions: health-, coaching- and ICT effectiveness. And second, as contributions on these three requirements increased, we indeed empirically observed an improved health readiness. Thus, our proposition was confirmed that the requirements from Figure 1 are important for ICT-enabled health intervention success.

Regarding *practical implications*, the relevant design question is what made these results come about and how can we improve even further? In this section we first discuss study limitations and then conduct a design evaluation, using the framework from our theory section.

This study has several limitations. First, it is largely qualitative, evaluating effects across three case organizations. In the survey, users mostly agree on issues of micro-learning usefulness and ease of use. Statistical techniques like explorative regression analysis were not possible, since the variance in answers was too low. Second, our survey results are likely subject to self-selection biases: our survey respondents are largely those users who completed most or all of the micro-learning courses. They are the ones most likely to be positive. Third, the context is different in each case organization and in our study design we cannot control for confounding factors. On the other hand, the strong evaluation- and effect agreement between participants across organizations does hint at the robustness and cross-case validity of the findings. For a more rigorous evaluation, we are preparing an experimental design to compare intervention and control groups, where the latter receive the service mix without the mobile micro-learning health quiz.

Table 6 shows that in our own authors' opinions there are several *points for improvement*. Regarding factor 1 of Figure 1, health effectiveness, more objective improvement measures could be advantageous. Especially for self-management of people with health issues (e.g. diabetes-2, irregular high blood pressure or heart arrhythmia, or impaired renal function) 24x7 monitoring of effects of lifestyle improvement can be very beneficial. For the second factor, coaching effectiveness, there is a challenge of automatically integrating context- and health information. For example, if we notice that someone has been sitting most of the day, when

will reminders/triggers be appreciated to get up and move about, and when not? For example, if I'm very busy with finishing a report or having urgent meetings, it can be a conscious and preferred strategy to continue a sedentary work activity for the time being. Reminders and triggers can easily become a nuisance. But at other times, when falling in my coach potato trap in the evening, I may very well appreciate more persistent triggers to go play sports with a buddy. Finally, ICT value adding (factor 3) could be improved via at least two routes. First, improving automated logging of health (behaviour) data and integrating this into coach processes. Second, designing more intelligent, interactive coach processes, which incorporate user preferences and plans, contextual/situational priorities and health data consequences.

Health Effectiveness	**Coaching Performance**	**ICT Value Adding**
++ Health Literacy: Impacts from Health Quiz, workshops and education materials. + Health behaviours: BRAVO survey indicates improvements. +/- Health outcomes: Feeling more fit is a positive outcome, but more objective measures not used. + Quality of Life: Feeling better, mentally and physically more fit.	+/- Promoting health actions: Many health tips are provided. Impact depends on execution of plans. ++ Supporting self-efficacy: Users indicate a strong contribution from 'know what my own influence is' ++ Activating intrinsic motivation: A strongly activated desire to improve, plus rewards via feeling better.	+ Motivators, triggers, experiences: health quiz, mail tips and surveys provided triggers, (fun) experiences plus hope and improvement opportunities. +/- Simplicity: Installation and first use were burdening for some. After that usage was simple, low effort. +/- Fit with coach processes: Users felt synergies with the workshops, education materials, personal action plans and answering individual questions.
Potential improvement: Using more objective health outcomes, possibly future 24x7 health tracking.	Potential improvement: Context aware and personalized coaching.	Potential improvement: Coach processes could be automated more (e.g. goals/means support).

Table 6: Design evaluation (authors' opinions, 5-point scale from - - to ++)

In summary, given the relatively static content of the micro-learning health quiz, it served its health support goals well, thanks to the other service mix elements and the overall service concept. eCoach improvement opportunities for the future abound, of which we identified several.

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A description of an e-Commerce Lab in Finland

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Abstract

International online retail stores are increasingly challenging Finnish retailers. In order to strengthen the Finnish e-retailing competence and to educate the retailers of tomorrow an e-Commerce Lab was created. The Lab is the first of its kind in Finland and it is built around a concept that *we call "reality-based simulation before a live audience". This paper describes the e-Commerce Lab, shows the simulated business processes and provides lessons learned on what is gained by setting up an e-Commerce Lab together with different stakeholders of e-Commerce in Finland. We also propose some initial thoughts on how to further develop the Lab.*

Keywords: e-Commerce, Lab, simulation

1 Introduction

In recent years the development of e-business has been rapid and B2C e-commerce is expected to reach nearly a 450 billion market in 2015 on a global level (Laudon et al., 2012). During year 2012 Finnish consumers spent 9.65 billion euros in e-commerce. In 2013 (H1) this continued to grow, with 5,9% compared to 2012. Internet buyers will continue to grow and 75 percent of active-aged Finns have already made purchases online ([1] TNS, 2013). All consumers are increasingly searching cross-border to meet their needs (Google, OC&C Analysis, 2012). One third of searches in UK based web-shops stem from international searches and

17% of sales come from abroad. In 2011 approximately 40% of Finns purchased from UK e-retailers and this figure is likely to continue growing in the coming years. According to TNS ([2] 2013) the foreign e-commerce accounted for 15% of the total net sales and compared to the previous year the growth was 16%. However, according to figures from Google, the share of foreign trade is said to be even more significant ([1] Helsingin Sanomat, 2013).

The fact that both service and retail trade growth is driven by foreign e-commerce is a concern for the Finnish national economy. The traditional model, in which a company consolidates a position in the domestic market and then moves towards the rest of the world, is dead in the water. International competition has become a real threat to e-business in Finland, which again places high demands on Finnish retailers. (Deloitte, 2009). As the Internet presents new opportunities to create customer value, it has at the same time intensified competition.

The previously mentioned figures were one of the driving factors for the Finnish Commerce Federation (hereafter FCF) to start arranging a national e-commerce seminar twice a year. The seminar consists of five different modules, all tailored to systematically discuss critical areas in the value-chain. Contributors in the seminar are well-known Finnish and international companies such as Descom, Google, Itella, Klikki, Maksuturva, NearMe, ProCountor, Sanoma Digital, Smilehouse, TNS Gallup and Vilkas. (Kaupan Liitto, 2013). The long-term objective is to get more entrepreneurs into e-business and to see the possibilities with internationalization. According to a research by Digile (2013) there is a clear concern about the level of digitalization in Finnish businesses. Consumers again belong, according to many factors, to the top three among consumers in the world.

Vilkas (Korkiakoski, 2013) recently conducted a study where 2300 Finnish webshops were examined and six years of data (2008-2013) analyzed. This study showed that only 2,35% of a total of one million transactions came from abroad in Finnish web-stores. It is fair to conclude that Finnish e-retailers have failed to succeed in international trade and in marketing their webshops for a broader public. This is confirmed by Google's country manager Anni Ronkainen who thinks Finnish companies have made it very easy for foreign e-businesses to conquer the Finnish market. ([2] Helsingin Sanomat, 2013).

Based on the discussion above it seems obvious that there is a great need to educate and support Finnish e-retailers to lower the thresholds for opening web shops and to strengthen the e-retailing competence among them. Therefore, Arcada University of Applied Sciences, Maksuturva Oy, Itella and the FCF joined forces to create an e-Commerce Lab that will support the e-retailers of tomorrow in Finland. The e-Commerce Lab is first of its kind in Finland.

The aim of this paper is to describe the e-Commerce Lab, show the simulation process and provide lessons learned on what is gained by setting up an e-Commerce Lab together with different stakeholders.

2 Business process simulation and labs

Simulation is according to Britannica (2013) a research or teaching technique that reproduces actual events and processes under test conditions in industry, science, and education. Robinson (2003) again defines it as - an imitation of a system. Another approach to developing and using a simulation model would be the use of a real system for experimentation (Robinson, 2003).

The use of a simulation has some advantages to using a real system, for example cost, time and the control of the experimental condition. With a simulation model the conditions under which the experiment is performed can be repeated many times. Simulation is however not suitable for every situation, but Banks et al (1996) suggest that business process reengineering and management is one area that can be modelled with simulation.

It is possible to distinguish between three different types of labs; a demo lab, a simulation lab and a Living Lab. In short, the difference is the following: In a demo lab, we interact with reality and we demonstrate the possibility or necessity of a particular process. In a simulation lab, we just pretend we have interaction with reality because the simulator is designed so that it gives the predicted response to everything we do. Simulation laboratories are environments that, in a sense, have been built on the demo lab, but made, but made it an instrument for secondary production of knowledge or learning. By the use of a simulation, known processes for studying a secondary phenomenon, which depends on the simulation, are studied. The simulation lab is therefore a step in the direction of the Living Lab method. The interaction in a Living Lab is in the reverse direction compared to the demo lab and simulation lab. In a Living Lab it is the outside world that interacts with us researchers. (Lundsten, 2013)

3 The e-commerce lab – reality based simulation

In December 2012 a research group called ARBIT (Applied Research in Business and IT) at Arcada started a one-year long joint-project with Itella, Maksuturva, the Finnish Commerce Federation (Kaupan Liitto) and Vilkas Group. The aim of the project was to create an e-Commerce Lab for a national e-Commerce-seminar held by the Finnish Commerce Federation. The project was to include participation in two different e-commerce seminars, the first in March 2013 and the second in October the same year. The main objective was to demonstrate different processes both from a back-end and front-end perspective. Hence, a complete web-shop environment published under a public domain address was built-up. Additionally, different live systems with delivery, payment and web-analytics features were connected to the back-end of the web-shop. These live systems included possibilities to execute real monetary transactions and product deliveries. Hence, the e-Commerce Lab uses what we call *reality-based simulation before a live audience*, i.e. it is a hybrid version of business process simulation and lab demonstration.

The management team consisted of representatives from Itella, Maksuturva, Vilkas, FCF and Arcada. For the operative development of the web-shop and the preparation of simulating different processes within the store, three international business students were recruited to the team. These students had previously taken part in an e-Business and digital marketing course and they had the prerequisites and knowledge for a real case project.

For the purpose of the simulation a web-shop called Arc Store (inspired from Arcada), which sells Arcada-branded merchandise, was developed. A natural choice for building the web-shop front-end was E-pages[1], a platform the students had been using in an e-business course at Arcada. The student team was responsible for the whole life-cycle of the web-shop development. This included e.g. layout development, photographing products, implementing payment systems, integrating delivery options and making sure all legal aspects were according to Finnish law.

For the e-Commerce seminar the students carefully planned and prepared a reality based simulation of the order process, i.e. a detailed go-through of the consumers´ buying process. In addition, all back-end processes for the retailer were planned in detail. All processes were finally tested and fine-tuned for the simulation. This included real money transactions through PSP Maksuturva[2], order confirmations, delivery and tracking of products via Itella Smart Post[3] and the whole return-logistics process including handling product returns and reimbursing money to the consumer. The process scheme was then fine-tuned for the simulation at the e-Commerce seminar.

In addition, an e-Commerce Lab room (see figure 1), which included an office for the Arc Store retailer and a living room for the consumer, was built for the seminar. This was a separate room especially built for the simulation of different front-end and back-end processes. Two big tv-screens were set up; one where the audience was able to follow all processes from the retailer´s perspective and one from the consumer´s perspective. Hence, the participants were able to see what happens "behind the scenes" when a retailer receives an order. A corner in the room acted as the warehouse with boxes, products, address labels etc. needed to send the order.

1 ePages is a leading provider of eShop software in the cloud. More than 80,000 small and medium-sized enterprises worldwide use ePages to run their online shops and business websites. (E-pages, 2014)

2 Suomen Maksuturva Oy (Payment Trust Finland Ltd) provides Intelligent Online Payment Services consisting of a comprehensive set of high quality payment service features in the Finnish market. (Maksuturva, 2014)

3 The SmartPOST parcel point is a new, simple way of sending and receiving parcels. The total number of parcel points in Finland is over 300. There are four locker sizes available: S, M, L and XL and consumers receive a text message notification with a locker opening code when the parcel arrives at the parcel point of their choice.



Figure 1. The e-Commerce Lab room built up for the reality based simulation

A 60 minute simulation of key processes, which included what the retailer needs to do when receiving an order, was presented. All main steps presented during the simulation can be seen in figure 2 – The order process – retailer perspective. The buying process seen from the consumer's perspective can be seen in figure 3 – the order process – consumer perspective. During the e-Commerce lab simulation all processes were presented simultaneously, however, figures 2 and 3 below present them separately for clarity.

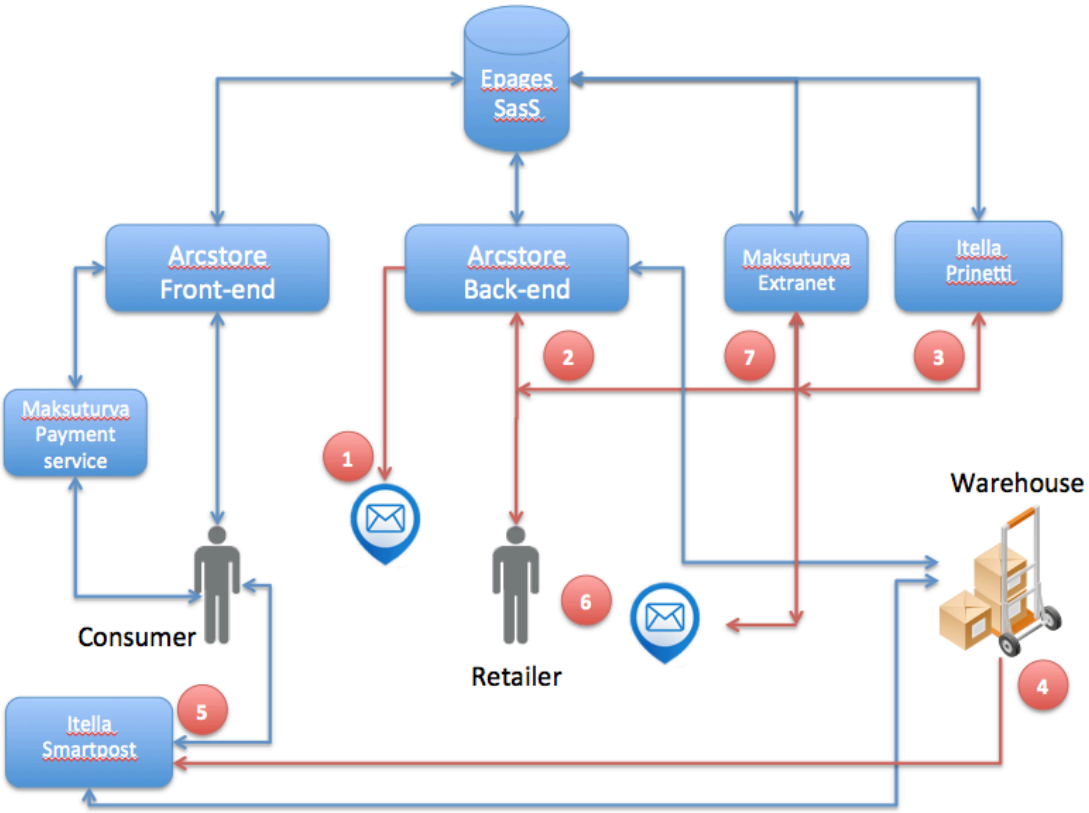


Figure 2. Order process - retailer perspective

1. The retailer receives an order notification from the e-pages back-end
2. Retailer logs into the back-end of the e-pages and processes the order. Maksuturva extranet connected to the e-pages SasS informs the retailer that the order has been paid. Maksuturva will keep the money for 14 days (inspection period) before the money is transferred to the retailer.
3. The retailer uses Itella Prinetti service that has been integrated into the e-pages back-end. Prinetti is an address label printing software for Itella's domestic and international deliveries. This makes delivery handling, tracking and delivery data management quick and easy through one single application.
4. After printing address labels the retailer packs the merchandise, which is picked up by Itella at 17.00 (depending on contract details).
5. The parcel is sent to Itella SmartPost according to the consumer´s premises. The retailer puts Maksuturva´s form for returning goods in the parcel. The form includes information about the satisfaction guarantee offered by Maksuturva.
6. In a case where the consumer wishes to return all or some of the goods or make other changes to the order the retailer receives an email notification.
7. The retailer can then log in to the Maksuturva extranet from the notification e-mail and see why the consumer wants to return the products. No action is required from the retailer, if all products are returned all money will be transferred back to the consumer from Maksuturva´s service. In case of a partial return, some of the order amount is returned to the consumer and some transferred to the retailer. The retailer is by law obliged to pay for the delivery costs when a consumer wants to return some items. This must be done within 14 days.

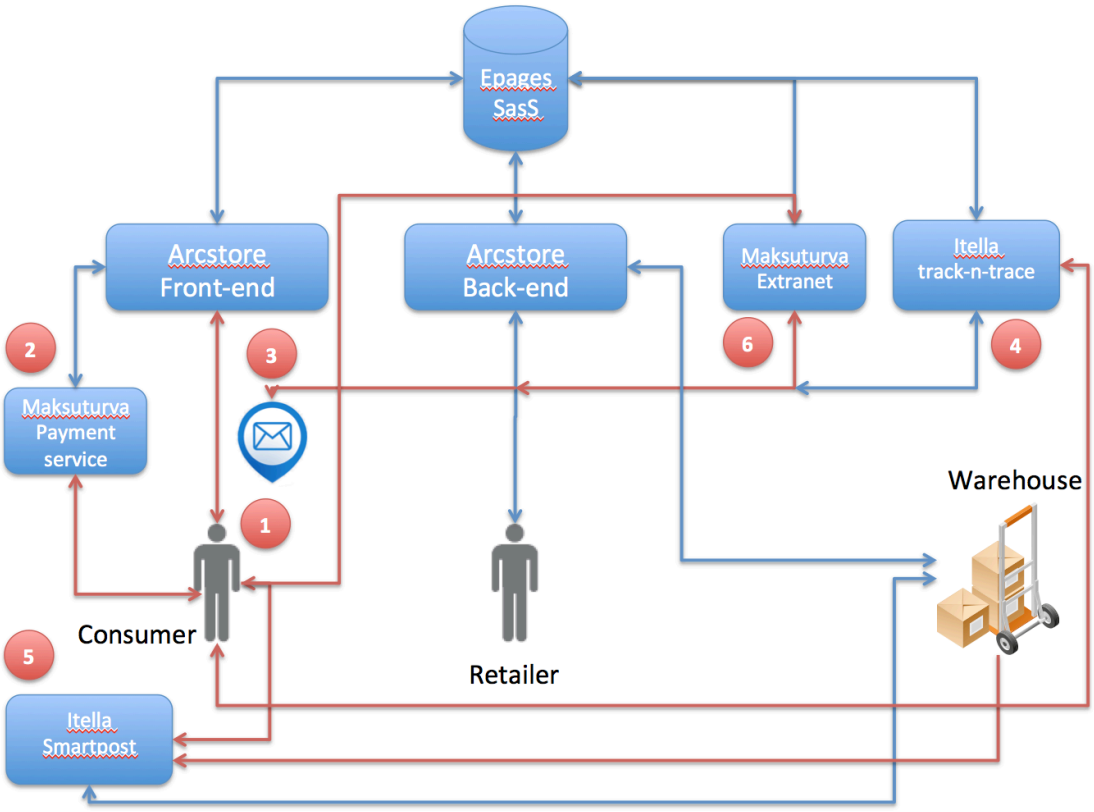


Figure 3. Order process – consumer perspective

1. The consumer visits www.arcstore.fi and puts two Pink Arcada T-shirts (Size M and L) in the shopping basket. During the order process the consumer chooses delivery to Smartpost due to its convenient pick-up in a SmartPost located at the supermarket.
2. The consumer chooses Maksuturva as payment method and is redirected to Maksuturva's payment service. On the site the consumer chooses to pay by credit card (Online bank payments, invoice and part payment also available). Maksuturva stores the payment for 14 days (inspection period) before transferring it to the retailer.
3. After the payment the consumer is redirected to Arcstore and automatically receives an order confirmation from Maksuturva's extranet service. Using this service the consumer can keep complete track of the order.
4. When the order has been processed and Itella picks up the parcel from the retailer, the parcel is registered in Itella's systems. The consumer receives a text message with track and trace information.
5. The consumer receives a text message notification when the parcel arrives at the parcel point of his/her choice. The consumer picks up the parcel and opens the SmartPost locker with a pin code received as a text message
6. If the consumer is dissatisfied with the product or would like to return them, Maksuturva's Web Buyer´s Service can be used. From a link in the confirmation mail the following services are available: Give Feedback, Make reclamation, Propose discount, return items, and cancel order. Returning products is free of charge to the consumer as stated by the Finnish Consumer Act. The return must be done within 14 days after delivery. In case of a return, the money is transferred from Maksuturva to the consumer within three business days.

During the reality simulation live systems were used with real money transactions and delivery of products via Itella Smart Post. For the presentation, two short films were shot to show how SmartPost parcel points work as this was not possible to simulate live in the e-Commerce Lab at the seminar. A key element in the simulation process was Maksuturva Extranet. This enables safe shopping experiences regarding either paying, returning the order or giving feedback after ordering. The consumer is given a wide range of payment solutions, from Internet banks, credit cards and invoice.

Maksuturva acts as a middleman between the consumer and the retailer. When a consumer orders products and pays them using Maksuturva as a payment service provider, the money will be stored for 14 days at Maksuturva. This is called the satisfaction guarantee and during that time the consumer can change, cancel or return the products via Maksuturvas extranet service. 14 days is also the return policy as stated by the Finnish Consumer Act. If a consumer returns all or some products the right amount of money will be transferred to the consumer and the retailer based on the information in the extranet service.

The e-Commerce Lab reality-based simulation was followed by a discussion among all participants. During this, participants were able to discuss with Arcada representatives and all partners enabling the simulation. The back-end and front-end of the shop was also opened for the audience to take a closer look at different systems used in the simulation. In general the feedback from the simulation was highly positive and the participants valued the reality-based approach, which gave hands-on experience on different processes in a real web shop.

4 Lessons learned and further directions

We have here described an e-Commerce Lab and showed the simulation process. The lab is the first of its kind in Finland and it has so far been used in two simulation sessions in front of a live audience. All stakeholders in the live audience gained valuable insight into how reality based simulation can be used to enhance Finnish e-Commerce. We see that there was an information and knowledge exchange between all parties.

For example:

- Participating retailers gained hands-on experience from a real web-shop, insight into different business processes in a web-shop from both a consumer and a retailer perspective and knowledge regarding issues in international trade.
- Arcada as an educational and research institution can apply the lab in degree programs to disseminate e-Commerce knowledge among young business students.

- FCF as a support organization gained a valuable educational tool in their training program for retailers.
- Moreover, the e-Commerce lab gained extensive national visibility in the press, which benefitted all parties.

All these aspects we see that contribute to the enhancement of Finnish e-retailing of tomorrow. In other words we find the e-Commerce Lab concept that we call "reality based simulation before a live audience" very successful. This concept could, nevertheless, be furthered developed and conceptualized within the field of business process simulation and labs. In fact we have not in this article properly classified or positioned the e-Commerce lab within scientific research on business process simulation and lab theory. However, we see that the concept "reality based simulation before a live audience" could contribute to the scientific discussion on different types of lab environments and their value propositions. Hence further research could focus on a structured evaluation of the lab and on a classification of the lab within business process simulation and lab theory.

The e-commerce Lab could also be extended with Enterprise Resource Planning (ERP) and customer relationship management (CRM) systems. Feeding the consumer data, i.e. contact information and purchasing data, to CRM and/or ERP systems and merging it with the data gained from web-analytics, would benefit the understanding of consumer behavior in a web-shop. In fact, as described in the introduction many Finnish retailers have failed in marketing their web-shop to a broader public. Therefore, a Lab that makes reality based simulations of e.g. targeted online campaigns ought to be highly valuable from a retailer perspective. This further development work will be planned, evaluated and implemented during the academic year 2014-2015.

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Bridging the gap between technical and human elements in digital service innovation

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Abstract

Creating and establishing a successful innovation is challenging and many attempts fail. Despite of the complex nature of the phenomenon, previous literature often tends to limit its focus on either to the technical elements or human elements related to an innovation. Current research-in-progress paper aims to avoid this 'either-or' thinking and rather examine the roles, impact and mutual interaction of both, technical and human elements, in order to further understand the successful emergence of a digital service innovation, i.e. a novel value co-creation practice enabled by a digital infrastructure. To achieve this we draw from three separate fields: service ecosystem perspective, information technology (IT) perspective and actor-network theory. The paper presents a plan for future empirical study and provides initial description of a case study about establishing a digital shopping solution in a small brick and mortar convenience store in Northern Finland.

Keywords: Innovation, IT artefacts, service ecosystems, actor-network theory, digitalization

1 Introduction

The current world is characterized both as a digital economy (Brynjolfsson and Kahin 2000), economy that is based on digital technologies, and as a service economy (Chesbrough and Spohrer 2006), economy where the importance of the service sector is continuously increasing. Therefore, it is only natural that the emphasis on creating and developing solutions including the both worlds is constantly growing and lot of private and public funding is allocated for creating new kinds of digital services. However,

creating and establishing a successful digital service innovation is challenging and many attempts seem to fail. One of the reasons for this might be that when we try to understand such a complex phenomenon, we tend to limit our focus either on the technical elements or human elements (Akrich et al. 2002). However, the comprehensive understanding of the complex and systemic innovations developed in the ICT service sector requires a more balanced approach and the combination of insights from several different research fields.

In this paper we aim to forgo the 'either-or' thinking and examine the role, impact and mutual interaction of both, technical and human elements, in the process of creating and establishing a digital service innovation. The theoretical background of the study draws from the service ecosystem perspective (e.g. Vargo and Lusch 2011) and the information technology (IT) perspective (e.g. Orlikowski and Iacono 2001). Furthermore, the paper uses actor-network theory (Latour 2005) as a bridging approach to guide the methodology section of the study. Building on top of these literatures we define digital service innovation as a new value co-creation practice that is enabled by a digital infrastructure. By combining the three views we aim to acquire tools to overcome the conceptual separation of technical and human elements in digital service innovation that limits our understanding of the phenomenon.

Due to the 'research-in-progress' nature of study, full analysis and final results are not provided in the paper. Instead the paper presents a plan for the empirical study and provides an initial description of the proposed case study in which the ongoing efforts to establish a digital shopping solution in a small brick and mortar convenience store in Northern Finland by various stakeholders are followed. This 'pilot project' is part of a larger research program in Finland, in which a target is to implement new digital solutions in currently underserved sectors.

This paper is organized as follows: Section 2 presents the service ecosystem perspective on innovation. Section 3 introduces the information technology (IT) perspective. Section 4 gives a brief overview about the history of actor-network theory and how it is discussed in earlier IS and service innovation related studies. Section 5 describes the planned empirical part of the study. Finally, section 6 summarizes the paper.

2 Service ecosystem perspective on innovation

In order to better understand the complex and systemic nature of digitally enabled service innovations, this study draws from service-dominant (S-D) logic (Vargo and Lusch 2004), and its service ecosystems perspective (Vargo and Lusch 2011). S-D logic is a worldview that offers an alternative logic for understanding value creation (Vargo and Lusch 2004) and highlights a need for a unified model of innovation (Vargo 2013). It has also been acknowledged as providing a critical theoretical foundation for the development of service science and the study of service systems (Maglio and Spohrer 2008).

Due to the increasing specialization and the division of labour, people are highly dependent on each other for creating value (Vargo and Lusch, 2004). Hence, S-D logic reframes the concept of service as applying one's resources for the benefit of another (Vargo and Lusch 2004). To exchange service for service, actors 'come together' in service ecosystems and jointly co-create value for themselves and others (Vargo and Lusch, 2011). Service ecosystems are defined as ''relatively self-contained self-

adjusting systems of resource integrating actors connected by shared institutional logics and mutual value creation through service exchange" (Vargo and Akaka 2013). Hence, applying this perspective, innovation is not seen as a novel output, but as a change in how value is co-created in a service ecosystem. Furthermore, the service ecosystem approach broadens the process of value creation beyond a firm's operation activities to include the active participation of customers and other stakeholders, through the co-creation of value (Vargo 2013). Recently Vargo and Akaka (2013) have also highlighted technology as a critical resource for value co-creation in service ecosystems. However, the role and influence of technical artefacts in service ecosystems require further research.

3 Information technology perspective on innovation

Information systems (IS) research is multidisciplinary in nature and there has been a lot of debate about future trends of IS research. One of the approaches to study innovation in the area of information systems research is a technical deterministic approach that emphasizes the technical aspects of an innovation (see Tatnall and Gilding 1999). A basic idea of technical determinism is that technological development drives social and cultural changes. The nature of IT artefact as a core subject in IS research has been studied by many researchers. Orlikowski and Iacono (2001) have identified computational view of technology as one of the IT artefact related category, which approaches technology as algorithm and model representing computational algorithms and programming models. In a more technical approach a term service can be often used to delineate mainly some technical implementation. Service science, research field closely related to S-D logic, takes however a broader view to a service and aims to create a foundation for systematic service innovation with a focus in service systems (Maglio and Spohrer 2008). In this discussion, information technology (IT) artefacts are considered as one of the many resources contributing the service innovation.

According to Orlikowski and Iacono (2001, p.121) IT artefact can be defined as "bundles of material and cultural properties packaged in some socially recognizable form such as hardware and/or software". Furthermore, they state that IT artefacts tend to be taken for granted in information systems research and call for theorizing the IT artefact with a focus on "meanings, capabilities, and uses of IT artefacts, their multiple, emergent, and dynamic properties, as well as the recursive transformations occurring in the various social worlds in which they are embedded" (Orlikowski and Iacono 2001, p. 133). Other studies in IS research also support the notion that IT artefacts have both material and abstract elements (see Zhang et al. 2011). Our approach follows the view of the IT artefact that takes material and social aspects in to consideration as an integral part of the IT artefact. In our study we consider that IT artefacts constitute the digital infrastructure that enables digital service innovation and, hence, are an integral part of the digital service ecosystems.

IT ecosystem is approached often from technical perspective in IS related research without pointing out explicitly societal aspects (see e.g. Adomavicius et al. 2008). A

service ecosystem perspective in a service-dominant logic takes a broader scope to ecosystems and focus on aspects beyond technology in a service innovation context. Many researchers in the field of IS area have identified a need for interdisciplinary perspective in the context of IT enabled services in different domains (see e.g. Bardhan et al. 2010). Through enhanced multidisciplinary approach it can be possible to achieve balanced view to a complex and dynamic service ecosystem and digital service innovation and achieve a deeper understanding on the role of IT in that context.

4 Bridging the gap – Actor-network theory

In order to continue to bridge the technical and human elements in studying digital service innovation and overcome the 'either-or' thinking this paper draws from actor-network theory. Actor-network theory (ANT) is a socio-technical approach which aims treating human and non-human elements equally and argues these elements cannot be studied separately (see e.g. Callon 1987, Latour 2005). As such it positions itself at the exact place where innovation is situated – in the hard-to-grasp middle-ground where technology and the social environment which adopts it simultaneously shape each other (Akrich et al. 2002).

ANT is rooted in science and technology studies and developed during 1980's by Michel Callon (e.g. Callon 1980, Callon 1986, Callon 1987) and his colleagues Bruno Latour and John Law. Later on its focus has also been turned to information technology (e.g. Latour 1995). Although ANT is called as a theory, it is often considered to be more an ontology or an approach rather than a traditional theory (Latour 2005). ANT can be seen as "a very crude method to learn from the actors without imposing on them an a priori definition of their world-building capacities" (Latour 1999, p. 20).

ANT has spread across different disciplines from science and technology studies over time. In the context of information systems, Walsham (1997) summarizes actor-network theory as follows: "Actor-network theory is concerned with investigating the social and the technical taken together or, putting it another way, with the creation and maintenance of coextensive networks of human and nonhuman elements which, in the case of information technology, include people, organizations, software, computer and communications hardware, and infrastructure standards." Tatnall and Gilding (1999) propose that ANT differs with the qualitative research tradition of IS research as it does not separate social and technological and properties are seen as effects of network rather than as characteristics of some entity.

Hanseth et al. (2004) argue that ANT can help us achieving better understanding on the IT artefact by providing a rich set of concepts (e.g. actant, heterogeneous network). In addition, Holmström and Robey (2005) suggest that ANT provides possibilities to examine interactions between social and technical elements, and that way it responses to Orlikowski's and Iacono's (2001) call to research interactions between IT and its social context. It can be seen that IT artefact can achieve a balanced position in digital service innovation through ANT-based approach as nonhuman and human elements are treated

equally based on a basic principle of ANT. Recently, ANT has also been connected to service science and service innovation related research (e.g. Sundbo 2011, Uden and Francis 2009). Carroll et al. (2012) discuss in their service science paper on how ANT could be used to examine complex service systems and service innovation and suggest that ANT has potential when exploring service networks.

In other words, an ANT-based approach can ensure that both human and technical elements are treated as integral parts of the service system and essential when digital service innovations and ecosystems are studied and created.

5 Planned methodology of the study

Due to the 'research-in-progress' nature of study, full analysis and final results are not included in the current paper. Instead the paper describes a plan for the empirical study is and provides an initial description of the proposed case.

Proposed case study

The case study relates to the ongoing efforts of various entities to establish a digital shopping solution in a small brick and mortar convenience store in the rural area of Northern Finland. This 'pilot project' is part of a larger research program in Finland, in which a target is to implement new digital solutions in currently underserved sectors. The piloted solution provides alternative ways for customers to purchase items that usually are not available in their convenience store. Customers have a possibility to order products through the pilot service either independently in the store or at home or purchase products with the help of sales personnel working in the convenience store.

The pilot solution is a result from collaboration between many different actors that have different roles in different phases of the emergence of the digital service solution. The solution 'owner' is a big Finnish retail chain from which several different organizational units are involved in the pilot case. In addition, wide array of different kind of IT service providers are linked to the pilot either directly or indirectly. The forming service ecosystem of course also includes the convenience store personnel and end customers. Each one of these actors has different and partly conflicting aims and intentions related to the overall solution and they carry out different 'roles' and practices in the overall process of value co-creation. Our aim is to study the diverse aims, roles and practices of the different actors and understand how a viable new digital service solution (innovation) is able to emerge as a result of the conflicting interests. Figure 1 illustrates direct and indirect actors participating in the service ecosystem of the case solution.

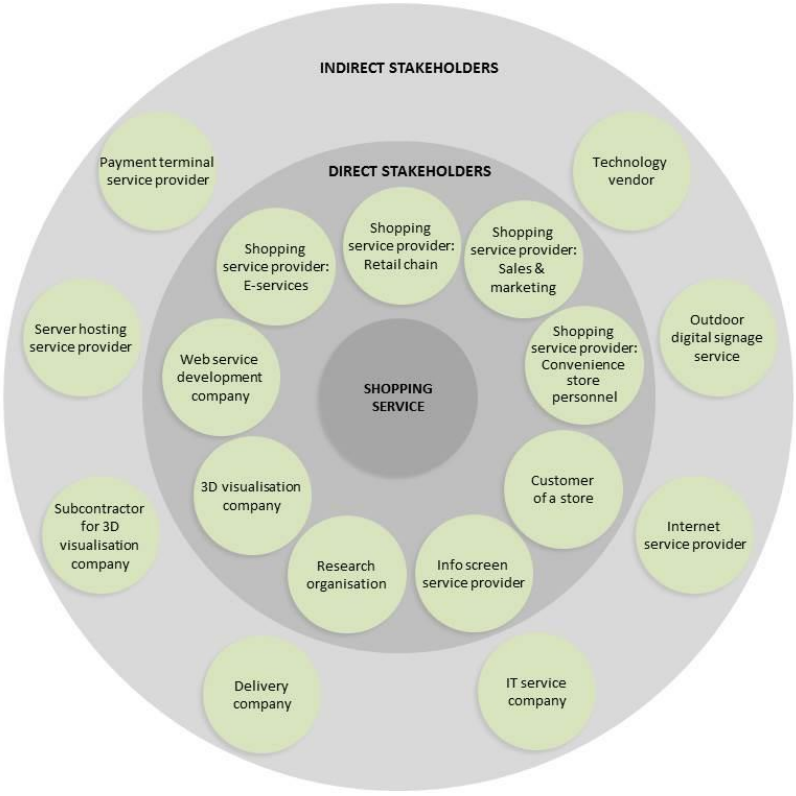


Figure 1: Actors involved in the case solution either directly or indirectly.

The digital infrastructure of the pilot solution is based on IT artefacts that have earlier been used commonly in different kind of services. Key technical elements of the piloted digital shopping solution are illustrated in Figure 2.

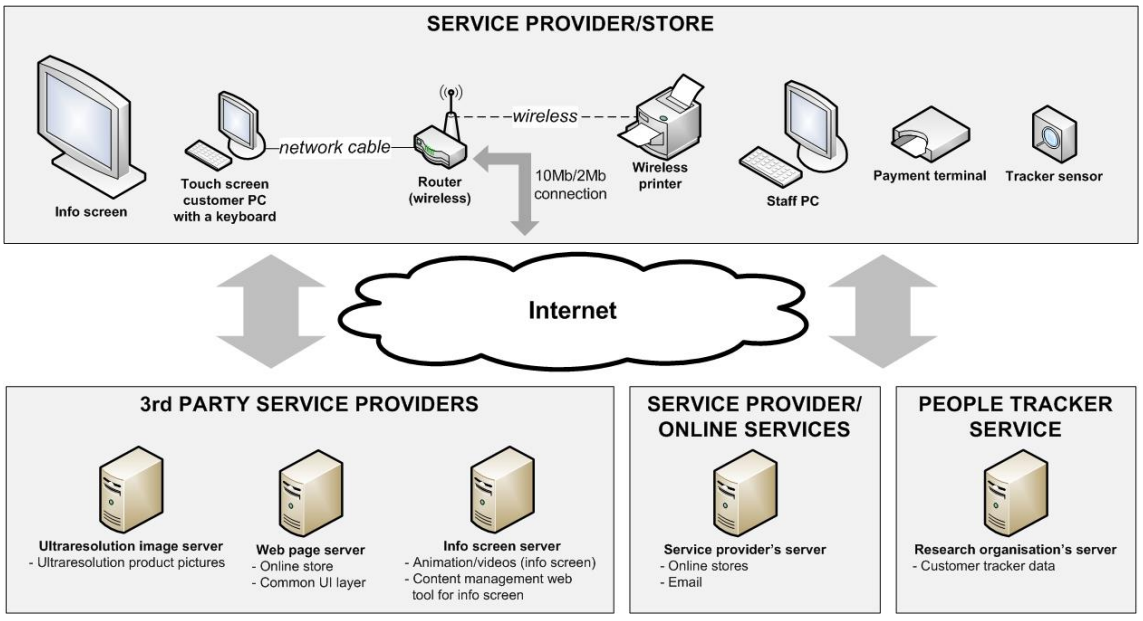


Figure 2: Digital infrastructure of the case solution.

Following the ANT approach, the data analysis will focus on examining the connections and interactions between different technical and human entities involved in the case

solution. In other words, our aim is to understand how the involved human actors interact with the IT artefacts solution and how the value co-creation practice are enabled, constrained and changed by these artefacts.

Planned data collection and analysis

One of the authors has been actively involved in planning, designing and implementing the service from the beginning and participated in data collection activities. Other one has been observing the process with more distance to the actual solution and the case itself.

In a pilot design and development phase data has been collected in planning meetings and by actively participating in the design and development activities. Observations, meeting notes and minutes from those phases are used in data analysis. Once the pilot system was installed in the store the data collection consisted of customer and store personnel face-to-face interviews. Representatives of the store have also been interviewed during the test phase several times via telephone interviews. In addition, customers' shopping routines and the use of the user interface of the digital shopping service has been observed. Furthermore, the use of the shopping service was monitored by using a 'depth sensor' solution, which enables tracking how often people use the solution. Data collection will be continued by conducting narrative interviews with all the actors that are involved in a pilot case to capture their stories and experiences related to the case solution. Forthcoming interviews will focus on various themes, such as actors' interests, aims, roles and practices. In the analysis the main goal is to identify different entities, their associations and possible challenges and opportunities through an ANT based approach and examine them especially from the perspective of value co-creation.

6 Summary

This research-in-progress paper outlines an on-going study about creating and establishing a digital service innovation. The paper presents service ecosystem perspective and information technology (IT) perspective as well as use of actor-network theory as a bridging approach to guide the methodology section of the study. A goal is to combine different research views in order to examine the service ecosystem and related digital service innovation in a pilot case study about establishing a digital shopping solution in a small brick and mortar convenience store in Northern Finland. In the pilot case study our specific goal is to gain comprehensive understanding on how both human actors and IT artefacts interplay with each other to co-create value. The pilot solution is a result of collaboration between various actors that have different aims, roles and practices in different phases of the pilot. Technologically the pilot solution is based on IT artefacts that have earlier been used commonly in different kind of services. The study continues with narrative interviews from different actors involved in a digital shopping service pilot. The data analysis will focus on examining connections and

interactions between the technical and human entities involved in overall value co-creation.

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The Role of Alignment Capability in Strategic IS Outsourcing Success

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Abstract

Strategic Information Systems outsourcing refers to the long term outsourcing of systems with a major transformational impact on the client's business strategy. Such outsourcing arrangements mitigate risks through closely aligned client and vendor business/IT operational processes and shared strategic vision. Strategic outsourcing arrangements rely on both contractual and relational governance to build inter-firm alignment capability. This research paper defines a multi-item measure of client-vendor alignment capability, and uses that instrument to survey a number of North America based oil and gas exploration and energy producing firms, who have undertaken the outsourcing of strategic information systems to an Indian information systems vendor. The results indicate which elements of contractual and relational outsourcing governance support the building of client-vendor alignment and whether alignment capability improves outsourcing success factors.

Keywords: Information Systems Outsourcing, Business IT Alignment, Contractual and Relational Governance, RBV

1 Introduction

Information Systems Outsourcing (ISO) refers to transferring the provisioning of IS/IT products or services to a vendor for an agreed upon time, cost and functional scope (Dibbern et al.., 2004). As of 2013, worldwide outsourcing spending for IT Services has grown to over $406 billion a year[1], due to the rapid movement towards utilizing hosted information systems (IS) and cloud-based system providers. This spending is driven by the adoption of next-generation cloud delivery models and split roughly equally between application, infrastructure and consulting services. Traditionally, most ISO involves the sourcing of "commodity" systems like payroll or help-desk with a

1 Gartner Dataquest. (2012). Gartner Says Worldwide IT Spending to Grow 5.3 Percent in 2013, Available at www.gartner.com.

focus on cost reduction and divesting the responsibilities of non-core, secondary value-chain activities of the client. While the global energy industry size is over $10T in revenues, their outlays for IS applications is only 1% or $100B a year. The primary focus of these systems are in managing capex outlays for energy exploration and operational expenditures for product extraction and distribution to global markets.

A growing trend in the North American energy exploration industry is strategic ISO, which refers to the outsourcing of IS that transforms the clients' business and has a significant long term impact on the client company's strategy (Grant, 2003). The newer IS engaements in the energy exploratioin industry include enhancing exploration data management and analytics in site evaluation and management, in research of potential reserves, maximizing efficiency in end to end operations, improving health, security and environmental issues and the optimal deployment of resources across multiple producing sites. Typical objectives of the outsourcing of such strategic systems transcend cost savings and include enhancing core competencies, creating value, increasing flexibility to meet changing business conditions, exploiting new markets and adopting systems that can transform their organization (Grant, 2003; Greaver, 1999). For example, the sourcing of an enterprise resource planning system to manage the mining field sites for increased 'end-to-end' visibility and control of mine operations and planning, including life of mine planning and management of equipment and other critical resource for an oil and gas company is highly strategic, since it can impact the client's business for many years into the future.

Although risks of outsourcing include loss of control, erosion of client knowledge, hidden costs, business uncertainty and potential for systems failure (Earl, 1996), clients benefit from saving IS function costs, getting access to trained and experienced IS staff from the vendor, and eliminating the overhead from frequently upgrading inhouse technology infrastructure and system components. Clients also benefit by utilizing and leveraging the knowledge of external vendors (Chang and Gurbaxini, 2012) in their IS projects, by adopting the latest IS project methodologies and by improving internal business processes. Strategic ISO, which typically is long term and broad in scope, can be difficult to precisely define and govern solely based on service level agreements and contracts (Willcocks & Kern, 1998). As outsourcing moves to this next level, clients seek greater value and diverse objectives (Mukherjee et al., 2013) and require sophisticated vendor management activities that rely on elements of both contractual and relational governance (Keating et al., 2013; Willcocks et al.,1999; Rottman & Lacity, 2004). The realization of value is contingent upon the client and vendor firms' ability to leverage their relationship to manage their resources and build inter firm capabilities in a dynamic environment. Prior studies have shown that outsourcing relationship quality dimensions such as commitment and trust lead to successful outcomes (Beimborn, 2012). The success of a strategic offshoring relationship depends on effective collaboration between client and vendor to build alignment by facilitating the sharing and transformation of knowledge. This alignment involves linking strategic intent through the joint process of identifying core and non-core business areas. At the tactical level, the client and vendor exchange knowledge about their management methods and values and jointly organize their business processes and organizational structures.

1.1 Research Goals

Business IT alignment has been recognized for several years as an important organizational capability (Luftman and Brier, 1999), but a multi dimensional measure of alignment, that includes strategic, structural and relational is yet to be tested for outsourcing. The importance of strategic alignment between the client and vendor (Keating et al., 2013) and the fit between outsourcing strategy and business strategy (Lee, 2006) have found to improve outsourcing success. Strategy is operationalized through the knowledge sharing and decision making and tactical activities of the client and vendor, which is at the root of strucutral/operational alignment (Martin et al., 2008). Lee (2006) has also called for future research expand the notion of fit ('alignment') to include task-technology relationships in the field of outsourcing. A client-vendor alignment (CVA) capability over three dimensions: structural ("execution"), strategic ("planning") and relational can lead to improved outcomes in strategic ISO scenarios. Such a capability has not been studied in the context of strategic ISO.

This research will study strategic ISO between an Indian vendor and several medium to large sized North American firms in the oil and gas and energy exploration industry. The goals of this research study are to:

(1) Build a measurement model for CVA capability.
(2) Determine if CVA capability increases the success factors of strategic ISO.
(3) Determine the contributions of both contractual and relational governance on client-vendor knowledge sharing and the creation of the CVA capability.

1.2 Theoretical Background

The Resource Based View (RBV) of the firm states that "resources are essential raw materials for capability-building and their availability determines the firm's ability to build such capabilities, which are often critical drivers of firm performance" (Wade and Hulland, 2004; Barney, Wright and Ketchen, 2001). Capabilities are defined as repeatable patterns of actions in the use of those resources to create, produce and offer products/services to the market. Capabilities can include management ability and skills and processes and IS that allow for creation, storing and sharing of knowledge (Wade and Hulland, 2004). A variety of capabilities have been reportedly used to improve outsourcing outcomes with the emphasis being on relational alignment (Kern & Willcocks., 2000; Palvia et al., 2010; Plugge et al., 2013).

Business –IT alignment refers to the capability to apply IT in an appropriate and timely way and in harmony with business strategies. Prior research has identified three dimensions of business/IT alignment: (1) strategic alignment, (2) structural alignment and (3) relational alignment. Strategic alignment provides the fit between the priorities and activities of the vendor IS function and those of the client business units, so that IS and applications can be aligned with business needs. Strategically well aligned ITO investments can lead to improved performance and greater competitive advantage when the alignment is *enacted in choices managers make over time* (Keating, et.al., 2013). To support the long term maintenance of strategic alignment, structural and relational dimensions of CVA are needed, so that decision making and tasking support and operationalize the strategic alignment. Structural alignment defines the formal organizational structures that enable the alignment of the planning, decision-making, reporting and other project management aspects between client and vendor. Relational alignment refers to the informal organizational structures, norms and agreed processes,

divisions of work, formal and informal teamwork, and working relationships between the firms. Relational alignment lays the foundation for strategic and structural alignment. Because of its social nature, however, relational alignment is particularly challenging to achieve for offshore ISO (Ghosh and Scott, 2009). The close interaction between the three dimensions of alignment suggests that a multi-dimenssional client vendor alignment (CVA) capability is necessary for managing outsourcing efforts, maintaining the strategic fit in operations (Lee, 2006) and improving success.

2 Research Model and Hypotheses

Outsourcing governance involves many operational and strategic decisions such as the definition and prioritization of IS projects, the funding and allocation of resources and measuring the value of such projects. Governance attempts to counteract the uncertainties posed by the increasingly complex and interconnected hosted technical environment. Since it is difficult to specify complete service level agreements (SLA) inside contracts, strict contractual governance or "mechanistic" governance is limited to outsourced systems that are "commodities" and are well understood and bounded in terms of their extensiveness and completeness and every detail and scenario and outcome is pre-specified in the contract (Goo et al., 2009). Under relational governance, the client and vendor can rely more on their ongoing relationship and mutual trust for deciding about emerging situations and managing the outsourcing arrangement, rather than just following a contract very closely.

Figure 1 shows the research model. The research constructs are defined in Table 1.

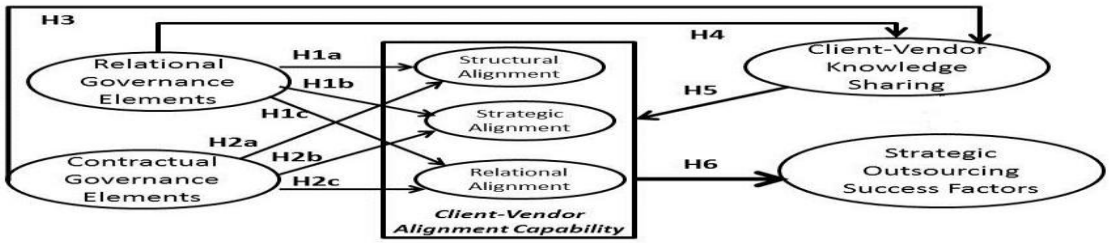


Figure 1: Research Model

2.1 Building Client-Vendor Alignment Capability

Outsourcing governance typically falls into two categories – contractual and relational governance (Goo, et.al., 2009; Srivastava & Teo, 2012). Most outsourced work is fully or partially governed by contractual governance using a formal contract between the client and vendor. Such client–vendor contracts describe the expected outcomes and behaviors of the work and can be tracked and measured per the vendor's performance.

Contractual governance and relational governance mechanisms allow the client and vendor to develop a common vision and establish a working structure. Trust enables the workers to work more cooperatively, limiting the power and positional rivalries. A stronger common identity fosters common goal among the workers and common norms enable members to transcend the diversities that are inherent in a multi-cultural organization and make communications smoother. These facets of relational governance can play a large part in the effectiveness and success of the outsourced processes, how much synergy is achieved between client and vendor personnel and the extent of tacit knowledge sharing (Inkpen and Tsang, 2005). By specifying relational

governance elements – (1) staff feel safe to explore and share new ideas without fear of failure, leading to better process execution (structural alignment), and (2) shared business vision is developed between client and vendor staff that establishes better strategic alignment. Therefore, we have:

H1a-c: Relational Governance Elements have a positive relationship with Client-Vendor Alignment Capability Components. *(H1a: Structural Alignment, H1b:Strategic Alignment, H1c: Relational Alignment).*

An outsourcing contract provides a well defined framework in which client and vendor can understand each other's rights, duties, and responsibilities in the outsourcing arrnagement (Goo et al., 2009). The contract also specifies policies and strategies underlying the arrangement. The contract enables firms to establish working relationships (relational alignment) and exchange knowledge about work processes (structural alignment) and share their long term vision (strategic alignment). Consequently we posit:

H2a-c: Contractual Governance Elements have a positive relationship with Client-Vendor Alignment Capability Components. *(H2a: Structural Alignment, H2b:Strategic Alignment, H2c: Relational Alignment).*

Construct	Definition	Sources
Relational Governance Elements	Relational norms for bonding, conflict resolution, linking and interdependence, trust and collaboration among the client and vendor personnel involved with IT and/or business definition and execution functions	Goo, et.al. (2009); Kishore et al. (2003); Ghosh& Scott (2009); Beimborn (2012)
Contractual Governance Elements	Service level content and objectives, process ownership, feedback and change, measurement, communication and enforcement for the development, deployment of IS that support business strategies	Goo, et.al. (2009), Poppo and Zenger (2002)
Client-Vendor Knowledge Sharing	System, development processes and business knowledge are freely exchanged through synchronous and asynchronous channels.	Alavi and Leidner (2001), Davenport et al. (1998); Ghosh and Scott (2009).
Client-Vendor Alignment Capability	Strategic Alignment is the fit between the priorities and activities of client and vendor, such as investment decisions and application prioritization. Structural alignment includes the operational processes. Relational alignment refers to the working relationships, norms and teamwork.	Weigelt (2013); Ghosh and Scott (2009); Chan (2002); Plugge (2013); Feeney and Willcocks (1998)
Strategic Outsourcing Success Factors	Define and manage IT needs, exploit a mix of resources from client and vendor, reduce complexity and uncertainty in IT tasks, prevent opportunistic behaviour, support power balance and collaboration, develop common norms of behaviour, implement strict division of labour, manage cost efficiency and support all stakeholders	Gottschalk and Solli-Saether (2005);

Table 1: Definition of Constructs

2.2 Governance Elements support Knowledge Sharing

Outsourcing governance elements facilitate more cooperative, long-term exchange relationships between the client and vendor (Poopo and Zenger, 2002). Contractual governance elements document mutually agreed upon policies and procedures for dealing with dynamic situations during the outsourcing and lays the framework for knowledge exchanges (Goo, 2009). Likewise, relational elements of governance such as social capital and norms of relationships help close knowledge gaps in offshore ISO

and serve as a lubricant for workers to get support and advice well beyond the organizational hierarchy or contracts, to enable them to share knowledge and get things done more effectively (Ghosh and Scott, 2009). The client and vendor continually produce new domain knowledge and technological knowledge, respectively (Martin et al., 2008). Threfore contractual governance and relational governance are needed elements in outsourcing to support successful knowledge sharing (Palvia 2010).

H3: Contractual Governance Elements have a positive relationship with Client Vendor knowledge sharing.

H4: Relational Governance Elements have a positive relationship with Client Vendor Knowledge Sharing.

2.3 Knowledge Sharing builds Alignment Capability

The process of managing strategic ISO is often a "learning experience" in which the client may have to adapt and adjust the linkages that tightly couple the offshored activities with their internal skills and processes (Larsen et al., 2012). The client and vendor build interfirm organizational capabilities and structures by exchanging knowledge which enables the client to effectively exploit the vendor's resources and quickly address the uncertainties that are likely to be faced during the outsourcing period (Plugge et al., 2013). The knowledge sharing among client and vendor helps build and sustain the alignment capability by addressing emergent issues (Grant, 2003). We posit:

H5: Client Vendor Knowledge Sharing has a positive relationship with Client Vendor alignment capability.

2.4 Alignment Capability supports Strategic Outsourcing Success

Both client and vendor develop and use internal resources to respond to the demands of ISO and shifts in the business environment. Dynamic capabilities such as client-vendor alignment are particularly important to adapt to changing environments and achieve success over the long term in strategic ISO (Lee and Kim, 1999). The vendor needs to continuously make important decisions in order to improve its operational performance while supporting its clients' strategic goals with a long-term orientation. Developing and managing interfirm capabilities jointly with the vendor have been found to be keys to achieving greater outsourcing success for the client (Weigelt, 2013). When aligment capability is strong, the client provides the vendor with a unifying vision to enable the client to lead in their business and marketplaces and support the client's strategy across all business segments and stakeholder groups (Palvia et al., 2010). Therefore we have:

H6: Client-Vendor Alignment Capability has a positive relationship with Strategic Outsourcing Success Factors.

3 Methodology and Data Collection

A questionnaire with multiple items (Likert scale) for each construct is being developed and pilot tested. The data will use a convenience sample of key business and IT personnel from the client and vendor side of over 20 strategic outsourcing deals. The client companies are all based in North America in the oil and gas exploration and energy production industries, which have experienced turbulent times recently with industry consolidation, labour shortage, government regulations, and economic

conditions creating major fluctuations in commodity prices and consumer energy demand. Such environmental uncertainties are motivating the firms to invest in systems to better manage drilling sites and optimize product extraction and distribution. The size and public availability of geological data has enabled the vendor (India based) to build systems that can help these firms achieve operational efficiency. However, to achieve market focus and responsiveness, the firms may need to restructure their functional orientation around processes through organizational reengineering, updated infrastructure and technology use. Concerns are that the highly rigid and inbred organizational culture, strategy and relatively stable IS practices of the client would need to be aligned with the vendor's system capabilities and implementation processes to achieve transformational results. A mix of contractual and relational governance elements was put in place to build client-vendor alignment and manage the outsourcing.

4 Research in Progress

The authors anticipate that pilot data collection will be complete by the time of the conference. Results from preliminary analysis of the data shall be presented at the conference. Most of the existing alignment research has focused on strategic alignment, while much of outsourcing management research has studied the relational dimension. The contribution of the study will be a validated measure of alignment over the three dimensions (CVA) and its application to a set of strategic outsourcing cases in the North American energy exploration industry.

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Towards Business Process Management in Networked Ecosystems

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Research in Progress

Abstract

Managing and supporting the collaboration between different actors is key in any organizational context, whether of a hierarchical or a networked nature. In the networked context of ecosystems of service providers and other stakeholders, BPM is faced with different challenges than in a conventional hierarchical model, based on up front consolidation and consensus on the process flows used in collaboration. In networked ecosystems of potential business partners, designing collaboration upfront is not feasible. Coalitions are formed situationally, and sometimes even ad-hoc. This paper presents a number of challenges for conventional BPM in such environments, and explores how declarative process management technology could address them, indicating topics for further research.

Keywords: Ecosystems, BPM, Declarative Business Processes, Business Models

1 Introduction

Today's business is increasingly performed in networked ways, offering composite products and services (Kortuem et al., 2010). The production of these products and services crosses organizational boundaries, and they have features or coverage that no single participant in the network is able to deliver by itself (Lusch and Vargo, 2010; Vargo and Akaka, 2009). Examples of this range from governments that delegate

execution of its policies to decentralized agencies, or even commercial companies, to increasingly dynamic and cloud based outsourcing scenarios, to logistic and financial service providers cooperating with dedicated marketing organizations and manufacturers to create end-to-end online shopping experiences (Demirkan et al., 2009). All these examples require partners in the network to collaborate to deliver the integrated product, and comply with (local) rules and regulations at the same time.

The field of business process management (BPM) has developed tools and methods to support such collaboration and make sure all requirements are met. At the same time, these tools and methods have mainly been developed in intra organizational settings. This has led to a design-based approach, where analysts design process flows that they believe meet all requirements that apply. With the rise of ecosystems of smaller, autonomous entities, this does no longer work. Situational, ad-hoc coalitions of partners cannot afford to align and design a shared process, neither in terms of cost or time spent.

Although these same challenges have been recognized by different authors (Oasis, 2006; Demirkan, 2009), this problem has often been approached from a services-oriented architecture approach. Based on functional decomposition, different partners in the ecosystem offer their contribution by standardized contracts, providing a degree of interchangeability of partners. When truly interactive collaboration is needed, including dialog between partners throughout the process, this is not enough.

So-called networked BPM should help to enable ecosystems of partners to provide a multitude of services, at different quality and price levels, with unique processes of collaboration for each unique coalition of partners.

In this position paper we present a number of challenges for BPM technology when supporting collaboration in networked ecosystems, and present preliminary results that suggest that declarative business processes could be a foundational technique to address these challenges, identifying a way for further research.

2 Challenges for BPM in Networked Ecosystems

This section presents a number of challenges that BPM faces when supporting business processes in networked ecosystems.

2.1 Networked Business Models

The process support in a networked environment will have to deal with the new, networked business models that are emerging and that dictate new ways of coalition forming. Malone et al. (2007) identified 16 possible business models, which organizations can apply. Business models can be configured into various value constellations. In the last decade the frequency of value constellation configuration has increased. This can be found in organizations that form networks to be able to perform disaster rescuing or networks of care centers with healthcare institutions, relatives and elderly care (Camarinha-Matros and Afsarmanesh, 2006). But also in traditional networks a higher frequency of value constellation is required to stay competitive. For example network-orchestrating organizations like Nike, Li & Fung and, Cisco configure their collaboration per process instantiation. Brown et al. (2002) even state that organization only have one product / service: the configurable process. Camarinha-

Matros and Afsarmanesh (2006) analyzed such networks and identified that the composition of the network can exist of a variety of entities which are autonomous, geographically distributed, and differ in operating environment, culture, social capital and goals. In specific situations value constellations are forced upon market players by government. An example of such value constellations is the energy market. First the energy supply was controlled by a few big firms. Later, the production of energy, the transport of energy and sales of energy was divided by law. The last laws also dictate that organization must buy back the surplus that energy consumers produce, but consumers can also sell to other consumers. Conventional flow-oriented business process design and execution cannot follow the speed of individual configuration let alone the process as product.

2.2 Situational Coalitions of Stakeholders

Classically, actor selection in BPM is implicitly dealt within business processes. Typically, only actor roles are modeled, for instance using swim lanes, and all actors fulfilling a certain role are expected to act the same. When organizations are for instance optionally involved in a process, or an organization or user has to be selected to fulfill a role within the process dynamically, there are specific sub flows for this weaved into the process itself.

In networks, it is highly situational who the stakeholders are of a specific process instance. It may for instance depend on the product variants ordered, local considerations or contractual reasons. In addition, there may be stakeholders who have requirements the actors in the collaboration must meet, but are not actors themselves. A good example of course is legislators and regulators. In international context, this leads to 'the same' process being different in different places, as local regulations apply. Other examples of passive stakeholders are the often cross cutting requirements by legal and risk departments, on for instance archival policies.

2.3 Distributed Ownership and Traceability

In a networked setting, having the different stakeholders exercise distributed ownership over the process models is important. This means that individual stakeholders are able to express their requirements and are able to review how they are formalized in business process analysis efforts. Traceability of these formalized models to source texts, that for instance contain policies and regulations, is crucial to allow for impact analyses on policy change.

3 Supporting Ecosystems with Declarative BPM

Conventionally, business processes have been designed in terms of activities, the order that they are executed in and by whom. This is typically encoded by successor relations between an activity and the activity that is executed consecutively. These process designs are typically created by information analysts that, after carefully considering all requirements, design a flow that meets all these requirements. In the enactment phase, business process support tools assign work to the different actors based on these process designs.

As alternative to imperative, flow oriented business processes, declarative process formalisms have been proposed, such as EM-BRA^{2}CE (Goedertier, Haesen en Vanthienen, 2007), Declare (Pesic and Van der Aalst, 2006) and DPMN (Van Grondelle and Gülpers, 2011). These approaches all try to capture the constraints that the collaboration must meet, rather than the exact order in which activities are to be performed. Although they have different approaches, they use similar techniques (Van Grondelle, Zoet and Vermeer, 2013) to decouple the statements made at specification time from the concrete flows allowed at execution time.

In the context of networked collaboration, the most important feature of declarative process management approaches is the ability to consolidate the requirements and constraints of different stakeholders automatically into a process that all those stakeholders agree with.

This feature helps addressing the first two challenges presented in Sections 2.1 and 2.2. As all participants in the network are able to express their own constraints for the collaboration, including the passive stakeholders, having declarative BPM technology make sure that the different activities across the network are performed within the union of these constraints guarantees that all individual stakeholders are satisfied with the resulting collaboration.

In the context of open ecosystems and highly situational coalitions, we are researching how this scales up when the number of potential participants grows and the number of potential coalitions therefore grows exponentially too. Figure 1 proposes a model for how to support situational collaboration of dynamic coalitions of ecosystem members using declarative process modeling techniques.

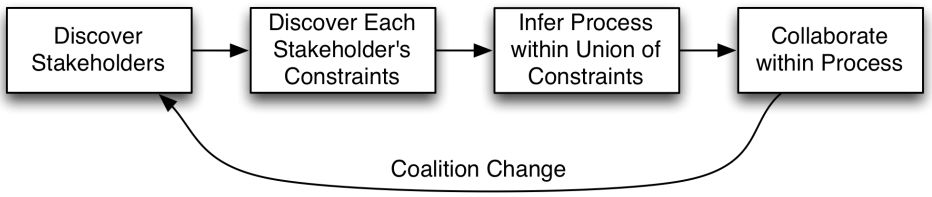


Figure 1: Leveraging declarativity to dynamically creating a collaboration process

To ground the four steps presented in Figure 1 we will describe each steps illustrated by an example. In for instance the case of a claims handling process, depending on customer properties and claims history, in step 1 different departments and/or regimes and external experts, appraisers and auditors may be discovered as stakeholder for an individual claim. In step 2, all the constraints of these stakeholders are retrieved. In step 3, the constraints are consolidated by taking the union and a process is inferred within the combined set of constraints. This process is enacted in step 4 while the set of stakeholders does not change. A coalition change triggers step 1, consequently re-evaluating stakeholders, their constraints and the inferred process.

With respect to the challenges in section 2.3, the fact that constraint sets only need to be merged for a process instance at execution time, prevents the creation of big process designs that can deal with all possible coalitions and situations at once. Having each stakeholder sign off only his own constraints, without asking him to check how those are incorporated into a bigger model, could improve their ability to take ownership of the model. Similarly, constraints map to policy sources better than the impacted flow.

An important question in this context is the ability of non-IT people to understand and work with these formalisms. Existing studies (Fahland et al., 2009) suggest that the intuitive nature of explicitly modeled order is better understandable for users. However, the experiments underpinning this study seem to focus on a conventional setting where analysts have complete information about the requirements of different stakeholders, and create or evaluate process models based on that information. We have conducted initial experiments where growing number of stakeholders, each with individual confidential stakes, have to collectively create or evaluate process models that meet as much of their own stake as possible. The performance of these teams is measured and compared, when using BPMN and a declarative formalism (Van Grondelle and Gülpers, 2011) respectively, in terms of time spent and correctness of the models produced. Although the data is inconclusive at this point, and the experiment is being improved to correct for the effects of unexpected game dynamics, first experiments among groups of students indicate that the combinatoric effects when using BPMN grows very fast when the group size is increased, affecting their ability to converge on shared process models.

Another question is how stakeholders respond to the new form of control they get in this way of working. Instead of having detailed knowledge and influence on the precise way how the collaboration will be performed, the stakeholder gets strong guarantees that his personal constraints will be met, regardless of the requirements and constraints of others. There intuitively is a parallel to different leadership styles, where directive leaders control how employees do their work, while in modern leadership, setting goals and boundaries and allowing for professional autonomy are valued.

4 Discussion and Further Research

In this paper we have explored what the challenges are in supporting the collaboration between dynamic coalitions of service providers in an ecosystem. The main challenge, certainly from a conventional BPM perspective, is the ad hoc, situational composition of coalitions of stakeholders on a per case basis. The emerging field of declarative BPM addresses this, as it does not depend on up front, integral process design, but computes acceptable flows within the constraints of all stakeholders that participate in an individual case. This way, composite products and services can be supplied by ecosystems with high numbers of providers, where the collaboration process needed for every possible coalition is supported.

Further research is needed for the field of declarative BPM to address the challenges introduced by collaboration of large networks of stakeholders in ecosystems.

To move stakeholder identification out of the process model and into the cycle introduced in Figure 1, advanced stakeholder models are needed that support stakeholder identification in ecosystems, but also allow for establishing stakeholders in individual cases.

There seems to be a performance trade-off between better understandability of flow-based formalisms, compared to declarative formalisms, and the inherent complexity when they are applied to exhaustively prescribe the collaboration of large numbers of autonomous stakeholders. Additional research is needed to establish at what network scale there is a tipping point and declarative BPM outperforms conventional BPM.

The relation between BPM paradigms and leadership and influencing styles should be studied further, as it may help understand and overcome the sometimes-perceived lack of control when BPM stops prescribing collaboration explicitly at design time.

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27th Bled eConference

e-Ecosystems

June 1 - 5, 2014; Bled, Slovenia

ICT Innovation for manufacturing SMEs

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Panel Outline

The European Commission in 2013 launched a new 77 million Euro innovation initiative for the manufacturing sector and in particular its high-tech small and medium size enterprises (SMEs), to profit from newest advances in ICT: **I4MS** (ICT Innovation for Manufacturing SMEs). Europe's competiveness in that sector depends on its capacity to deliver highly innovative products that are produced economically and at high quality. The innovative part of these products often originates from advances in ICT integrated in these products. At the same time, ICT-based solutions applied across the manufacturing process chain help to make manufacturing these products efficient. Both in combination allow for more personalized, diversified and mass-produced European products and flexible reaction to changes on the world market.

In the "ICT Innovation for Manufacturing SMEs" (I4MS) initiative, in each of the more than 150 innovation experiments to be launched in the next 3 years starting from July onwards, European innovators are connected across the value chain to mature and adopt ICT innovations across the production value chain spanning from design and engineering down to laser-based manufacturing and industrial robotics. Experiments are implemented with the help of pan-European networks of competence centres providing the knowledge and support for partnering beyond national boundaries. Companies interested will have the opportunity to apply to Calls for Experiments launched by these centres in 2014 and 2015.

Arctur is a member of two (out of seven) Competence centres: Fortissimo (www.fortissimo-project.eu) and CloudFlow (www.eu-cloudflow.eu). At the panel we'll have an opportunity to hear the first-hand experience from a number of Fortissimo project experiments.

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e-Ecosystems

June 1 - 5, 2014; Bled, Slovenia

CentraLab – Central European Living Lab for Territorial Innovation

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Panelists

INTRODUCTION PART

CentraLab Project Presentation

Video Presentation of Pilots

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EXPERIENCES OF CO-DESIGN METHODS

PANELISTS:

Open Societal Innovation - Challenges and Solutions: The eSociety Bodensee 2020 Project

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How to Implement Open and Collaborative Innovation

Martin Duval, CEO, Président, Bluenove

SID ROVINJ WORKSHOP: A High-Powered Creative Experience

Andrea Busato, Scuola Italiana Design - PST Galileo, Italy

Co-Creating Innovation in a Mobile Living Lab

Christian Kittl, Managing Director

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UPSIDE, User-driven Participatory Solutions for Innovation in Digitally-centred Ecosystems

Ralf Trunko, Project Manager, CyberForum, Germany

POLICY ISSUES

Joining Forces for Social and Territorial Innovation

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The Role of Living Labs and Open innovation in the Danube Region Strategy

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Integration Between H2020 and Regional Innovation Policy

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Panel Outline

The Living Lab approach for the co-design of innovative services promises to be able to blend social and technical innovation and inspire behaviour changes in a direction of sustainability. The CentraLab project, funded under the ERDF's Territorial Cooperation Central Europe programme, is exploring the role of the Living Lab approach at the regional and cross-border level, shifting the emphasis even more strongly towards territorial innovation and touching on a range of sectors of development policy. The work carried out suggests the emergence of a new and specific Smart Region model as a user-driven approach to Smart Specialisation.

Final CentraLab will address two challenges, the first one is focused to experiences of co-design methods and the second one to the policy issues.

The first panel will address experiences of co-design methods. In the first panel, co-design methods will be presented through the eyes of CentraLab project as a result of 10 pilot projects, addressing different regional challenges (climate challenges, eco-tourism, e-health, energy efficiency, environment and education, media and creativity, micro-SME networks, mobility, rural development, waste management), carried out by project partners. In addition also experiences from other projects will be presented as for example from eSociety Bodensee 2020 project, UPSIDE project, SID Rovinj experiences, experiences from co-creating of innovation in mobile living lab and experiences from implementation of open and collaborative innovation.

The second panel will address policy issues from perspectives of social and territorial innovation, the role of living labs and open innovation in the Danube region strategy and integration between Horizon 2020 and regional innovation policy.



Project CentraLab is implemented through the CENTRAL EUROPE Programme, co-financed by the ERDF.

27th Bled eConference

e-Ecosystems

June 1 - 5, 2014; Bled, Slovenia

IS & Agility

Experiences from Different Industries and Perspectives

Chair

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Panel Outline

Agility is a 'hot topic' both from a technology and from a business perspective. Rapid changes in government regulations, customer demand, and technological possibilities require organizations that are able to adapt quickly. Information Systems (IS) can be both a driver and a barrier for this business agility. On the one hand, IS provides technological possibilities that make it possible to respond swiftly. On the other hand, IS are often 'set in stone' (for example big Enterprise Systems based on best practices) and difficult to change. Developments such as Software as a Service (SaaS), Business Process Management (BPM), and Service Oriented Architecture (SOA) carry the promise of alleviating these barriers and increasing the driving forces of IS. Much work has been done in the area of agile software development, but it remains an open question how IT governance and IT infrastructure should be effectively arranged. This panel will address the timely and important topic of IS & Agility from various perspectives and industries.

Marijn Plomp will chair the panel and provide a short introduction on the topic of IS & Agility. He will discuss its importance, various forms of agility, and the concept of loose coupling between business processes and applications. Next, each panelist will cover the topic of IS & Agility from his/her own perspective.

Research on IS in health care organizations is much focused on hospital information systems (HIS), their adoption, maturity, and implementation. **Ronald Batenburg** will argue that so far, the agility of HIS is hardly studied, but the need for this is quickly emerging. Hospitals are increasingly confronted with stronger demands and compliance from governments, inspectorates, health care insurers, and patients. At the same time, hospitals are still dependent on their legacy and custom-build HIS, and struggle to select the appropriate next HIS that will support the organization for the coming years. In his presentation, the agility of HIS will be addressed from both the supply and demand side of this specific software market.

The financial industry is confronted with an ever increasing range of regulations, both from a "systemic security" and a consumer protection point of view. It is not uncommon for (large) banks to spend over 50% of their annual transformation budget on implementing these regulatory changes in their processes and systems. Or, if the costs are prohibitive, they may choose to quit certain products or markets, for instance smaller banks no longer accepting US clients due to the regulations imposed by the US authorities on foreign banks. The question **Roger Bons** poses is if the use of more flexible processes and IT infrastructures could make banks more agile and help them embrace these changes. Regulations are not going to decrease in the foreseeable future, and the bank that manages to be the most effective in transforming them into new opportunities might well be the winner in the long run. In the panel discussion he will explore this in more detail.

Ulrike Lechner will report on her research experiences in agility in crisis management. Crisis situations are characterized by high dynamics and fluid structures. Agility in crisis situations is being attributed to flexibility and appropriate command and control systems. She will discuss the scholarly knowledge on how to design organizations, processes, and IT to facilitate agility. Experiences in experimental settings as well as case studies on agility, command, and control in crises management will be covered. Ulrike will explore the link from crisis management to business continuity and from

agility in crisis situations to resilience and robustness in organizational design.

In 1984, Appleton wrote a paper titled "*Business rules: the missing link*". Exactly 20 years after that, Kovacic's (2004) wrote an article "*Business renovation: business rules (still) the missing link*." **Martijn Zoet** will argue that – another 10 years later – business rules are still the missing link. Increased regulation and compliance issues concern not only the financial and medical industry, but are a general trend. When implementing demands, too much focus is on business processes and data, while regulatory changes usually influence business rules. In his presentation, the contribution of business rules to agility will be addressed from both an IS and from an IT perspective.

27th Bled eConference

e-Ecosystems

June 1 - 5, 2014; Bled, Slovenia

eHealth/mHealth Gamification for Health

Chair

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Panel

One of the challenges in the eHealth domain is how to support people in initiating and maintaining healthy lifestyle changes. Healthy lifestyle is becoming increasingly important in the face of cardiovascular disease, diabetes-2, obesity, some cancers and even depression and chronic fatigue. Part of this challenge regards designing technology and applications which are enticing enough to stimulate healthy behaviors. But even more challenging is to keep motivating people to maintain healthy lifestyles on the long run (2-5 years or even longer).

On the other hand, gamification and smartphones offer huge potential for supporting and motivating healthy behaviors. Games can potentially be relevant for the entire spectrum from our sometimes obese iPad youngers, to our chair-bound working classes, to our TV-tied elderly with increasing social isolation. How can we best use this potential? Which forms of serious games can help to improve people's health literacy and -awareness? Which types of games help people make healthier choices and improve their day to day health behaviors? What makes it fun? What makes it worthwhile? And how to create long term benefits?

The panel aims to share experiences and insights from various projects in this domain. Examples from research groups in China, The Netherlands and Germany will be provided.

The panel should include a broader discussion with the audience, as this may indicate both researchable issues and some strategies to overcome the challenges in this domain.

Topics:

- Games for extensive lifestyle improvements.
- Best Practices.
- Games for nutrition,
- Games for elderly versus youngsters?
- Most fun games; most effective games (health outcomes; long term adoption)
- Does long term support and motivation require solutions that are different from short term solutions?
- Research results and experiences from various research groups

Doug Vogel:

Doug Vogel will report particularly on devices affecting intrinsic motivation related to staying healthy (including exercise and diet) as well as devices intended to monitor health condition and behavior. China has special issues associated with an aging population, not the least of which is lack of potential for elderly care and inability to deal effectively and efficiently with the onslaught of chronic disease, e.g., diabetes. As such technology needs to be brought to bear to enable people at all ages (but especially elderly) to live a quality life with confidence in support. Aspects of social networking and interaction between patients and doctors will also be addressed as people take more responsibility for their own healthcare. Personal experiences and research in progress will be discussed with the audience.

Luuk Simons: Intensive (e)Health Coaching as Employee Benefits Program; TU Delft case

Luuk Simons will report on multiple work site lifestyle interventions. The retirement age in the Netherlands has been shifted to 67 years. Chronic health problems exist for the majority of employees by the time they reach this age. Large employers are increasingly interested in offering in-company health programs. For deploying the game solution in the field, a hybrid service concept is used, combining group sessions with a microlearning based health game. The work site environment actually appears conducive to health games, because a) it helps save time in educating and coaching people, b) game elements can be used to let different teams of colleagues compete, c) employees do appear to become more productive due to their better health. Lessons from the cases will be discussed with the audience.

Ulrike Lechner: Designing Applications for Health Consultations, Invade Case

Ulrike Lechner will report on her experiences in designing an application for coaching sessions in the health program Invade. Invade is a successful, evidence-based intervention program for reducing stroke and dementia at family practices. A web-based application for tablet computers, the INVADE intervention assistant tool (ICAT) has been developed to enhance standardization of intervention delivery and the overall intervention success. ICAT features interactive content for consultation session in the Invade program to make consultations more interactive and more fun. Experiences and lessons learned will be discussed with the audience in the panel discussion.

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CentraLab – Central European Living Lab for Territorial Innovation

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Panelists

ICT and SMEs

Gregor Zupan, Information Societ

Statistical Office of the Republic of Slovenia

eInvoicing – Case of Republic of Slovenia

Dušan Zupančič, Chamber of Commerce and Industry, Slovenia

OpenAlps: presentation of OI Lab ORbITaLA and Alpine Open Innovation online Platform

Borut Jurišič, MRA - Development Agency, Slovenia

How Businesses should Cope with the New General Data Protection Regulation

Matija Jamnik, Law Office Jamnik Ltd., Slovenia

Trentino as a Lab - Facilitating SMEs Networking in Ecosystem

Marco Combetto, Informatica Trentina, Italy

Connecting the Nodes: SME Networks in a Digital Business Ecosystem

Christian Kittl, Managing Director

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CO-EFFICIENT: Collaborative Framework for Energy Efficient SME Systems

Katja Hanžič, Faculty of Civil Engineering, University of Maribor, Slovenia

Panel Outline

To remain competitive and energy-efficient, small- and medium-sized enterprises SMEs) need access to the kind of sophisticated logistics systems that global corporations use. But such systems are usually beyond the resources of SMEs. ESSENCE seeks to establish a free ICT network that lets SMEs manage logistics and optimize their supply chain by designing their own business networks.

Project pilots explore the use of customized eServices that give logistics support to individual SMEs. SMEs can see a chance in improving their competitiveness and their international performance by exploiting the ESSENCE ICT network.

Scientific will also be attracted from the possible exploitation of the ESSENCE network to commercialize research results and to establish partnerships with the entrepreneurial world.

Partner institutions' employees and their networks, (intermediaries, multipliers, innovation agencies, etc.) can be interested in improving their network and experiment cooperation by make use of existing and new knowledge more efficiently.

Policy makers and indirect beneficiaries can see ESSENCE as an innovative project that tackles the logistic sector, and helps policy makers to integrate results and recommendations into local policies as well as will allow decision makers to learn from other experience and to import the best actions available on the market.

During the Bled eConference, the knowledge management event of ESSENCE will be held and organized within two panels.

Panelists will present different topics related to SMEs and ICT and e-services usage as for example ICT and SMEs usage in Europe, e-invoicing case of Slovenia, open innovation approach from OpenAlps project, issues related to the new general data protection regulation, Trentino as a Lab facilitating SMEs networking in ecosystem, SME networks in a digital business ecosystem and collaborative framework for energy efficient SME systems.





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June 1 - 5, 2014; Bled, Slovenia

Applied Social Media For Competitive Advantage

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Panel Outline

Information & Communication Technologies (ICT) are rapidly evolving and today they are seen as a central resource for management in the pursuit of business objectives and strategies. As a result, the role of ICT – and in particular Social Media - in business needs to be re-evaluated in order to develop a sophisticated understanding of how innovative Social Media can benefit today's organisation obtaining and sustaining competitive advantage (CA) in the global marketplace.

In recent years, many organizations – indigenous, multinationals, profit and non-profit – have incorporated Social Media technologies and applications, such as LinkedIn, Twitter, YouTube and Facebook as part of their overall strategy. However, managers are still trying to evaluate how existing and emerging initiatives may add sustainable value to the organisation.

The objective of this panel/workshop is to create an awareness of innovative and sustainable Social Media initiatives to be implemented by organisations. We will also elaborate on implications of Social Media on different industry sectors.

Main topics include:

- Social Media and Competitive Advantage in context of Michael Porter's Value Chain Model
- Social Media and Disaster Recovery
- The Dark Side of Social Media
- Social Media = The end of email

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University 2.0 – Are we there yet?

Co-Chairs

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Workshop performed by using WiMicNet, University of Maribor, Slovenia

Workshop Outline

In the past decade education sector is faced with tectonic changes. Not only interactions among stakeholders in the educational processes are changed, new methods of teaching, learning and new business models are being explored.

In the past years, we discussed the use of virtual learning environments, the use of social media in educational process - predominantly in the ICT and business oriented schools. Today the use of ICT among students is widely adopted and as such all the studies, from engineering to humanities, are faced with these challenges.

This panel will seek answers to the questions of how, where, and who. How we can use existing technologies to support different kinds of studies, learning styles, and educational curriculum? How do we adjust and reinvent methodologies to support different learning goals and expected outcomes. How do we adjust the organizational structures and processes, define new business models that will work in the so called University 2.0? What are the roles and responsibilities of the stakeholders (policy makers, professors, students, industry) in this new environment? Can we bring education, science and industry closer by using modern ICT in an innovative way? How can we utilize social media to foster collaboration between students, professors and industry partners to create innovative solutions?

With speakers coming from a variety of university and industry background we will try to assess the current state of University 2.0 and pave the way for future research and practice.

27th Bled eConference

e-Ecosystems

June 1 - 5, 2014; Bled, Slovenia

Young Elderly – Progressive Market for Advanced Digital Services?

Chair:

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Markus Merne, Group CEO
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Panel Outline

The group of young elderly, the age interval 60-75 years, is a particularly interesting segment for developing technology based well-being eServices and for designing advanced mobile services for the new generation of smart mobile phones. The young elderly group has the time, often also purchasing power and motivation to invest in personal well-being and remain active. Soon the cohorts coming to the retirement age are growingly IT-savvy, too: the share of Internet users among part of the age cohort (65-74 age) in Finland is 53%, but the percentage rises to 81% for the next cohort (currently 55-64 years old). For the use of

smartphones the respective figures are 11% (age group 65-74) and 28% (age group 55-64) (Statistics Finland). Another trend is that the adoption rate of smart phones in Finland (as in several other countries) passed 50% among mobile phone subscribers in 2012, and this trend is now visible also among the young elderly where the 50% level was passed early in 2014. Thus there will be a technology platform available for building and implementing advanced digital services.

A partial answer has been found in working on the design of mobile value services for young elderly and making sure that the technology platforms both for the services and for the smartphones are advanced enough to satisfy their requirements. This would be important as we in discussions with network operators, and Nokia and Microsoft, have found out that the potential markets are interesting and challenging: at the moment there are about 800 million young elderly worldwide; this is expected to grow to 1 billion by 2020.

We cannot expect to have sets of services we could simply download and implement for the young elderly on short notice. This is probably not as bad as it may seem; the positive part of it is that we can design and build services that are context adaptive (and adapted) and user cognition adaptive (or adapted); the negative part is of course that this will take time and will require resources to carry out. In Finland the first steps have been taken and there is a an R&D program in place with 11 companies and 6 research groups that work on the first ecosystem of digital services for young elderly. The panel will initiate discussion about the focus areas for the digital services, the impact the digital services may have, the business models that will drive the ecosystem and the global markets for digital services for young elderly

27th Bled eConference

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ALADIN – Alpe Adria Universities Initiative

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Presenters

Representatives of ALADIN

Meeting Outline

The Universities are creating international networks, at regional level, sharing common ideas and knowledge in teaching and research activities in the field of any aspects of "e" business, technologies, solutions and their application.

University network is considered as an important contributor to eRegion development of the neighbouring countries. The intention of the cooperation is to create mobility of students and professors, imposing common lectures, creating virtual teams of students from different Universities and professors lecturing at different Universities, in order to harmonize with global and international activities of eBusiness. Another very important aspect is collaboration in research projects.

Representatives of Aladin members will share their experiences and achievements and discuss the possibilities for further cooperation, especially in the scope of joint project proposals for forthcoming Horizon 2020 and other programmes.

Dishareliciously

LOVE FOOD, LOVE THE WORLD

Kristin Atmann
Tiffany van Erp
Claudia Jongeling
Rianne Klaassen
Marloes Slotboom

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Introduction

The greatest potential for the reduction of food waste in the developed world lies with retailers, food services and consumers. (Lebersorger & Schneider, 2011) This is due to wrong planning of this group, they either buy wrong products or too much. This is an indicator that the app Disharelicious might become a success because so many people are throwing food away.

People waste a lot of food that other people can eat which is not good for the environment. This is a big problem. By making an app that connects people who would like to share their food we could reduce the waste of food. Than the production of food can also be reduced, which is good for the environment and animal welfare.

In order to reduce the waste of food, we would like to make an app about composting and especially the waste of food. We would like to make an app so people can share their food and give it away. People can make a picture and/or recipe of their food scraps and put it on the app. Some other people can react on it and may pick it up within 24 hours.

Trends

Our app is based on the following trends:

The last few years, our view on the waste of food has changed. People started consuming more but unfortunately also starting to waste more food. According to a study by the University of Arizona called Garbage Project throws an average American around 0.5 kilogram of food away per day. This is about 215 kilogram per year. Food waste does not only include the food that gets thrown away without opening or eating it, it also concludes the leftovers from meals that people throw away.

An article shows us that reducing the amount of food and drink that is wasted is a key element in developing a sustainable food system (Quested T. &., Issue 4). It also gives important numbers about wasted food and drink in the UK. This article tells us that recycling food (with Disharelicious) will help a lot because there will be less food wasted.

The next article tells us that communicating the environmental benefits of products and showing the importance of wasting less food will help people make better choices about the food we consume (Kerr & Foster, 2011). This is relevant for Disharelicious because this shows that Disharelicious is better because of the communication and the social networking. It will remind people about the waste of food and hopefully makes their choices about the waste of food better.

People waste a lot of food that other people can eat which is not good for the environment. This is a big problem. By making an app that connects people who would like to share their food we could reduce the waste of food. Than the production of food can also be reduced, which is good for the environment and animal welfare. We think Disharelicious can help to reduce the waste of food.

How the app works

Our app is designed to reduce the amount of food waste and the environmental impact. The app offers users a social platform where they can share ideas and their opinion with people who have the same vision.

Users of our app can share their leftovers and give it away. People can make a picture and/or recipe of their leftovers and share it on the app. Other users can claim the leftovers and pick it up.

Undoubtedly, in order to make the app useful, it needs a couple features. First of all, the app will have a map with spots in the neighborhood where you can pick up leftovers. Also, you can see the location of other users and see their profile. You can add other users as your 'friend', which allows you to receive a notification when they share a new dish on the app.

Secondly, you can make a personal profile. This includes some personal information like your name and location, the type of food you like and a section where you can add ideas and photos of dishes.

Thirdly, the app has a 'market' with offered dishes and where you can share your own dish. This includes information about the dish, the pick-up location and possibly a picture of the dish.

Finally, the app has a forum where you can chat with other users about ideas, recipes, Q&A, the environment, etcetera.

Also, the app will be using a point system. Whenever you pick up someone's leftovers, you have to give them points. You can only get the dish when you give points. The one who receives the points can buy a dish from someone else with those points. The maximum is five points for one dish. Of course you can buy these points, we are thinking of a price of € 0,20 per point.

The layout of Disharelicious

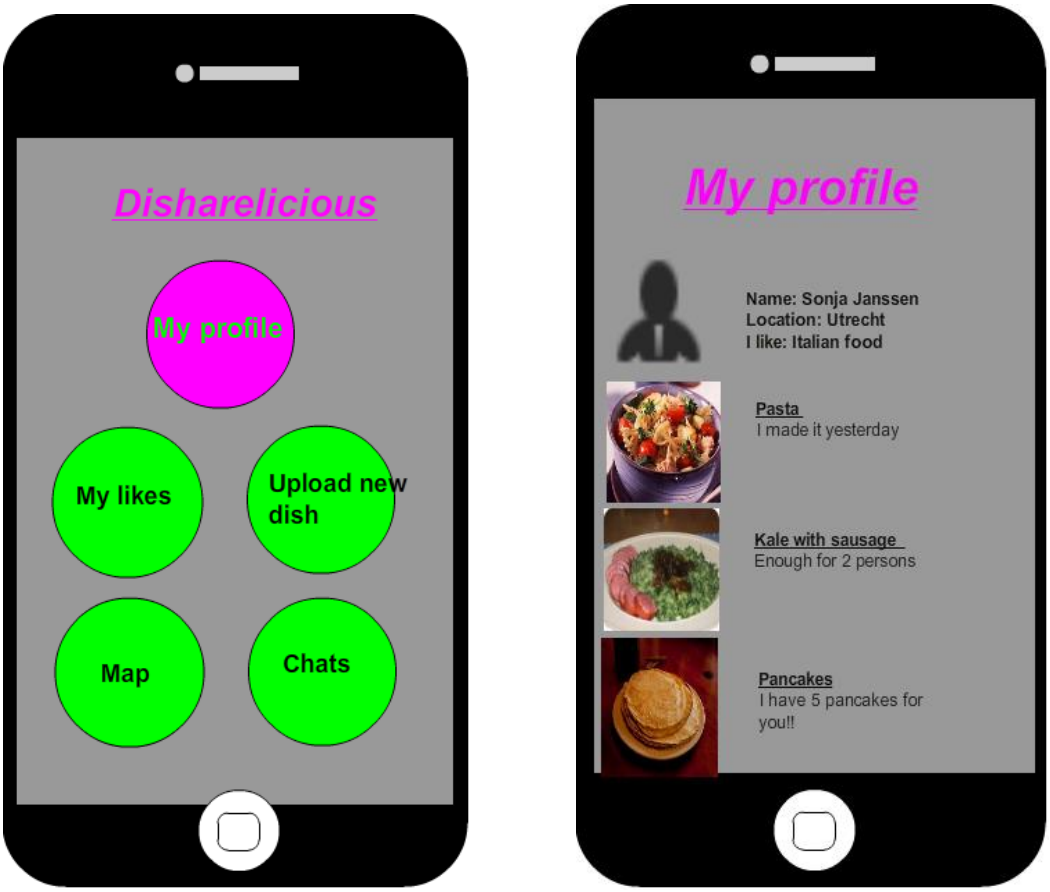


Image 1 - The layout of the app

See above a draft version of the layout of Disharelicious.

The homepage of the app is the left image. You can navigate via the buttons if you would like to go to another page of the app. The features are a personal profile, a page that contains the dishes that you like, a place where you can upload a dish to give away, a map with locations of people that are offering dishes and a chat or forum, where you can chat with people about food, the environment, et cetera. There will also be a search bar at the home page.

The right image shows your personal profile where you can share personal information, your location, the type of food you like and a section where you can add pictures and ideas.

Business Case

Research

Research is done so the app can be developed well. A questionnaire was made to find out whether people will use Disharelicious and what their opinions are. We had 37 reactions on our questionnaire. The key findings were that almost every respondent has leftovers and they mostly throw it away or eat it on another day.

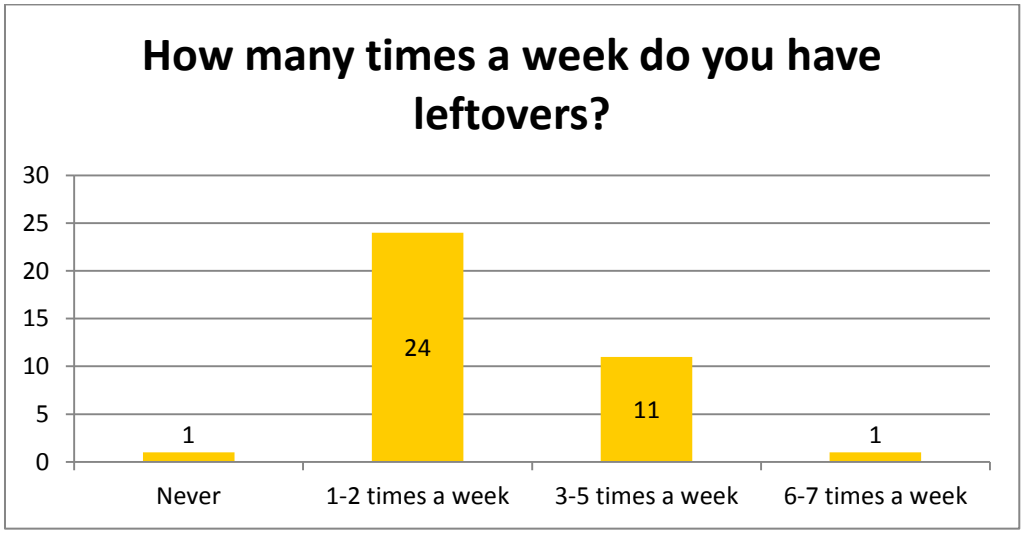


Figure 1 - How many times a week do you have leftovers?

A large majority of the respondents state that they would give the app a chance. There were 7 respondents who would put dishes on the app and 20 respondents who might put dishes on the app.

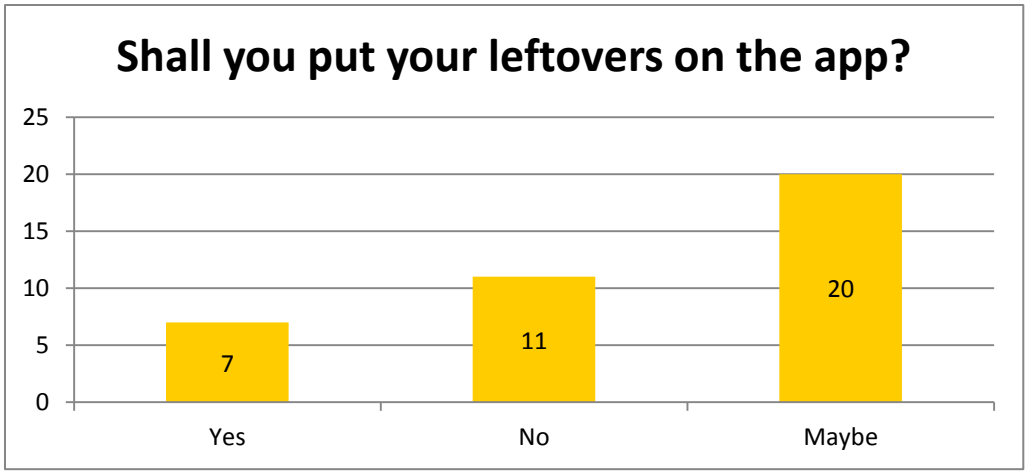


Figure 2 - Shall you put your leftovers on the app?

Many respondents would get dishes from the app. The majority will give it a chance. Whether they would get dishes depends on the type of food, information about the dish and the look of it. Our app will get the option to upload pictures and information about the offered dish.

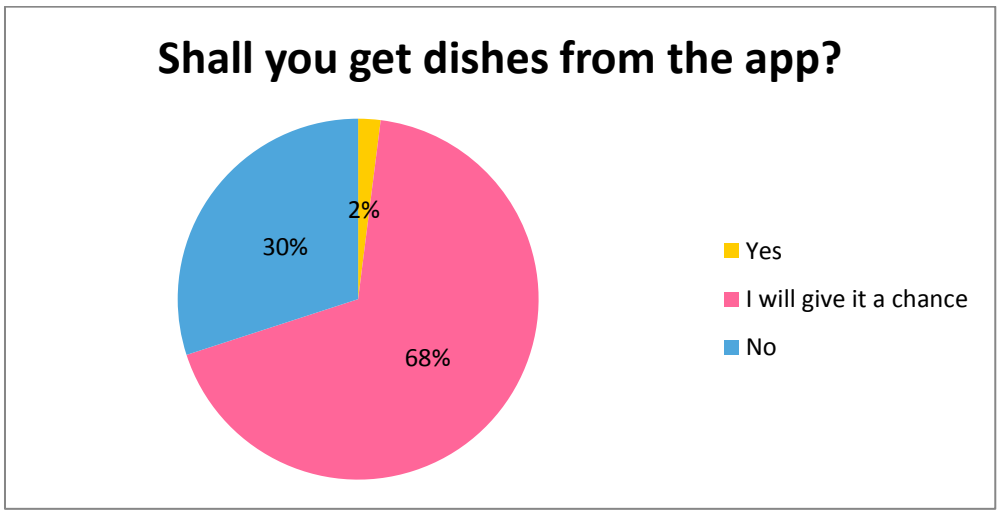


Figure 3 - Shall you get dishes from the app?

How to earn money

The app is going to earn money by advertisement and the point system offered in de app.

Food suppliers and maybe also other companies will use the app as a channel to advertise. The app will have an advertisement unit at the bottom.

Another way of earning money is via selling points to the users of the app. People will pay for the points to buy dishes from other users and a part of the money will go to Disharelicious.

The added value of Disharelicious

Reduce the amount of food waste

People can share their food scraps with other people, so there will be less food scraps in the bin.

Reduce the environmental impact

If food scraps are shared with other people, there will be less food waste and less of an environmental impact because people will use less gas and electricity.

Create a social network

The app will provide a social network for people who would like to share their food scraps with other people. The users can chat and share ideas with each other on the app.

An alternative for take-away food

People can pick up a meal from other people. It is similar to picking up pizza at a pizzeria or Chinese takeaway, but sharing leftovers is cheaper and environmental friendly.

Innovative

The app will provide a complete new social network for people who would like to share their food scraps with other people. Also, it is a new way of dealing with food waste and it is a way to build a community of people who like food and the environment.

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Univerza v Ljubljani
Fakulteta za elektrotehniko

Univerza v Mariboru
Fakulteta za organizacijske vede

Proposal for the Professor René W. Wagenaar Prototype Bazaar

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Vrtojba, April 2014

Outline

In this proposal we present the concept behind Moboff – a system consisted of two parts: an app for tourists (users) which offers information about upcoming events and nearby attractions in a certain area, and a web content converter used by tourist information providers.

Converter is meant to make information providers' work easier and more effective by automatically converting information on their websites and making it available through the mobile application.

The primary goal of Moboff is to promote and expand Slovenian tourist offer to mobile platforms with little additional effort and give tourists an opportunity to get full experience of places they visit, without relying on internet connection.

The key features:

- The app can be used without internet connection – allows users to download packages representing individual area they want to visit.
- Uses GPS to show the direction and air distance to individual sites.
- Server/converter automatically checks for updates on the website of tourist information provider, converts it and makes it accessible through the mobile application.

Moboff

There are many apps for tourists available today, but many of them fail at what they are supposed to do. Some of them require constant internet connection, the others only offer static and partial information. If there is an app, where content is frequently updated, it normally represents only a small portion of what the location really offers. They are also mostly limited to local attractions.

Moboff, on the other hand, keeps a user up-to-date, with no need to visit any website to see what is new in the area. Upcoming events are sorted by date and locations by distance. If someone wants to spend a few days in the next town, he doesn't need to download another app but only a package for that destination.

Where Moboff also stands out is that it doesn't just help tourists with information, but also those who provide them. Slovenia has many tourist info centres and local tourist organizations providing information about destinations. Moboff is a solution to collect all that information in one single product and to represent Slovenia as a whole.

The basis of Moboff are dynamically formed content packages.

At the very first use the aggregators (tourist information centers) connect their websites with the Moboff server through the online platform. Each website is a source of information that is daily accessed by Moboff server, automatically transferred and converted into a mobile package representing individual area. This means that content only has to be entered once, and there is no

need for editing two or more separate databases, but only one. Tourists can then choose and download packages they are interested in to their mobile devices. After that, all information is accessible offline.

In case of fresh or updated content on the website, users (who downloaded package which corresponds to the updated website) receive a notification about available updates.

Additionally, the website editors can use online platform to enrich the data with geolocation which allows users to use an integrated "compass" that shows the direction and distance to individual locations. After the users download an app and a package (or multiple packages) of their interest, Moboff can be used without wi-fi or cellular data connection.

Moboff has a potential to be further developed as a tool to collect data and analyze user behaviour based on GPS location and their feedback, which could be used as guidance to help improve tourism in the country.

The poster

The poster will contain the following information:

- Short description of Moboff
- Basic data about the authors
- List of key features
- Flowchart

Oral presentation

We will give short introduction to the concept of Moboff and show an animated video explaining it.

Attachments

Attached is a statement of support by Associate professor *dr. Matej Zajc* and Tomi Ilijaš, CEO of Arctur d.o.o.

27th Bled eConference

e-Ecosystems

June 1 - 5, 2014; Bled, Slovenia

BusGuardian:
A Mobile Application for School Bus Safety

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1 The BusGuardian Application

The purpose of the application is to provide a school bus monitoring system to help ensure the safety of student-passengers. The application will provide much needed information to parents between the time a child leaves home for school and when they return home.

For bus drivers, the application will offer a feature to track student attendance on the bus, and provide maps for automatic re-routing when the system knows that a child is staying home. For school administrators, the application will allow the close monitoring of school buses, students, and student emergencies.

1.1 Students

Through the student-interface, each student will have access to a wide range of information and communication tools through *BusGuardian* on a smart phone to make the school bus experience safer and easier.

- If the bus is running late, students will be informed so they can avoid waiting outside in bad weather. Students may arrive at the bus stop just in time for the bus' arrival. This will also reduce the risk of child abductions and bullying (familylives.org, 2013, Child Abduction Prevention, 2014)
- When students board the bus, attendance will be confirmed by a personal QR code displayed on a smart phone. If a student does not have a smart phone, a QR code may be printed on an ID card the student carries.
- The student account provides buttons for instant texting or audio and video recording; providing the ability to record and upload any disturbances (such as bullying) on the bus; this will be automatically be pushed to the school administrators, bus driver, and parents (familylives.org, 2013).

1.2 Bus Drivers

Bus drivers will have a mobile device and a *BusGuardian* interface designed to provide access to information unique to the needs of their job. Included features will be:

- The ability to scan QR Codes on student phones or ID cards in order to take attendance. This information will be pushed to school administrators and parents.
- Information relating to driving conditions such as: weather, traffic, and re-routing when parents inform the systems that their student does not need to be picked up or dropped off today.
- Information relating to student safety such as a photograph (for identification), names, ages, family members on the bus, disabilities, medical conditions, parental contact information, and emergency information.
- Bus location and speed (based on GPS) will be automatically pushed from the driver's device to the Parents and Administrators, informing them of the bus' location, safe operation, route, and estimated time of arrival.
- A daily roster of expected students will be modified by parents (in case children are sick or will be driven to school by parents). This will allow the bus driver to skip certain stops, and the GPS will re-route the bus for efficiency.
- If a student is missing, the parents and administrators will be pushed an email notification stating that the student did not make it on the bus or failed to show up.
- The driver's device will push information to other users regarding the bus' location and speed; and informing users of delays. Parents and administrators have the ability to further investigate based on student-generated reports, while the driver is operating the vehicle. This will help keep a close watch on the busses.
- Text messaging information from the driver to parents and administrators will only work when the GPS indicates the bus is parked. If the bus is moving, students will be able to upload status reports from their own device on the driver's behalf. This will be helpful in unforeseen circumstances such as traffic delays.
- If a student does not show up to the bus stop in the morning or after school, but the system expected them to ride the bus (for example, the parent did not notify the system that the child was sick), then the system will automatic push an "absent" notification to parents and administrators.

The system will be particularly helpful for substitute bus drivers. *BusGuardian* will help substitutes overcome any disadvantage of not knowing the students or the route by providing up to date rosters, photographs of children, and GPS routing information.

1.3 Parents

Parents will find comfort and some sense of control through the use of the *BusGuardian*. Features for parents will include information about the bus and the children, as well as communication features.

- Attendance information uploaded from the bus driver's application will allow the parents to see whether their child got on the bus, and at what time, with an optional text message when their child boards the bus.
- The bus driver's mobile device will push live GPS data to both the administrators and the parents. This will include location, speed and estimated time of arrival at school, or at the bus stop on the way home. It will also inform parents of delays.
- Parents will be alerted if their student uploads audio or video while they are on the bus, or during the school day. This will serve as a deterrent to bullying.
- A "Parental Override" feature will allow parents to notify the bus driver and school administration that a child is:
    - Going to be absent, and will not ride the bus
    - Using alternate transportation today
    - Has permission to walk to/from school today

1.4 School Administrators

Administrators will have a *BusGuardian* interface with access to all parents, students, and driver features and data. Administrative features will include information about all users, emergency features, and administrative override controls, including:

- Access to all live data such as:
    - Live data pertaining to students, busses, and parental users
    - Live search capability
- Communication capabilities will include the ability to push notifications to any individual (parent, student, and driver), or to select sets of users (all students currently on a particular bus, select students and their parents who were involved in an incident, etc…).
- Access to all communications from all users will allow administrators to review and make content available to others. This will help administrators and law enforcement officials investigate situations that may have occurred.

2 Problems Addressed by the Application

Children riding school buses face threats from several sources, including bullying behaviour, the driver's capability to maintain control of the vehicle in all conditions - including conditions caused by students inside the bus, and external threats such as traffic and weather (US Department of Transportation, 2014).

The *BusGuardian* application addresses these concerns for the children riding school buses. The application provides insight for the parents, bus drivers, and school administration to (literally) 'see' what is happening on the buses, and to monitor them. Until now, parents had no way of knowing whether their child got to school safely, whether their child was being bullied, or why the school bus is running late (familylives.org, 2013). The *BusGuardian* application will provide a full overview of

the transportation situation by providing transparency through increased availability of information. It will provide information throughout the process; from getting to the bus stop and going to school, to being picked up by the bus and transported home safely.

3 Why this Application is Unique

The *BusGuardian* application will be the first to fully integrate the new technologies available in modern smart phones, and to arm everyone with the tools and communication capabilities to provide openness and transparency through access to live information. The application provides collaboration between students, bus drivers, parents, and administrators, to provide a safer bussing environment.

State of the art bus systems such as Boston Public Schools' (BPS) system do not have the features or the capabilities *BusGuardian* provides. BPS provides a bus system for an estimated 33,000 students. Every bus has a GPS installed that allows BPS to locate any bus in real-time (Keary, 2013). Parents have free access to an online application, "Where's my School Bus" (Boston Public Schools, 2014). Unfortunately, it does not allow for communications, attendance, or personalized information, such as estimated time of arrival.

4 Value

The value of an application can be measured in both tangible and intangible ways. The value of saving students from bullying, and saving parents from undue worry is difficult to measure. However, the revenue stream coming from an application that provides advertising on a mobile application can be calculated.

Starting with a few assumptions:

- 160 days of school per year
- 1000 student users in a typical school, using the app at least twice per day (conservatively)
- At least one parent user per student, using the app at least once per day (conservatively)
- Revenue of $30-75 per thousand views (Schneider, 2006)

Based on these (conservative) assumptions, the annual revenue per typical school (approximately 1,000 students) is calculated to $14,400 in Figure 1.

$$\frac{160\ days\ x\ 1000\ students\ x\ 3\ views\ per\ day}{1{,}000\ views}\ x\ \$30 = \ \$14{,}400\ revenue$$

Figure 1: Revenue per School

In the United States alone, there are 25,000,000 children being bussed to school every day (American School Bus Council, 2014). If (conservatively) *one percent* of these students used the BusGuardian application (250,000 children), the annual revenue stream would be: $3,600,000

5 Technology and Content Sources

The application will be designed for the mobile platform using a cloud-based server. Content will come from both users, and on-line sources, as depicted in Figure 2:

- Google Maps will provide all mapping and routing services and information.
- Traffic information is already integrated into Google Maps
- Open Weather Map will provide the real-time weather information available to all users, with integrated API (openweathermap.org, 2014).
- All content that is generated by users will automatically be uploaded to the cloud, distributed in real-time to other users, and archived.
- Traffic information will be provided by Google to select the most efficient route for the buses.
- Advertisements will be the primary source of revenue. The sponsor will provide them to the administrators, to be uploaded to the server.

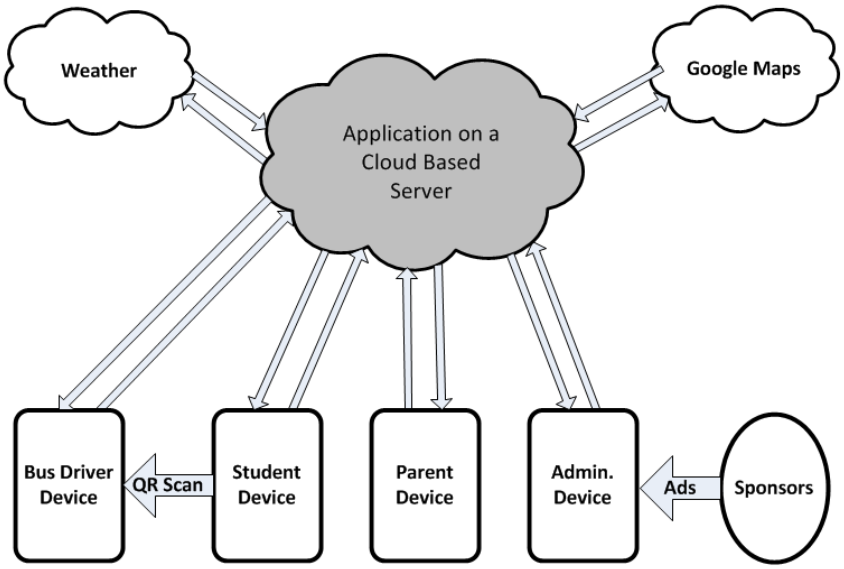


Figure 2: Cloud Diagram

6 Business Model

The *BusGuardian* uses the Advertising business model. The application generates interest among users who are compelled to log on to check the status of the bus, or the location of a child. Advertisements can be displayed in several ways, the easiest being an opening screed where the advertisement needs to be cleared from the screen by the user before proceeding to the application. This method would be the least intrusive to the user's view of content on a small-screen mobile device.

7 Prototype of *BusGuardian*

BusGuardian will have an opening page and 4 distinct interfaces, depending on the user.

When *BusGuardian* is opened, an advertisement will appear covering the application until the user either clicks it, or discards it, as depicted in Figure 3.

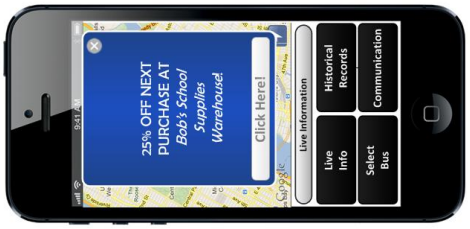


Figure 3: Opening Page

The Student's Interface will display a map depicting the child's location, the current location of the bus, its route, and 4 buttons for additional features, as depicted in Figure 4.



Figure 4: Student Interface

The Parent's Interface will display a map depicting their child's bus location, the destination, and the current route, along with 4 buttons for additional features, as depicted in Figure 5.



Figure 5: Parent's Interface

The Bus Driver's interface will depict a map indicating the bus' location and most efficient route to the next bus stop, and 5 buttons for additional features, as depicted in Figure 6.

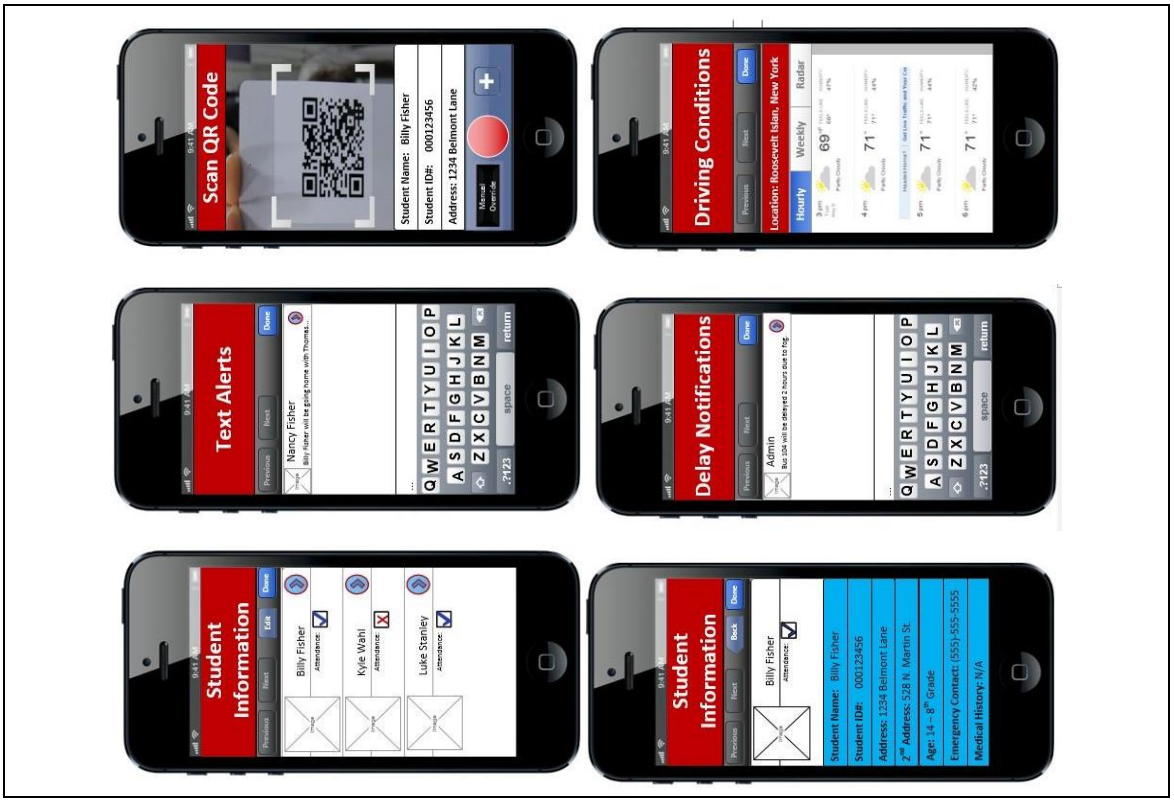


Figure 6: Bus Driver's Interface

The Administrator's interface will depict a map with the current location of a particular bus (routes for other busses can also be selected), along with 4 buttons for additional features, as depicted in Figure 7.



Figure 7: Administrator's Interface

8 Conclusion

BusGuardian uses commodity mobile smart phones to bring peace of mind, safety, and transprency to potentially thousands of users; with the added bonus of offering a profitable revenue stream with a minimal investment.

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MediText

Proposal for Professor W. Wagenaar

ePrototype Bazaar 2014

A concept by:

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Description

Quality health care requires effective communication. In the United States alone, fatally flawed communication between healthcare providers causes 7000 preventable deaths annually, costing society an estimated 17 to 29 billion dollars each year (Banning, 2005). Because of this, health care providers have long been searching for ways to improve their internal communication. Recently, Wani et al (2013) conducted a trial with an existing instant messaging service (WhatsApp) among one hospital's surgical staff. Overall, instant messaging appeared to improve internal communication and user satisfaction was high. However, using an external messaging system inevitably leads to one important limitation: a lack of connection between the messages and the electronic records of the patients they concern (Wani et al., 2013).

We present an application that combines both.

MediText is an innovative new app that stimulates and facilitates quick and effective communication between medical specialists in a hospital setting. Combining easy access to relevant, up to date patient data and integrated live monitoring with an instant messaging feature linked to the patient's digital records, MediText connects all physicians and caregivers within the various medical specialties who share responsibility for the treatment of a patient. Once installed on a mobile phone or tablet, MediText helps bridge the physical gap between doctors in different specialties, eliminating the need to search for a workstation or an internal phone to communicate. Its user-friendly interface makes MediText an easy and efficient tool that enables medical professionals to consult with colleagues or check on patients with minimal delay, helping them achieve a higher level of care through better internal communication.

How does it work?

MediText requires a mobile device (i.e. smartphone or tablet) to work. The application is linked to the electronic patient records of the hospital. Medical specialists log in with their username and password at the start of their shift. After logging in, as an extra security measure, the app requires an additional PIN code to be able to access patient data (figure 1). The home screen is then displayed, featuring 5 different buttons: "*Patients*", "*Contacts*", "*Feedback*", "*Settings*" and "*Log Out*", see figure 2.

Patients

The "*Patients-button*" directs the user (i.e. physician) to an overview of all patients under his or her care, whether under their direct responsibility or as a consulting physician. For example, a cardiologist will see all patients admitted to the Cardiology ward, as well as those who were admitted for another speciality but also require cardiovascular management (for instance a patient who was admitted to Neurology for a brain haemorrhage, but who also suffers from pre-existent heart failure), see figure 3.



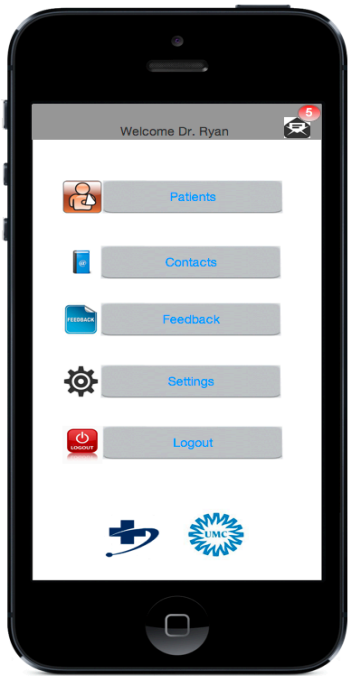




Figure 1. Digit code *Figure 2. Home Screen* *Figure 3. Patient list*

After selecting a patient by touching their name on the screen, the application displays a summary page containing essential information (i.e. date of birth, location, resuscitation status, known allergies, attending physician and specialty, current medication, recent diagnostic results and, if connected, a link to a live feed of their bedside monitor). Each can be selected for additional, more detailed information on the topic. Gender is displayed with an icon next to the date of birth. If available, a patient photo is shown for identification purposes, see figure 4. If there is no photo available, a female or male silhouette is displayed.

When dealing with critical patients, live monitoring of vital parameters can be of added value to the medical specialists involved. Currently, monitors can often only be read at either the patient's bedside or at the central monitoring unit in the nurses' station. This means that if a physician wishes to closely follow a patient's vital statistics, he will need to remain nearby and will often not be able to perform their other duties as they might wish to. MediText offers a means for them to monitor a patient's vitals on the go, see figure 5. If so desired, this can be combined with a notification system in case of critical instability. Should a patient's vitals then suddenly or abnormally change, the application immediately notifies the medical professional using either a ringtone or vibration – a concept similar to CPR team pagers, already in use in many hospitals - saving valuable time that might otherwise be spent trying to contact the physicians responsible for the patient in case of an emergency. The physician can enable or disable the notification system in the live monitoring screen.

Messaging functionality

The message and chat feature is intended for all healthcare specialists involved in the care for a patient, either as attending physician, consulting physician or, occasionally, other healthcare providers such as physical therapists, dieticians and social workers. Its purpose is to stimulate and facilitate communication and discussion between healthcare professionals. See figure 6. Both individual conversations and group conversations are possible and healthcare providers can be added to, or removed from, the list as necessary by the attending physician only. This is in line with regulations concerning attending and consulting physicians (Physicians practice, 2007) and prevents incorrect, unsupervised or overuse of the chat feature.

The **MediText** messaging system includes the possibility to upload patient data or results directly into a chat window. This enables an easy and quick way to monitor and check the patients' results.

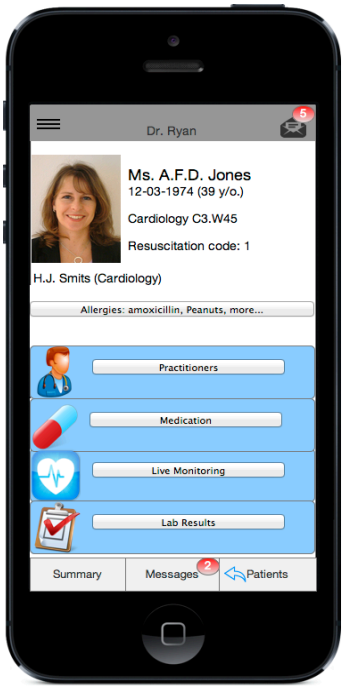


Figure 4. Patient summary.

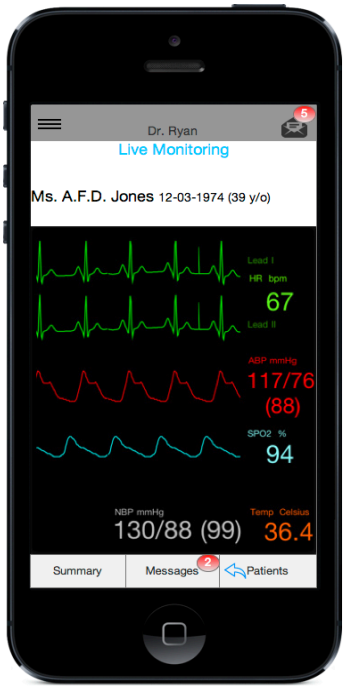


Figure 5. Live Monitoring.

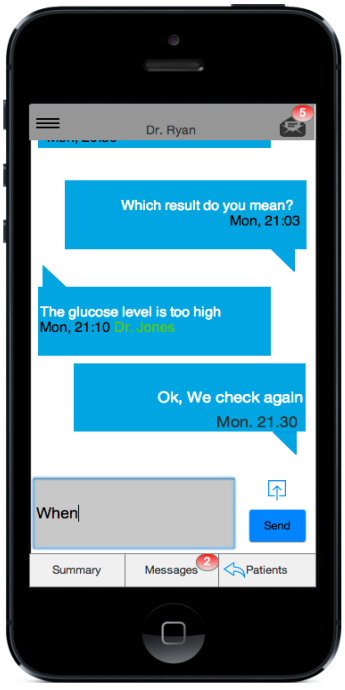


Figure 6. Live chat.

Contacts

The "*Contacts*" button directs to the user's list of contacts (all **MediText** users within the hospital, sorted by name). Here, medical staff can select a contact to start a private chat. These conversations will not be linked to a patient file.

Feedback

The "*Feedback*" button links to a feedback form which provides medical staff the option to share their opinion about the app. These forms are sent directly to our database and serve as a critical component of our research and development.

Settings

The "*Settings*" button gives medical staff the option to change certain user options like font and haptic feedback. We purposefully limit the amount of options in order to standardize and stabilize our application.

Log Out

The "Log Out" button completely returns you to the log in screen which will require you to re-enter username and password and, finally, your PIN code.

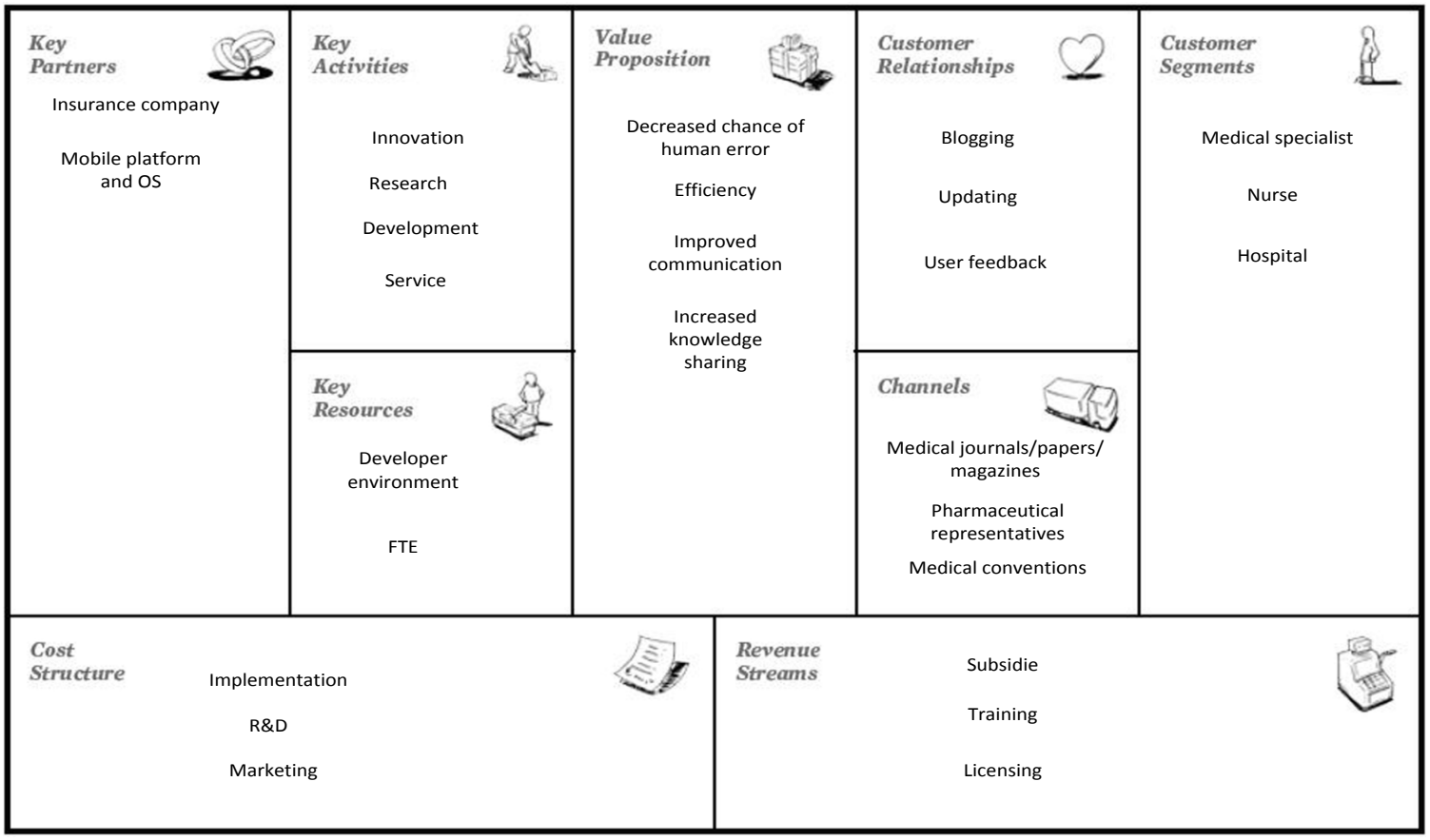
Additionally, at the bottom of each Patient subpage are three fixed buttons: "Summary", "Messages" and "Return". The "Summary" button returns the user to the summarized patient overview. Pressing "Return" simply returns the user to the previous page. "Messages" gives the user access to the instant messaging feature of MediText.

Data lifecycle

Our application accesses a lot of sensitive patient data. To protect patient privacy, this data must be small in size and easily transferable. We do not intend to have huge data chunks full of sensitive information largely stored on mobile phones. Ideally small pieces of information will be saved regularly at the hospitals' data centre and *not* on the mobile device itself. To achieve this, we will implement a feature that, when a medical specialist logs out, will transfer patient data to the hospital servers and remove it from the device's memory. This way we ensure all information is stored on a centralized location and thus more easily protected.

Business Proposal

There are several grounds for this application: the common preventable errors that occur because of miscommunication (Crane, 2006) and the enormous costs that are generated by these (Banning, 2005). We have elaborated a business model to support our venture in MediText.



We have come up with a concept that allows for improved internal communication between physicians, increases efficiency and significantly decreases the chances of human error. This concept is powered by a unique combination of features such as organized patient files, live monitoring and instant messaging, see figure 4, 5 and 6.

We will channel the product towards our desired target groups through medical-themed magazines, pharmaceutical representatives and medical conventions. We involve our customers in our business by writing and updating an online developer's blog, implementing a feedback feature and pushing regular software updates that are based off our research and development.

Our main goal as a company will be to maintain an innovative application that suits the needs of medical staff. We will achieve this by conducting research and development cycles with our users to analyze their wishes and implement these in our application. We will keep our product innovative by conducting market research and encouraging creativity in our Research & Development staff. Finally, we provide services for our clients that include, but are not limited to: helpdesk support, user courses and hands-on training.

In order to maintain this business model we need certain resources. These include our partners: insurance companies, hospitals and mobile platforms for development, but also our own FTEs and a development environment to support our revenue streams. These revenue streams include subsidies or other forms of governmental financial support, hourly fees for providing courses and hands-on training and, lastly, license costs for the use of our product.

This business model has its limitations. For instance, our FTEs ask a competitive salary. Secondly, our research and development cycles and projects need funding. Finally, all development related factors bring costs: implementing the software, developing new updates and managing our development environment.

MediText will be introduced into an existing market (medical apps), however, because it is quite innovative, MediText can be considered a new product in this existing market. According to the Ansoff matrix (see right) it is called 'product development'.



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Trends

Following the data-rich wearable devices, eco-systems and e-mobile trends our application will be ready for the future.

The University of California San Francisco (UCSF, 2013) as well the KBMGroup (KBM, 2013) every year publishes the top trends in health sciences. The number one trend for 2014 according to UCSG (2013): *"Creating a next generation of truly useful devices and sensors that can send data to care providers. The only way this technology is going to revolutionize health is if it actually tells doctors what they really need to know about their patients when they need to know it."* KBM identifies the same trend and call it mobile health. This aligns with broader IT trends identified by Gartner (2012) and Forrest (2014) who both state that sensors, devices and mobile applications will be drawn together into an eco-system to provide the right information at the right moment in time.

The purpose of the medical eco-system is to help patients (Bendix, 2013). To do so the right data at the right moment in time is important (Stimmel, 2009). Research from Penson et al. (2006) states that good communication can offer the most rewarding aspect of comprehensive medical treatment. However, fast paced, multispecialty approach of modern medicine all too often triggers a crisis in care, particularly for the critically ill and dying. Proactively coordinating, slicing information and support can be a challenge (The Oncologist, 2006). The results of miscommunication are irreversible and can sometimes be fatal. In the U.S. an estimated 7,000 deaths each year are contributed to errors in medical administration, costing $17 to $29 billion dollars (Banning, 2005; Stimmel, 2009). Crane states that medical errors are not only considered costly to the healthcare but are also widespread. With integrated real-time medical informatics and electronic medical records those solutions will reduce medical errors, and subsequently, costs (Crane, 2006).

Chat applications are nowadays for some people the preferred means of communication, because it is faster and easier to communicate (Faulkner, 2004). Therefore, hospitals are already conducting studies to assess the efficacy of smartphone chat applications. Results show that the majority of the users were satisfied with this mode of communication. However they missed an option to link the chat to a medical record (Wani, 2013).

That is why we created an application that shows physicians the information they need at the right moment. With an integrated chat feature: MediText.

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How social networks affect the process of hiring new employees

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Abstract

The dissertation project is focused on the important topic of social network influence on HR in organizations during the process of choosing new employees.

The thesis will be divided in two parts. The literature analysis and review will contain history of the social networks and explanation of related theories, description of labour market and analysis of job boards and social networks in relation to HR. Analysis will prove the importance and attractiveness for companies to be present on Facebook. Also the summary of the rules on Facebook, and how companies in the Czech Republic comply with them, will be presented. The applied part of the research will be focused on analysis of interviews, and associated data.

The main aim is to research whether the social networks could replace job boards such as jobs.cz, prace.cz etc. (job boards in the Czech Republic) Next aim of the thesis is to compare the form - how the companies offer new/vacant jobs on the Internet. Another focus is to discover how HR specialists evaluate the use of social networks to facilitate the recruitment of new employees and their experience with social network recruiting. The objective is to find out how the data presented publicly in the Facebook profile can influence the recruitment process and the decision about hiring new employees.

Keywords: social media, sharing information, job boards, human resources, recruitment on social networks

1 Definition of the subject area

The 21st century world is highly globalized, with the Internet playing an important role. Older methods of interpersonal communication in business are being replaced with modern trends. The importance of social networks is increased in particular.

The largest social network is Facebook with over a billion users, making it the world's largest database. In the Czech Republic there are more than 3 million users of Facebook, almost 61% of Internet users in the country (Vance, 2012).

Traditionally, a recruiter's options for seeking new candidates has been newspaper advertisements, purchasing databases from external sources, using on-line job boards, or asking hiring professionals to headhunt the appropriate candidates. Social media websites like Facebook and LinkedIn have come to the labor market, and are growing more and more in the area of recruitment. There are frequent situations, when the employer has to make a decision (Doucek, Maryska, Novotny, 2012). The employer could use social media to check the profiles of candidates. The recruiter can find out whether the candidates are responsible and loyal persons, whether the candidates provided the correct information during interviews, how other people react on candidates' comments or if they are friendly. There are many aspects that can be discovered in the recruiting process by using social media. If the user of social networks knows how to properly work with them, social networks could be very helpful when looking for a new job. On the other hand, social networks can be also very dangerous for their users (Sunshine, 2011). In the United States the selection of employees through the social networks is a common practice (O'Neill, 2012). In the Czech Republic it is a new challenge.

For employers, the hiring of excellent employees is becoming a great challenge. In this respect, there are two important factors - economic and innovative. Due to the economic savings, the global crisis and the pursuit of efficiency, companies are trying to find their employees by the most inexpensive method. An important alternative to traditional recruitment (as the job boards are – e.g. jobs.cz in the Czech Republic) is to find potential employees by using social networks. The important goal is to save money and time in the selection of employees, but on the other hand, the great interest is, that these savings should not affect the quality of potential employees.

Related to that, a cost-effectiveness analysis could be used by the companies to decide if the traditional way of recruitment is still the most efficient, or if there is space for new approaches.

In my study, the concrete subject area will be social networks and job boards in the Czech Republic, their evolution, relationships, efficiency and future. I will also research what public information people publish about themselves in Facebook (for other Facebook users - not friends of friends). I will determine how HR can use this information in the process of recruiting. The paper will sum up the rules on Facebook and how companies in the Czech Republic comply with them.

2 Problem definition

Nowadays there are many discussions on the topic of the use of social networks for purposes other than the original they were made for. Typically, this topic is analyzed in relation to the networks Facebook and Twitter. Qualman (2011) argues that: "Social media platforms like Facebook, YouTube and Twitter are fundamentally changing the way businesses and consumers behave, connecting hundreds of millions of people to each other via instant communication". It is a comprehensive resource for bringing together such disparate areas as IT, customer service, sales, communications and more, to meet social media goals.

The effort of using social networks in recruitment process is increasing. In 2009, 45% of employers reported in the survey of CareerBuilder[1] that they use social networking sites to screen potential employees, in comparison to 2008, when there were only 22% of employers participating. (Haefner, 2009).Facebook users carelessly publish a lot of personal information. More than 60% show their photos and around 50% of them have their wall open for all Facebook users. A similar percentage of users show the list of their friends publicly.[2] (Bohmova, Malinova, 2013)

Even the number of business profiles on social networks is growing significantly. A lot of companies whose business has nothing to do with technologies are reaching the Social networks nowadays. They do not know how to work with the network and are trying to get the maximum profit. This situation causes the inappropriate use of Facebook, for example, by violating the rules, bending them, and so on. The possible penalty is the elimination of the profile.

People and companies need to be more educated how behave on social media and also how to take care about their footprint on the Internet.

In my PhD thesis, I will try to prove that social networks could be useful tools for HR in every view, eventually even replacing job boards. The objective is to create directions how HR could use social networks in a cost-effective way, which will save money and time. Consecutively, HR will be able to select the best candidates in labor market. The research will focus only on the Czech Republic.

3 Methodology

The PhD thesis will have two parts. The literature analysis and review will contain history of the social networks and explanation of related theories, description of labor market and analysis of job boards and social networks in relation to HR. The analysis will contain three phases. The first phase will include qualitative and quantitative research. The qualitative research will be done through semi-structured interviews with personal managers from the Czech companies.
The quantitative research will be conducted through an online questionnaire. The survey participants will be only from the HR departments. The questionnaire will be launched online and distributed via emails.
The second phase will be the research about how the companies use social networks. It will be done though the application which will be programmed specially for that purpose. The third phase will be the creation of directions for HR departments about how they could use social networks in a cost-effective way.

This PhD research aims to determine the significance of using social networks during the hiring process.
The objectives are to prove the importance and attractiveness for companies to be present on Facebook. The summary of the rules of Facebook, and how do companies in the Czech Republic comply with them, will be presented.
Main question of the thesis will be: Are social networks capable of replacing job boards and become the main way to recruit employees?

[1]More than 2 600 hiring managers participated in the survey.
[2]More than 1 400 people participated in the survey.

Main hypotheses:
The importance of social networks, from the perspective of HR, will rise in the long term.
Hypotheses:
H1: More people will look for a job in social networks.
H2: More employers will actively use the channel of social networks to find employees.
H3: Job boards will partially move into the social networking environment.

Further preliminary sub-questions could be:
• How recruiters perceive the social networks today?
• What are the benefits of social networking for HR departments?

4 Conducted and planned research

Three research approaches will be described which were conducted during the last year. The first approach focuses on information that can be used during the recruitment process. The exploration finds the kind of data people present in their Facebook profiles as public information.

Second approach builds on the previous survey, and investigates the use of this public information by the recruiters. The objective is to find out how the data presented publicly in the Facebook profile can influence the recruitment process and the decision about hiring new employees.

The last analysis finds out why it is important and attractive for companies to be present on Facebook. The research contains the rules of Facebook related to the management of corporate websites and their use.

4.1 Facebook user's privacy in recruitment process

In the first phase of research I went through 1400 Facebook profiles of users from different Facebook groups. I was focused on information which is visible (public) for other Facebook users (not friends of friends). The data were collected by students of courses focused on New Media. More than 20 students were involved in the research. They collected the data based on the selected Facebook groups. The Facebook groups were chosen from different areas in order to keep variety in the dataset. The age of Facebook users in the research was between 18 and 36 (from users who have made information about the age visible). The research was focused on the users from the Czech Republic. During the research, the students used a structured Excel file to fill in the publicly visible Facebook information. The term "publicly visible" implies the information that is available to all Facebook users. I was interested in the responses on questions, which are shown in the table below.

1. Can you see more photos not only profile picture?	
2. Is the user profile open to the public (= if you don´t have him/her in Friends)	
3. Can you see posts on the Wall?	
4. Can you see how many friends he/she has?	
5. How many friends does the person have? (number)	
6. Can you see the page that user likes and liked in the past?	
7. If it is available list first three (no duplicates) favorite activities of user in area:	a. Music
	b. Books
	c. Films
	d. Television
	e. Games
	f. Sportsmen
	g. Sport
	h. Activities
	i. Interests
8. If it is available fill in:	a. Where does user live?
	b. Where is user from?
	c. Nationality
	d. When was user born?
	e. Is user in relationship?
	f. Education
	g. Work
	h. Relatives (who)

Table 1: Structure of the questionnaire (Bohmova, Malinova, 2013)

In Table 2, the correlations for statistical sample on Spearman's correlation coefficient are presented. We focused on public photos, wall information, likes, relationship status, education and work.

As shown in the table below, there are no significant correlations between these parameters. From results we can say that there is a weak direct dependence between photos and wall visibility. The second and third weak direct dependence is between Relationship status and Education and Work visibility. The last weak direct dependence is between Education and Work visibility.

	Photo	**Wall**	Likes	Relationship	**Education**	**Work**
Photo	1	0,365	0,066	0,11	0,12	0,083
Wall	0,365	1	0,127	0,158	0,101	0,105
Likes	0,066	0,127	1	0,117	0,089	0,045
Relationship	0,11	0,158	0,117	1	0,242	0,274
Education	0,12	0,101	0,089	**0,242**	1	0,325
Work	0,083	0,105	0,045	**0,274**	**0,325**	1

Table 2: Correlations of users' publicly visible information (Bohmova, Malinova, 2013)

In the terms of our research, we conclude that from 1400 respondents 62,1% have their profile open for public. These 62% share mostly information about their education, photos and pages that they like. Hardly ever they share their relationship status. For the HR specialists, primarily the photos and the groups that people like are interesting. That

information is sufficient and very useful for the process of recruitment. It can help to decide whether to invite the candidate for personal interview or not.

The content observed	Yes
Visibility of education	91,5 %
Visibility of user's photos	62,5 %
Visibility of Liked pages	61,3 %
Visibility of employer	56,9 %
Visibility of list of friends	51,2 %
Visibility of relationship status	29,1 %

Table 3: Questionnaire results (Bohmova, Malinova, 2013)

705 users have published the number of their Facebook friends. We found out that our average user has an **average of 398,5** friends. There is a **standard deviation of 324,4** and **median of 327.**

In the dataset we have a normal distribution as can be seen in the histogram below. The peak of normal distribution lies in range of 200 and 400. (see Figure 1)

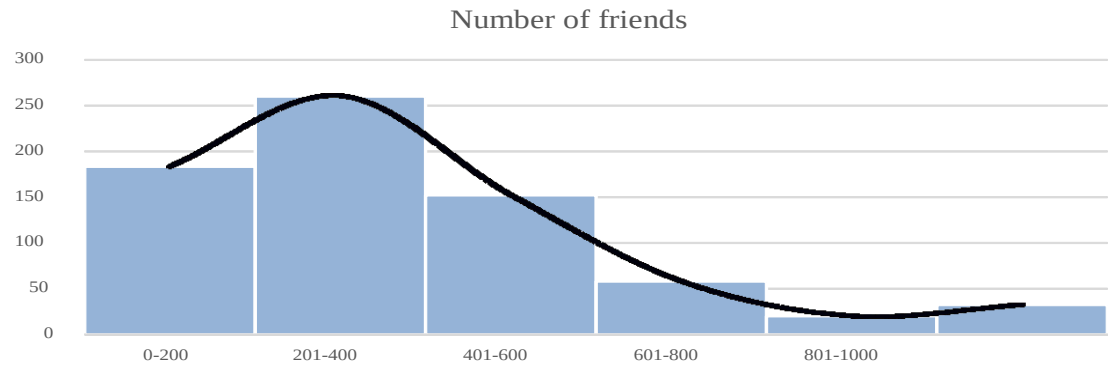


Figure 1: Histogram the Number of friends with normal distribution (Bohmova, Malinova, 2013)

Figure 1 shows that HR specialists see the social surroundings of approximately every second candidate. It is very probable in the number of "friends" that there will be someone from his current or previous job. HR specialist can use them as a reference about the candidate.

4.2 The HR point of view

The second phase of research was a block of expert structured interviews with top managers of recruitment companies, including the director of a leading personal agency in Czech Republic.

Recently we could observe the trend and the effort of HR to find new employees in social networks, mostly in Facebook. Recruiters are looking for information about the candidates, who sent their CV and applied for a job. The demand for some of the more interesting positions is enormous. It is impossible to personally interview each candidate. Regarding that fact, it is necessary to invite only the most suitable candidates for the interview. The choice is made based on numerous aspects: personal profile, data in the CV, application letter, recommendations from the previous job etc. Facebook

screen could be very useful to help the recruiter with the decision of hiring a new employee, especially when the difference between candidates is very narrow.
"HR specialists in Jobs21 are mainly interested in the photos that candidates present in Facebook. We check the candidate's public photos, and then we also screen the candidate's wall." (Hájek, 2013) If the comments are vulgar or critical to the previous employer, it definitely influences the outcome of the recruitment process. Finally, membership in Facebook groups could give the HR department information about the focus of the person. For example, if the recruiters look for the fashion shop sales manager, they could find out that fashion is more than only a job for the candidate (if in his free time the candidate talks about fashion in specialized groups for fashion fans and professionals). That is a fact that gives extra points to the candidate.

4.3 How Czech companies comply with Facebook's rules

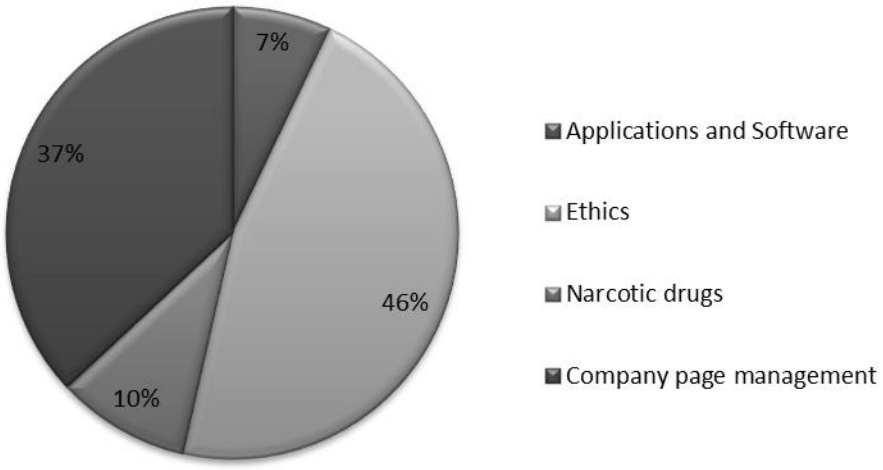
Each company from the research sample was investigated from the perspective of the violations made. The accumulation of the violations in each group wasn't counted. The companies that were found to be the violators of the Facebook rules, behaved incorrectly at least in one item of one group. The number of the companies that didn't break any rules set by Facebook is higher than 50% in all sizes of the companies. The largest companies behave more correctly than the other two groups of companies. Almost 70% do not violate the Facebook rules. More details can be found in table 4.

The size of the company due to a number of employees	Number of companies	Number of companies which do not break the rules of Facebook in %
Small company - less than 100	100	35%
Midsize company - 100 to 499	100	52%
Large company - more than 500	100	69%

Table 4: Number of companies which do not break the rules of Facebook in % (Author, 2013)

The explanation of that situation could be the following: Large, well-established companies do not act so aggressively, because Facebook is not only a place for promoting their products. They have a wide range of possibilities for offering their products, informing about new deals and staying in contact with the clients. They are able to finance large advertisements in newspapers, radio, TV and Internet. Their webpages are frequently visited and well known. In respect of all the possibilities that a large company has, it is not necessary for them to take a risk of behaving incorrectly in Facebook. Firstly, violation can cause blocking of their page or deleting the profile. Aggressive acting could attract some new clients, but the effects will not be nearly as positive as the negative effects of blocking the profile would be. Finally, many companies are proud of their image that could be negatively influenced if the company breaks the rules.
On the other hand, small and midsize companies are active in Facebook, sometimes crossing the border of the rules, because the balance of the risk and benefit for them is not so negative. Of course, depending on the company, but in general, Facebook is a cheap or even a free way for attracting new clients for smaller companies. Creating contests is one of the best ways of widening their clients' database and at the same time making their brand better known. The risk of being blocked is high, but it is not a big problem to create a similar profile and continue with the violating behavior. Many small companies are not as aggressive as described. From time to time they break the rules, but the reasons are usually the same.

The correlation of being small, midsize or large company is not significant, but it is evident. Focusing in more detailed way, the companies are most frequently violating the rules of organizing contests, using letters in profile photos or presenting offers of the third parties.
Here is the fact that direct correlation between the size of the company and errors does exist. The larger the company, the more it complies with rules.



Graph 1: Percentage of errors by category (Author, 2013)

Graph 1 shows the comparison of four analyzed groups regardless of the size of the companies. It is possible to observe that the ethics rules are most frequently violated. The second most problematic area is the Company page management. On the other hand, the areas that are not violated much are: Narcotic drugs, Applications and software. The reason why drugs are not less used is that this group includes alcohol and tobacco, which are sometimes promoted illegally especially by the smallest companies. Ethics is the most violated group because it includes the most attractive rules for the companies to be violated, such as promoting third parties or offering discount vouchers.

5 Preliminary/Expected results

During the master degree studies, I tried to gain practical experience in the field and I had a part-time job in the agency where I was in contact with the use of social networks and human resources in practice. This issue I reflected on later in my thesis and I would like to continue and deepen my research during doctoral studies and in my dissertation thesis.

In my opinion and my experience, social networking has its place in the field of HR and it is desirable to examine the development and their specific role in HR, as well as to compare the different uses of social networks in different parts of the world. United States and Europe have a different approach to the use of social networks in personnel management.
I also participated in numerous conferences and training sessions about human

resources and social networking. Among the important conferences, I could mention the Bled 2013 conference or regular LMC conferences.[3]

I also tutored training on these issues: How can social networks be beneficial and not time consumers; and how to be efficient in recruiting. Future research

Recently I finished testing a project that counts a frequency of using key words in social networking. My defined keywords are: job seeking, new job and others related to the job search and recruitment. The objective is to count how many times these words were mentioned in Facebook and Twitter.

Another project is the cooperation with the job boards. The objective is to announce the same vacant positions (that are offered in the web page of job board) in the social networks. Concretely; job board will offer a vacant position of an IT engineer. We announce the same job in the LinkedIn and Facebook (in the appropriate web pages where these people are present) and we evaluate the reaction in social networks and job boards. This research is currently ongoing.

In the future I will focus on the companies' ability of orientation in the social networks: keeping the rules of that space; means of looking for new employees; and the presentation of vacant positions.

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[3] LMC is the biggest and the most powerful job board in the Czech republic, that holds more than 90% of labour market in job boards area.

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Reducing sales forecast error by leveraging machine learning techniques for B2B opportunity-based forecasting

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Abstract

Companies are under constant pressure to deliver on planned results. To gain insights into risks, top management is turning to commercial divisions for information about marketplace and especially outlooks for the future. In sales segments outlooks are presented in a form of sales forecast for a few months ahead. Companies collect data about markets and sales opportunities in their internal CRM systems, which create an opportunity for them to learn from the past to better predict the future. Current practices, based mainly on statistical models relying on the historical data, experiences, and intuition prove to be inadequate in opportunity-based forecasting. Problem of statistical forecasting is in their need for a complete data and reasoning. To address this problem we propose to use machine learning to develop a predictive model for B2B sales forecasting. Such models provide transparent reasoning that can efficiently support experts in creative problem solving. For this purpose we will conduct an active research in the selected companies, where the developed models will be tested. Furthermore, the model of organizational learning, built on high quality sales tracking data, predictive model and experts' knowledge will be developed.

Keywords: *opportunity-based forecasting, sales modeling, machine learning, organizational learning, forecasting error reduction.*

1 Problem Identification

In this research we focus on sales activities executed by companies selling to other companies, also called Business-to-Business sales (further referred to as B2B). Such sales differs from sales to consumers; in B2B sales process involves many people on both sides which follow selling and buying processes in their respective organizations. The object of sales process can be goods and/or services, or solutions as combination of both. It is often the case that companies in the beginning of their existence do not have formalized process of selling as demand is propelling their growth. However, as reaction to increased sales complexity, number of clients, needs to adapt to client's expectations and extensive collaboration required, they recognize sooner or later need for a structured approach. CRM is often introduced to a company with some basic model to track the progress of opportunities.

As described in Bohanec (2014), in B2B sales representatives usually follow steps from originating an opportunity toward signing a contract and solution implementation. A complete sales process can be divided into sales stages, describing development of an opportunity. Every stage represents a milestone. Opportunity maturation requires completion of specific activities and fulfillment of certain criteria and prerequisites to move opportunity to the next stage, ultimately signing the contract being the most important milestone. To move opportunities between sales stages, sales representative needs to demonstrate sales-related skills, degree of adaptiveness and other drivers related to sales success, as researched by Verbeke et al. (2011). Those drivers can be exhibited during execution of sales process by the dynamic of the movement between sales stages.

Due to the fact that every B2B sales organization carries some specifics, this is much simplified description of sales process.

1.1 Example of B2B sales opportunities-based forecasting process

The purpose of this example is to illustrate the forecasting process, as it is often executed in the practice. In order to improve forecasting outcomes, we focus our research to this process to gain important insights about the opportunity maturation. This example is a shorter version of the case described in Bohanec (2014).

Sales opportunity described as text

John is working on an opportunity to introduce AI solution for forecasting with ABC Global Bank. He has completed small pilot and is currently reviewing outcomes and gathering feedback. Business users are excited; however, technical staff has some concerns due to "non-standard" platform. He is working with his technical team to sort out a proposal, which would satisfy client's internal technical policies. Deal size is apx. 100k€ and John expects to have deal signed in March.

For verbal analysis it is rather straightforward from the description of an opportunity, what is the situation; however text is not suitable form for having an analytical view on it. Table 1 represents more structured view of the same text.

Acc. Mgr	Client Name	Oppt. name	Oppt. stage	Deal size	Due month
John	ABC Global Bank	AI Fcst solution	2 – Opportunity definition	100.000€	March

Table 1: Structured description of an B2B sales opportunity

Typically we have more than one sales professional, in this example table 2 showcases the list of all their opportunities.

As the beginning of a month is approaching, sales managers are obliged to make forecast which deal is going to happen in the next month. Sales managers are under pressure to deliver good numbers, meaning that forecast should be at least equal to budgeted (or targeted) result for a particular month, or higher. Lower forecast often starts additional discussions about background information related to core reasons behind lower than expected forecast. With added column *Forecast*, table 2 represents submitted forecast to the company management.

Acc. Mgr	Client Name	Oppt. name	Oppt. stage	Deal size	Due month	**Forecast**
John	ABC Global Bank	AI Fcst solution	2– Opportunity definition	100.000€	March	Yes
Mark	NordSpace	BI solution	1 - Prospect	50.000€	March	No
Gwyneth	HealthSea	Segmentation	3 - Negotiation	40.000€	March	Yes
Steve	CloudMove	Data Center	2– Opportunity definition	70.000€	March	No
Bill	BMF Global	Mobile App	3 - Negotiation	130.000€	March	Yes
Paola	SempRack	BI solution	2– Opportunity definition	100.000€	March	Yes

Table 2: Submitted forecast

After March (in our example month of observation) is over, table 3 represents what in reality happened. Success or failure of the deal closing is represented by column *Reality*.

Acc. Mgr	Client Name	Oppt. name	Oppt. stage	Deal size	Due month	**Sales Forecast**	**Reality**
John	ABC Global Bank	AI Fcst solution	2– Opportunity definition	100.000€	March	Yes	No
Mark	NordSpace	BI solution	1 - Prospect	50.000€	March	No	No
Gwyneth	HealthSea	Segmentation	3 - Negotiation	40.000€	March	Yes	Yes
Steve	CloudMove	Data Center	2 – Opportunity definition	70.000€	March	No	Yes
Bill	BMF Global	Mobile App	3 - Negotiation	130.000€	March	Yes	No
Paola	SempRack	BI solution	2 – Opportunity definition	100.000€	March	Yes	Yes

Table 3: Deals closed after month is over

Column *Reality* in table 3 represents the basis for future analysis, therefore is marked green. We see that 3 opportunities behaved differently in real life compared to what was forecasted in table 2 (exposed in red in table 3). There are two slips in forecasted deals (John, Bill) and one positive surprise from Steve. Forecasted revenue was 370.000€, while delivered was 210.000€, which is quite a miss from the finance point of view. Company management needs to react immediately to control expenditure, several measurements are considered to minimize impact of 43% miss of the forecast. Reduction in the forecasting error seems to be important improvement in order to prevent such emergencies. Unfortunately forecast slips are happening all the time, so it looks like sales professionals are not skilled or knowledgeable enough to consistently improve their forecast. Despite a lot of information and data about opportunities are available in company's CRM, forecasting performance varies from month to month.

1.2 Simplified opportunity development Stages Framework

As further defined in Bohanec (2014), in our simplified view of the B2B sales management, we are introducing 4 stages which are describing opportunity from its inception to an implementation, as it is presented in figure 1.

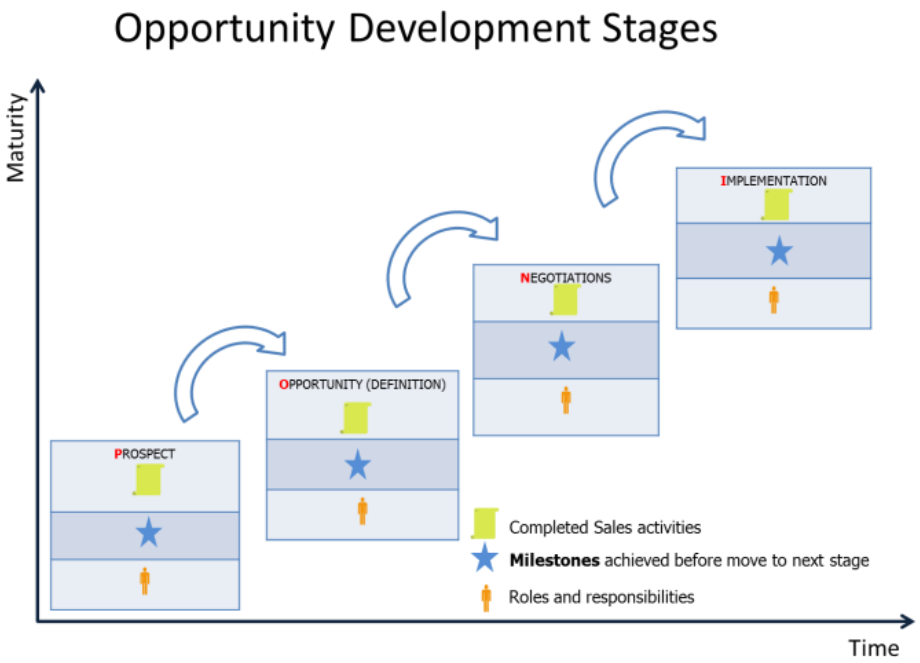


Figure 1: Simple Opportunity Development Stages Framework - PONI, as defined by Bohanec (2014).

Description of meaning of each stage is presented in table 4.

Stage	**1**	**2**	**3**	**4**
Stage name	**Prospect**	**Opportunity**	**Negotiations**	**Implementation**
Description	Potential prospect was identified through different channels.	Buyer and seller are sharing information and expectations to define key components of the opportunity; what exactly is expected from parties involved, what is timeframe and which resources are needed to proceed to next stage.	Buyer and seller execute series of meetings with a goal to narrow down the differences in specific areas of a deal and shorten the list of remaining open items before signature.	Implementation (or delivery of a good or services) follows after signature. It is essential that both parties have good collaboration to ensure no surprises happen and all unforeseeable events can be handled properly.
Primary goal	To understand basic needs of a buyer.	To obtain necessary information ensuring solid understanding of expectations on both sides.	To sign the contract.	To deliver on promises and create pleased client, which will want to cooperate with the seller in the future.

Table 4: Description of PONI Framework Sales Stages

In addition, each sales stage is contains:

- Activities, which are typically executed in a particular sales stage (for example – technical presentation delivered)

- Milestones, which need to be achieved before move to the next stage (for example – an offer submitted)
- Roles and responsibilities are bringing clarity to who does what when, so we can ensure proper engagement (for example – negotiations are done by Key Account Manager)

With the definition of the basic opportunity lifecycle, we are enabled to have more analytical approach toward understanding of development of an opportunity. It will be leveraged extensively during the research.

2 Research Goal

In this paper we would like introduce a concept for modeling opportunity-based sales forecasting with application of machine learning techniques. The research goal is to develop an organizational learning model, which will enable B2B selling organizations to consistently reduce their forecasting error.

To achieve this goal, the model needs to enable an organization to achieve two sub-goals:

a) Error reduction when classifying new and previously unseen sales opportunities, by leveraging machine learning techniques.
b) An improvement in organizational understanding of most important drivers (opportunity attributes, features), related to quality of opportunity-based sales forecasting.

In addition, a model that is easy to understand in daily work is preferred.

2.1 Motivation for a machine learning techniques approach

Forecasting, as an economic discipline of revenue management, has been well researched for many decades (Ingram et al., 2009; Talluri et al., 2004). Most forecasting techniques are based on time series data with an application of different statistical algorithms. A thorough overview of the most-used approaches was completed by Ingram (2009), pp.115-127. Most of them are focused on proposing expected averages or estimated percentage of growth in the market. This is useful for forecasters when they have a lot of opportunities to work with, and the outcome is one number: probability of a closure of a total value of pipeline of matured opportunities (Lodato, 2006, pp. 239-251). For small and medium enterprises (SMEs) with fewer opportunities this approach has limited value. The nature of an opportunity maturing to closure is binary; either it is "signed" or it is "failed". Smaller is the SME, the bigger impact such an outcome has (Duran, 2008). We would therefore need an approach, which would classify opportunity in only two classes.

An important element of the statistical approach is quality of the data, which turns out to be a real challenge to fulfil. For sales representative's data collection and data maintenance is generally perceived as a burden, so it requires an extra effort to reach an acceptable level. Sometimes data are not available or not easy to acquire (for example – how many competitors?), so we can't blame sales force for it. However, we still want to have some tools at hand to make forecasts based on known facts. Our approach would therefore need to be capable to handle missing data appropriately.

Practice confirms that most of the B2B sales forecasting done today is based on mental models of forecasters (Duran, 2008), which is hard to capture in a solution. Expert systems have accomplished important advances in this area; however they are still a reflection of expert knowledge and an ability to reflect the knowledge in the expert system, not benefiting from the hidden information in the data. Despite absence of mathematical forecasting formulation capable to be generally applied, we can sense that there is a pattern in the data. However, it is not trivial to extract it. A general approximation of that pattern, which would be learned from existing data, is what we look for.

3 Literature Review

A handful of articles and book chapters were identified when browsing through electronic research libraries. The majority of articles were related to forecasting, based on statistics, which have limited value for our research. In general they are acknowledging that topic is highly related to human judgment and influenced by many different drivers and factors. Here follows summary of key findings.

Fundamental research in the area of drivers of sales performance was done by Churchill et al. in 1985. Recent study done by Verbeke et al. (2011) synthetized the empirical evidence from 1982-2008. They built upon work of Churchill et al. (1985) and classification scheme for sales determinants devised by Walker et al. (1977). According to their research the following drivers demonstrate significant relationships with sales performance: selling related knowledge (ß=0.28), degree of adaptiveness (ß = 0.27), role ambiguity (ß = -0.25), cognitive aptitude (ß=0.23) and work engagement (ß =0.23). While this study has outlined significant relationships with sales performance, individual drivers require further break-down to attributes, which are practical for regular use (for example *cognitive aptitude*).

Duran (2008) has outlined an approach for developing sales forecast based on estimated probability distributions of sales closures. He incorporated inexact and approximated information into a model, especially quantifying the uncertainty of the inputs as an area to improve forecasts, which is useful information to leverage when building model for application of machine learning techniques.

After reviewing literature on customer buying behavior, Monat (2011) concluded that there are few articles regarding the characterization or quantitative qualification of sales leads. When some kind of model was developed, no quantitative means is provided for translating the results using a model and classification to specific opportunity ranking; this is left to the judgment of the sales manager.

Another study done by Rieg (2010) identified that environmental uncertainty is a significant reason why there is no evidence on increased forecasting accuracy despite improved statistical methods and organizational learning capabilities.

Machine learning, part of artificial intelligence field, is well researched subject. Book »Data mining – Practical Machine Learning Tools and Techniques, 3rd edition« written by Witten et al. (2011) provides strong foundation for comprehensive end-to-end application of machine learning concepts into practice. Extensive research about applications leveraging ML techniques was done by Bose and Mahapatra (2001), ranging from finance and marketing to Web analysis.

Explanation of ML prediction is very important to our research. Review of different machine learning techniques done by Robnik-Šikonja and Kononenko (2008) has unveil that symbolic models such as decision trees, decision rules and inductive logic programming are positioned well to fulfill this objective.

3.1 Example of some of attributes, describing sales opportunity

Foundation for machine learning techniques is data (dataset), described by the sales opportunity attributes. These attributes need to be simple to understand and capture in supporting tools. Based on literature review and author's expertize, table 5 demonstrates the core structure of the model (few attributes only).

Oppt Attribute	Type	Values	Description	Source
ID_Opportunity	Identifier	Integer	This unique identifier connects anonymized opportunity with ML solution	MarkoBo
Source	Nominal	referral; event; joint_past; online_form; direct_mail (we initiated contact)	How opportunity was originated, source of opportunity? Referral – someone opened the door; Event – initiated at an event; Joint_past – initiated by known person; Online_form –originated from web Direct_mail –response to direct mail	JPMonat
Existing_client	Nominal	Yes; No	Is this opportunity for existing client?	JPMonat
Client_growth	Ordinal	Shrinking; Slow_down; Stable; Growth; Fast_Growth	What is position of a client from a growth perspective?	MarkoBo
Need_defined	Nominal	Poor; No; Info_gather; Yes	Do we understand client's need behind their interest?	JPMonat
Providing_Info	Ordinal	No; Partial; Full	Is client providing requested information to prepare an offer, pilot, proposal…	JPMonat
Competitors	Nominal	NA; No; Yes	Do we have to compete with other external vendors to get the deal?	JPMonat
Prospect_authority	Ordinal	Low; Mid; High	Does contact person has authority to accept (not sign) final proposal?	JPMonat
Current_stage	Ordinal	1 – Prospect; 2 – Opportunity; 3 – Negotiation; 4 – Implement.	Where in the Opportunity Lifecycle is particular opportunity?	MarkoBo
Current_stage_days	Interval	# days in curr. stage	Number of days in current sale stage	MarkoBo
Product/Service	Nominal	Industry specific product	The purpose of this attribute is to reveal relationships between product/service and impact to a sale.	MarkoBo
Deal_size	Interval	Integer	Opportunity size	MarkoBo

Table 5: Sub-selection of attributes describing sales opportunity

3.2 Data Mining standards

Given described complexity related to the dealing with dataset, defined process is required. Standardized CRISP-DM (Cross Industry Standard Process for Data Mining, www.crisp-dm.eu) process will be leveraged, to address this objective.

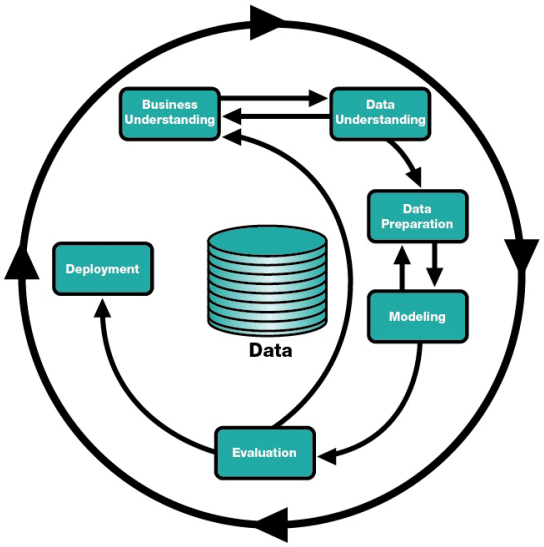


Figure 2: Phases of CRISP-DM Process Model for Data Mining (www.crisp-dm.eu)

Cornerstones of this process are data quality and permanent feedback to organization to improve their business understanding – both are closely related to our research objectives. CRISP-DM process is further outlined in steps representing specific actions and outcomes of actions, presented in Wirth and Hipp (2000).

4 Research Objectives

In our quest to develop the concept for modeling B2B opportunity-based sales forecasting with application of machine learning techniques, we will need to break it down into several research objectives. This will enable us to evaluate progress toward research sub-goals:

a) Error reduction when classifying new and previously unseen sales opportunities, by leveraging machine learning techniques.
   i. Development of holistic sales opportunity model, with aim to provide end-to-end view about critical factors (attributes, features) of success. Research attention should be devoted to following categories of attributes: a) external, b) organizational, c) individual and d) general opportunity descriptors.
   ii. Assessment of data quality, costs of misclassification and optimal number of learning cases per participating organization.
   iii. Analysis of machine learning techniques capable of providing explanations of classification. In particular following three categories appears attractive: a) Classification trees b) Classification rules and c) Association rules.

b) An improvement in organizational understanding of most important drivers (opportunity attributes, features), related to quality of opportunity-based sales forecasting.
   i. Development of easy-to-interpret data visualization to focus research into new areas (attributes) expected to improve classification performance.
   ii. Analysis of techniques for evaluation of an attribute's contribution to the classification. Analysis outcome serves as basis for feeding back to organization, where to focus seller's execution and sales manager's attention.

5 Research Methodology – action research

We plan to invite selected companies to participate in the research and measure advancement in their forecasting accuracy. We will focus on improvement of organizational ability to reduce the error in forecasting through our problem-solving improvement approach. By doing so, we will have an impact on success in their business. Bridging the gap between academic and business world is underlying motivation in this research. Action research as research methodology is fulfilling our aspirations, so it has potential to be our methodology of choice.

Our goal is to develop "easy-to-join" research protocol to research process, which will require few interactions per month only. Engagement will be executed for few consecutive months, where we will measure progress in reducing forecasting error. Comparison of ML forecast with Account managers and Sales Managers forecast is one of key metrics of progress.

By combining well researched areas of machine learning and organizational development with insights from existing sales data, we expect that new quality related to decrease of forecasting error will be developed. Insights about learning organization are well presented in Kljajić Borštnar et al. (2011) and will be leveraged during action research. High level overview of the approach is outlined in Figure 3, which can be also seen as an adaptation of CRISP-DM process.

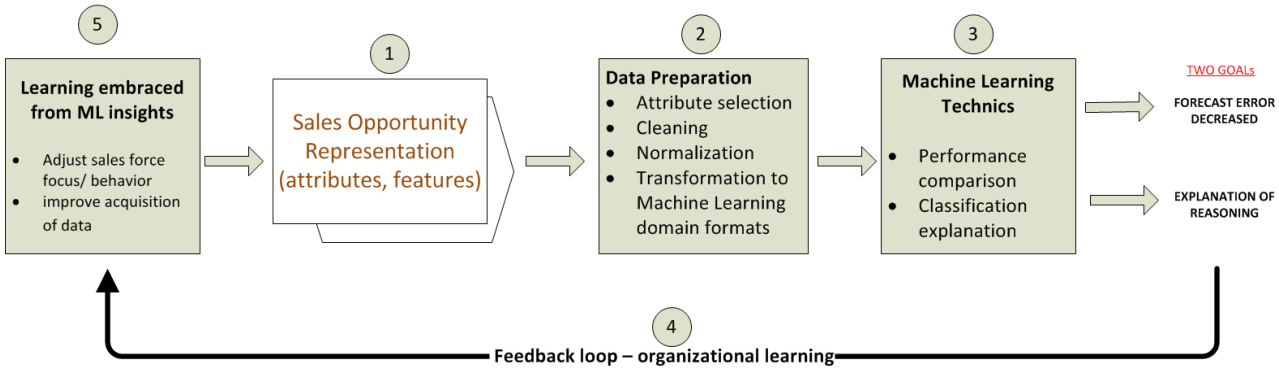


Figure 3: High level overview of learning feedback loop based on machine learning techniques

5.1. Illustration with an example

In this example (Bohanec (2014)) we have leveraged data from a company's CRM to support machine learning. CRISP-DM process was followed and machine learning techniques selected to develop the

classification model based on 200 known demo sales opportunities from the past. Table 6 shows (only a portion) dataset, which was used to develop machine learning classification.

	Source	Client_growth	Need_defined	Competitors	Prospect_authority	Product	Negotiations	Existing_client	External_svcs	'amiliary_wVendo	Signed
1	Event	Fast_Growth	Info_Gathering	Yes	High	B	Easy	No	Yes	No	NO
2	Referal	Stable	Yes	No	High	A	Easy	Yes	Yes	No	YES
3	Referal	Fast_Growth	Yes	No	High	A	Easy	No	Yes	No	YES
4	Event	Fast_Growth	Yes	Yes	High	A	Tough	No	No	No	NO
5	Event	Fast_Growth	Info_Gathering	Yes	High	B	Easy	No	Yes	No	NO
6	Event	Fast_Growth	Yes	Yes	High	A	Tough	No	Yes	No	YES
7	Event	Fast_Growth	Info_Gathering	Yes	High	B	Easy	No	Yes	No	NO
8	Event	Stable	Info_Gathering	No	High	A	Tough	No	Yes	No	NO
9	Event	Fast_Growth	Info_Gathering	Yes	High	B	Easy	No	Yes	No	NO
10	Referal	Fast_Growth	Info_Gathering	No	High	A	Tough	No	Yes	No	NO
11	Referal	Fast_Growth	Info_Gathering	No	High	A	Tough	No	Yes	No	NO
12	Referal	Fast_Growth	Yes	No	High	B	Easy	No	Yes	No	YES
13	Event	Stable	Yes	No	High	A	Easy	Yes	Yes	No	YES
14	Referal	Fast_Growth	Yes	Yes	High	A	Tough	No	Yes	No	YES
15	Referal	Fast_Growth	Yes	Yes	High	B	Tough	No	Yes	No	YES

Table 6: Demo dataset as presented in Orange (www.biolab.si)

In figure 4 results for techniques called *RandomForest* is presented. Reading the important factors describing quality of the classification reveals that it seems to be highly efficient. We can observe that only one existing case got misclassified (see Confusion Matrix).

```
Correctly Classified Instances         199               99.5    %
Incorrectly Classified Instances         1                0.5    %
Kappa statistic                          0.9872
Mean absolute error                      0.009
Root mean squared error                  0.0469
Relative absolute error                  2.2756 %
Root relative squared error             10.5611 %
Total Number of Instances              200

=== Detailed Accuracy By Class ===

               TP Rate   FP Rate   Precision   Recall  F-Measure   ROC Area  Class
                 1         0.019      0.993     1         0.997      1        NO
                 0.981     0          1         0.981     0.991      1        YES
Weighted Avg.    0.995     0.014      0.995     0.995     0.995      1

=== Confusion Matrix ===

   a   b   <-- classified as
 146   0 |   a = NO
   1  53 |   b = YES
```

Figure 4: RandomForest classification report form WEKA (http://www.cs.waikato.ac.nz/ml/weka)

Now we can continue with our example from section 1.1. We can apply learned knowledge to new, previously unseen, sales opportunities from table 3. New column *ML classification* is added.

Acc. Mgr	Oppt. name	Oppt Stage	Deal size	Due month	Sales Manager Forecast	**ML Classification**	Reality
John	AI Fcst solution	2	100.000€	March	Yes	No	No
Mark	BI solution	1	50.000€	March	No	No	No
Gwyneth	Segmentation	3	40.000€	March	Yes	Yes	Yes
Steve	Data Center	2	70.000€	March	No	No	Yes
Bill	Mobile App	3	130.000€	March	Yes	No	No
Paola	BI solution	2	100.000€	March	Yes	Yes	Yes

Table 7: List of opportunities combined with forecast, ML classification and real outcome

We can observe, that the ML classification represented within *ML Classification* column made only one wrong prediction, therefore two misses less than sales team forecast (based on experts' judgment) and hence improved forecasting accuracy. It is important to note that this is not solving problem for a company (total revenue in this case is even lower), however creates urgency earlier and gives management an opportunity to consider more options how to deal with the situation. By analyzing machine learning knowledge representation, in particular why an opportunity was ranked as it was, sales team can gather deeper understanding, which factors are important for a successful completion of a sale and focus on it in their daily work.

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