

Interviewer: Predrag Novaković

From Dalmatia to the North Sea, and from Stonehenge to Artificial Intelligence: Interview with Vincent Gaffney

Introduction

Vincent Gaffney (born in 1958) is a British archaeologist. In his 40-year career he has worked as a contract field archaeologist, museum curator, researcher and university professor at both Birmingham and Bradford. His expertise includes landscape archaeology, marine landscapes, remote sensing, GIS, computer visualization and communication. He has been awarded several prizes for his outstanding research achievements, among them the British Archaeological Award for the Best Book (2010) and European Archaeological Heritage Prize of the European Association of Archaeologists (2013), as well as an MBE in 2018, making him a Member of the Most Excellent Order of the British Empire. His close collaboration with Slovene and Croatian archaeology dates from the mid-1980s and is still continuing.

I know very few people who at the age of 18 had already firmly decided to study archaeology and pursue archaeological careers. For most, including me, we did not have a good idea what archaeology was, or what archaeologists actually do in practice, and there were many other details or minor things or even unexpected turns of events that ultimately cemented our careers in this discipline. Is this also your personal experience?

I was born in Newcastle upon Tyne, a big industrial city, in a very working class family. The only real options were the army, go down the mines or get a job in a factory. That was what we were educated to do. And you know, it's ironic that most of these industries have disappeared and I'm in archaeology. However, I did live on a street at the head of which was the route of Hadrian's Wall. I also had a grandfather who was a metalwork teacher, but with a passion for history, and he introduced me to archaeology. He took me out to see archaeological sites, and we didn't have to go very far.

I didn't really know much about any archaeology in Britain. The truth is I didn't even send in the form where I made my final choice of what to study. The government organization managing applications made the decision for me, which gives you an idea of just how good a student I was! And so I turned up at Reading. I found myself



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in a department which was very young, and people there were very good. I'm thinking especially of Richard Bradley, Michael Fulford and Bob Chapman, who are today leaders in the world of archaeology and established, grand old men. But back then, we were pretty much the same age, and we used to meet every tea break and go and drink together. When I did my undergraduate degree in archaeology I came out with an excellent understanding of British archaeology as it was at the time. But that was only pottery, and not much else. My first job was with the Wessex Archaeological Trust, and I was one of first people to be employed there. I worked on the Stonehenge Landscapes Project with Julian Richards for a year and then, in 1981, got chance to actually lead a project of my own, studying the Roman villas on the Berkshire Downs with Martin Tingle. It was wonderful, as we could pretty much do whatever we wanted. We undertook what was then one of the first detailed landscape studies of a Roman villa estate. This was a remarkable opportunity which gave me a chance to write and develop ideas.

At about this time, Margaret Thatcher had come to power and things were not looking good for archaeology. We were about to go through a cataclysmic change as we moved from local government funding to trust based and then contract archaeology. I looked at this emerging future, and I wasn't sure if it was for me. But I was lucky – again – and I got a job at Bordesley Abbey, where the gatehouse chapel of a Cistercian Abbey was excavated. There was also a museum next to it, at Redditch, the Forge Mill Needle Museum, no less. I hear the sound of millions of people laughing at this point! The museum was in an early modern water mill used to polish needles. They needed a curator and I applied, and somehow I got the job. The mill was part of a major world industry back in the 19th century. Some 90% of the world's needles came from this small town in Worcestershire. People were emigrating from America to work there.

But after some time you 'migrated' from Redditch to Yugoslavia?

Yes, after a while I realized that all I was doing was raising money, and I was missing the research and fieldwork. I decided that I had to do something else. I talked with people I knew, particularly with John Bintliff from Bradford University, who introduced me to Božidar Slapšak, a professor of Roman archaeology in Ljubljana. They suggested, on the basis of my work in the Maddie Farm Project in Berkshire, that I do something similar in Slovenia for my PhD. I left my job, got four years of funding from the British Council and British Academy, and came to work in Ljubljana, where I spent, on and off, several months between 1985 and 1990. I initially came to Slovenia to work in Istria and at the Rodik site in the Slovene Karst, but for various reasons it turned out that it was not possible. After a year, in which I think I taught quite a bit in Ljubljana, Božidar Slapšak offered me the chance to go and work on his project on the island of Hvar. After a couple of field seasons in Hvar – we'll talk about this fascinating island and its archaeology later – I went back to Britain to finish my PhD at Reading,

which was already delayed because of the dissolution of Yugoslavia. Mike Fulford took me as a postgrad and I submitted my final PhD in 1992. Obviously, I couldn't have done the original work without Božidar Slapšak and John Bitliff.

While I was writing up the PhD I wanted to change the routine again. So I started digging part time for the Birmingham University Field Archaeology Unit (BUFAU) on a Roman settlement at Shepton Mallet. When I was there I met the director of the unit, Simon Buteux, who now works in Historic England. He realized that I'd been working with something called geographical information systems (GIS). He said to me later he didn't know what it was, but someone said that he needed it, whatever it was. So he invited me to his unit, and over the next ten years I rose from a field digger to the head of the archaeology department at the university.

Your experience with GIS must have been crucial not only for getting job at the Birmingham University Field Archaeology Unit, but for your further career?

At that time GIS was only just emerging as a technology. Very few people had real experience of it. In fact, when I turned up at the university, I went to speak to the geography department, presuming that they would be able to help in establishing GIS use. They realized I had some GIS software, and asked me whether they I would give them a copy! This really was right the beginning of GIS applications in Birmingham. At BUFAU I started to run the computing side of archaeological services and teaching GIS on postgraduate courses. GIS was not an independent technology. It was merging with visualization technologies, and it was obviously going to be based around the Internet. So in the late 1990s we decided to create a visualization and spatial technology centre, probably the first such archaeological centre in Britain. We managed to set up an Internet server when there were only a few hundred of them in the country, and we went into 3D visualization on the web, and that was pretty rare in the mid-1990s.

We were lucky in Ljubljana because we were also very early into GIS, thanks to Zoran Stančič's and your work on the Hvar project. In the 1992 Zoran organized the first GIS course with Ken Kwamme from Tucson University, which really had quite an important impact on further developments in Slovene archaeology. How you got in contact with GIS and Zoran, with whom you wrote one of the pioneering studies on applying GIS to archaeology.

When I came to Ljubljana in 1985, I brought a laptop computer, an Amstrad PC, a simple word processor on which I had a number of specially written programs, mainly for geophysics. If I remember well that was one of the few computers in Slovene archaeology at that period. At that time I knew nothing about GIS and I planned to use it mainly for writing texts and making some databases. It was only when we established fieldwork in Croatia that this started to change in many respects.

I had no idea where Hvar was, when Božidar Slapšak told me to contact Branko Kirigin from the Archaeological Museum in Split. Branko took me to the island and we climbed up to a high place, it was like the temptation of Christ. Branko showed me the Starigrad plain, pointed out all the hills with hillforts around it, which had one the best preserved Greek field systems, spreading out before you. The villas stood two storeys high. Branko asked if I wanted to work there. He may as well have had horns on his head at this moment. It took me no seconds to decide that yes, this was where I wanted to work.

Once the work had started, we knew we were entering a very different phase. I was working with Zoran Stančić, who was then doing a PhD on Greek land division when we started talking about what we thought should be done technically. Our thoughts ranged around databases of various sorts. But then Zoran went to an international conference in 1990 or 1991, and when he came back he said to me, look, I've heard a lecture by Ishmael Williams from Arkansas, and they're using something called a geographic information system – GIS – and this must be important. We began to gather information and contacted the Americans. Zoran is a networker par excellence. It was always my career choice to put Zoran in front of me. He would clear the path and smooth talk his way into everything. And then I'd follow on and say I'm with him. So, we arranged to stay with Ishmael Williams for two weeks. But before that we spent a year working preparing the database. Zoran worked on the environmental data, particularly on digitizing topography, soils, things like that. He then went out to America beforehand and spent some time with Ken Kwamme from Tucson University, Arizona, who was already the big name in GIS for archaeology at that time. At Fayetteville, Arkansas we spent two weeks working our socks off, and at the end we essentially had enough data to write the first book on an archaeological project in Europe using GIS. Before that there had been only few papers on using GIS in archaeology.

The Hvar project was also highly influential in other domains of archaeology. It was an incubator of many new ideas and concepts which left deep traces in Slovene archaeology. It was something very different from what we have experienced in archaeological research before that. It was not just about new methods, but the whole concept and setting were new. It's the birthplace for landscape studies in Slovenian archaeology, GIS-based research, the development of systematic surface surveys, a meeting point with historical geographers and landscape architects. Very positive experiences were soon transferred into the university curriculum in Ljubljana, and in the next three or four years its ideas were implemented in the motorway project in Slovenia, with fantastic results. However, it ended abruptly with the civil war in Yugoslavia.

I think you've just said very well just how important the Hvar project was. And it wasn't just within archaeology. It cascaded out. After 1991, when Yugoslavia fell apart, decisions had to be made about how to go forward. The planned big field project could not be undertaken anymore at that point. What happened was that a small number of friends and colleagues from Hvar project got together and initially reduced the project. We went back to producing gazetteers. We went from one island to another, all of which were essentially terra incognita. We chose those islands for archaeological reasons. The archipelago was significant because it's essentially the first place you can sail by line of sight from the eastern to the western side of the Adriatic, with Palagruža in the centre, from where you can see both sides of the Adriatic. And that's how ancient shipping worked. This was the pivotal area, tying together the Greek and Roman worlds, northern and southern Adriatic, and see with the mainland Balkans through the great passes of Klis and Omiš. This is a massive crossroads by sea and by land. That meant if we started studying these islands as a group, we should be looking at major cultural changes over millennia. It took us some five years to complete the project. It involved Zoran Stančić and his team from the Academia Research Center from Ljubljana, Birmingham University and the Archaeological Museum in Split. Nikola Vujnović was also there and became an incredibly important regional archaeologist. He had everything in his head. He knew how to move, how to find things, who to find. He is, if you like, my Dalmatian equivalent of Zoran Stančić. Whenever we went into a new area to work, he would find someone and start talking about who he was related to. And of course they'd find out that they were third cousins twice removed. He opened all the doors that we needed. The team was great, with Branko Kirigin and Tim Kaiser and John Hayes. Working with John Hayes was just remarkable. This is a man who held in his head every sherd he ever saw across the eastern Mediterranean. A remarkable individual, the like of which will never be seen again.

Staying for a long time in the small community of Hvar must have left a lot of emotional impressions.

Yes. It's not just archaeology and databases. It's much more. 1990 was the best year of my life. I was free to do all the research I wanted and working with people I liked. I was in a country which was remarkable. The archaeology was beyond anything I could ever wish for. There were people who were open to ideas and gave me ideas, no one was selfish in any way. And, you know, it was a fantastic time to be there. One of the locals used to call me the *English gastarbeiter*. They loved the fact that I was there doing work and had deliberately left my job in the UK to do that! But these things work both ways. I'm sure there is a tendency for many British people to come to places like Dalmatia and presume they know it all. Perhaps I was arrogant, too. I hope I wasn't. But, you know, I learned a lot. It really was different, the society was different, the nature, archaeology

and landscape were different. One of the things I did some time ago was a paper on sky-scapes. I remembered Dalmatia for its dramatic landscapes framed by the sea and sky. It was a dramatic contrast to everything I'd done previously, and actually that guided a lot of my early work on GIS. Viewsheds are not just about looking at what you see inside a viewshed area. They're about boundaries, and I understood later that the boundaries that we were looking at reflected the dramatic landscapes that we saw and the culture that created them. The Dalmatian landscape is about boundaries. Thousands and thousands of dry walls and boundaries of all kinds. I have never personally seen a landscape which had been modified to the extent that the Dalmatian islands were during a very short period of time after phylloxera hit the grapevines in the mid-1890s.

If we put it in a wider context of the late 1980s and early 1990s, you coming to Slovenia and Croatia, John Chapman working in the Zadar hinterland, John Bintliff working with us on Hvar, and publication of the BAR issue in 1987 on the recent trends in Yugoslav archaeology, all this was the first very intensive collaboration of our archaeology with that in the UK. I think here it's necessary to stress the pivotal role of Božidar Slapšak, who stood behind much of these initiatives and endeavours. Yes. He was a contact person, an access point for much of this. This is a value I see in many Slovene archaeologists. You're good at making contact. That's why we're talking now. At that point in time, Božidar was in a pivotal position, and he was very open to new knowledge. He was very taken by geophysics, for instance, not just straight landscape surveys. And he was putting these things together and that was critically important. We could not have just turned up and done that without him.

He also got Lewis Binford to lecture in Ljubljana for a semester in 1986.

That is something no one would expect. Božidar is intellectual networker. And I always enjoyed a discussion with him. He understood all sides of an argument, was able to connect them and find something new and valuable out of these contacts. He was a mover and shaker in that sense, and I absolutely and utterly appreciate that. It would be incredibly arrogant for any archaeologist to say they made their own way. We have to be able to enter these networks in order to go forward. And, you know, to a certain extent, we have to rely on each other to do that.

After your return to Birmingham, in the next two decades you worked on several large-scale projects which put archaeological research on a completely new scale. I was most impressed by two projects, the one about the sunken landscapes of the North Sea, and the Stonehenge project.

I've been very fortunate in some of the projects I've worked on. Some came out of the blue, the blue sea, so to say. In the late 1990s I lectured about landscapes in our mas-

ters course, and I had one lecture on landscapes we couldn't do anything with. Some of these were the landscapes that had been lost to the sea after the last glacial period, when sea was 120m lower at about 18,000 BC. Then by 5,500 BC Europe had lost some 3,000,000km² of habitable land to the sea, a process that took place over 13,000 years or so, and we couldn't do anything with it. I mean, literally, this was the reason why archaeologists somehow came to the conclusion that there was a land bridge between Britain and the continent – but land bridges connect A and B, you don't live in the middle of a bridge. At that point in time, essentially the only clue we had was a single bone point which had been dragged up from the North Sea in the 1930s. We knew that there must have been a landscape out there, but all we could do was go onto a boat, look over the side and say, well, there's nothing there. So we built up this myth of a land bridge on which nothing happened across an enormous area – approximately 180,000 km² in the Early Holocene.

During one of these seminars the idea came up to ask oil and gas companies which had been mapping the North Sea using seismic data. So I and a student, Simon Fitch, who I still work with today, went to the marine geomorphologist Ken Thompson in Birmingham. He listened to us and essentially agreed that there was a lost land out there, and we should go and find it. So Ken and I put our suits on and went to talk with a company called PGS Petroleum Geoservices in London. Ken was known to them, which is the only reason we got through the door. They listened to me with a certain amount of suspicion, and at the end they said we don't know you, but we do know Ken and we trust him. We're not going to give you a big amount of seismic data, only 6,000 km². We walked out with what was essentially the largest archaeological geophysical survey in the world to that point. And we didn't look back. After the first couple of weeks of working on the data Ken saw a river on top of the Dogger Bank, right in the middle. It was only later he told me that he'd misunderstood what I was asking about with regard to this project, and that if he'd understood that we were interested in the Early Holocene he wouldn't have agreed to take part. He thought we were interested in much earlier time periods. People had been trying to look at this recent period back in the 1960s, but it didn't work because the technology wasn't very developed. But by this time there were new, improved technologies and the data was better, and suddenly we could map these enigmatic landscapes. So it really needed an idiot archaeologist to ask the wrong question and get the right answer. This was the first archaeological study in the region that revealed a level of historic climate change similar to those we are now experiencing.

When I first saw this presentation in the form of video animation I was astonished not by technology, but by the story of how the destiny of this land and its peoples was told. It was a genuine, touching drama, especially because we can now imagine something similar because of the period of global climatic change we have entered.

Yes, it was the last time that mankind experienced climate change at the scale we see today. It was not anthropogenic climate change, of course, but it must have been equally impactful. People had to migrate as a consequence. The difference, of course, was that they had room to move. The questions that were posed at that time sound very academic or theoretical, perhaps even out of touch. But now they are very much present in our lives. This was also a global phenomenon. It wasn't just in the North Sea, it happened in the Americas, Australia, East Asia, all around the world. And, you know, if you want to understand how people got into the Americas, you have to understand the coastlines which are now underwater. That's the same with Southeast Asia. If you want to understand how ultimately Australia was colonized, even though it was always probably a separate landmass, you have to reconstruct those ancient coastlines to understand how humanity spread around the world. We actually need a new discipline of marine paleolandscapes.

You have also changed our perception of Stonehenge, another great project. Stonehenge was great because of the landscape, and not the central monument itself.

Absolutely. Between 2007 and 2020, archaeological geophysics was going through a revolution. When I came to Yugoslavia in the late 1980s, I brought a Geoscan RM4 resistance meter. It required one person to spend the whole day picking it up, putting it down, waiting for it to go beep and then continue. You laid out grids with tapes. And, if you could do ten 20m by 20m grids a day, you were a king in the archaeo-geophysical world. But during the late 2000s we got our first multi-sensor GPS-guided magnetometer and four sensors in an array. We went down to Stonehenge to test it out and it blew our minds, because not only was everything immediately georectified and geopositioned, but also not affected by the pitch and yaw effect, because they were on a wheeled cart. The resolution was better, and it was so much quicker and more accurate.

Soon your Stonehenge test of new equipment evolved into one of the largest geophysical projects in Europe.

We knew at that point that we needed to have larger arrays, more of them, and they had to be more mobile. We were contacted by Wolfgang Neugebauer from Vienna, who was putting together a proposal for the Ludwig Boltzmann Institute, which was essentially to pull together a European geophysical resource. We bought the first multi-sensor radar array, a very expensive machine. I think it was £120,000. At the end we had multiple magnetometer arrays, perhaps with ten magnetometers on them, all of which were GPS guided. They were pulling the data into the computers which did semi-processing almost immediately. The whole project was a huge geophysical circus which went from country to country.

At that time the dominant idea was that Stonehenge was in the middle of a taboo area. There was not much going on around it. It was surrounded by later, Bronze Age barrows which presumably formed a sort of cordon sanitaire of the illustrious dead. The first day we went into the field, when we hadn't got all the systems set up, we hit a new monument underneath a barrow, a very short distance away from Stonehenge. It was from the Late Neolithic, most likely with a pit structure in the centre. After this we knew the thing would work. Everywhere we went we found new structures, thousands and thousands of features. Every monument we looked at, and we did survey on a lot of them, they all changed, and they didn't look like we thought they would. There were monuments underneath monuments, and there were monuments surrounding monuments. The data sets were so large that we weren't being able to comprehend them manually.

And then came the super henge at Durrington Walls.

The last area we surveyed was Durrington Walls henge, the largest or second largest henge monument in Britain. It's so big that you can drive a car through it. It's immense, vast, with massive ditches and banks. During the initial survey we discovered a series of features underneath the bank, a new phase of the monument. And we were happy with that. However, we had noticed three large, strange features which measured about 20m across which formed what looked like an arc. Initially, we called them dew ponds. Since there is no surface water in the Stonehenge area, in the post-medieval period farmers dug shallow basins in the chalk, and lined them with clay or straw, and rain would create artificial ponds. However, years later one of my colleagues, Eamon Baldwin, saw in the excavation north of Durrington similar features to that we'd seen in the geophysics, which excavators interpreted as sinkholes. I'd seen thousands of sinkholes in Dalmatia, and I was a bit suspicious about that. So we looked at our data again and realized we didn't have just three of these features but nine, together forming an enormous arc all the way around the south and south-west side of Durrington Walls henge. And when we put them all on the map, we realized that there was another massive arc running to the north. What we had in fact was an arc of 20m-wide features running all the way around Durrington Walls henge with a diameter of nearly three kilometres. We started to realize that this looked like it could be the largest prehistoric structure in northwest Europe.

When we used radar we realized that the features were so deep we couldn't see the bottom of them, and they were too big to dig. This is where our marine experience came in. We took cores with a massive mechanical corer. The features were five meters deep, circular and with vertical walls. You could get one of the Stonehenge trilithons inside one of them. There had to be about 30 of such pits around Durrington Walls, and we sampled about nine of them. We're absolutely convinced that the majority of them, at least the ones we're looking at, are not natural. They seem to be

linked to an earlier causewayed enclosure at Larkhill, which is about a thousand years older than the henge itself. So you've got two immense monuments next to each other, Stonehenge and Durrington Walls. Both of them appear to have their own territories. Stonehenge has a territory called the Stonehenge Envelope, which is the area you can see from Stonehenge with barrows clustered around the edges of the viewshed. Durrington Walls, seems to have a massive manmade boundary around it which wouldn't have been seen if we hadn't done the geophysics. Finds of this scale make us question why Wessex, and specifically the Stonehenge area, was so different in this regard.

After all these discoveries it's becoming clear that there's not one possible, let alone straightforward interpretation.

There are probably different answers to such a question, and we'll probably never understand why large ritual complexes begin. Given that Stonehenge was in use for more than 2,000 years, the structure certainly didn't mean the same to people at the beginning as it did at the end of its use. The reasons why the area first became significant are lost to us. However, we can make some educated guesses. A key point about these structures is that at some time something simply happened. It may very well be that the solstice was observed there, and for Mike Parker this is the reason why Stonehenge was erected in the first place. Indeed, there are some very strange striations coming out of the entrance and pointing towards the solstice. People may have seen these, probably natural, stripes, and their alignment on the solstice became important to them. But that's a chicken and egg situation. Presumably someone had a reason to believe the solstice was important before they found these features. So that's probably not the cause but a symptom.

But once the observation and link had been made, things started happening. People started doing things there, things which they hadn't done before, and eventually it just cascades. In nature there is a process called stigmergy, or indirect coordination. It's the process by which termite mounds are built. There's no master architect, and yet they're amazing complexes. We may be seeing something like this in the past. If you look at the Stonehenge landscape, it looks structured. The structuring is centred on Stonehenge. All the Bronze Age barrows, for instance, are around its visual envelope. But that wasn't planned by the people who built Stonehenge. They didn't know it was going to happen. And the people who built the barrows had no concept that the structures being created were essentially being driven simply by the fact that you could see these barrows from Stonehenge. Eventually, such structures evolve and emerge and become massively important centres of activity for past societies. Their importance transcends everything. It's the archaeological concept of being famous for being famous. The people who lived or visited Stonehenge were always looking backwards, and the landscape was structured on that basis. I'm willing to bet that most major ritual structures and complexes are like that. Like a medieval cathedral which starts with a small chapel, and five hundred years later

you've got an abbey on top of it. Pilgrims are coming from everywhere and make it even more important – and so the religious site develops on that basis.

Since the 1980s, when you started your professional career, archaeology has been through substantial changes. How would you reflect on this development, and where do you see the future of archaeology?

Obviously, there are different types of archaeology and archaeological careers. Of course they're all valuable, but they are still different. However, I'd like to stress one important aspect, that the future of archaeology is tied to communication with the general public. In Britain, we're fortunate enough to have a massive amateur base. I've worked with amateurs on many occasions and, as you know, large parts of the first complete survey of a Roman Wroxeter in the 1990s was carried out by amateurs, people who just came along and helped, moved equipment, and collected data. For some decades we've had a heritage industry, and archaeology is part of that. It's also true that pretty much every country in Europe now has some kind of contract archaeology. We had to develop contract archaeology in Britain because the impact of development on our archaeological heritage was horrendous, and this pressure remains. I would suggest that higher education has to work more and more with contract archaeology. Undertaking fieldwork these days is becoming massively expensive and complex, and if higher education is to undertake such work then they need to benefit from the rich experience of contract archaeology. We have to appreciate the value of professional field archaeologists and break down barriers between higher education and the world of contract archaeology. It is critically important that we give credit to practitioners. Whereas you and I both benefited from working with John Hayes, the greatest pottery expert you could ever find, increasingly few people within university departments in Britain are pottery experts. For that we must turn to the world of contract archaeology and the skills that are resident there.

This opens another question about the nature of archaeology. In one of my texts I have said that archaeology is becoming more and more data-driven science. Would you agree?

Yes. The amount of data we are collecting through all these works is huge. We need to change something in our approach to data in order to get the most out of it. The growth of digital data archives, and the fact that most archaeological data now only exist in digital form, means that we have different opportunities for information to cascade across generations. In some senses we are now at the point where we cannot handle all the data. In 1996, we surveyed the entire area of the Roman Wroxeter, 78 hectares, we had 2.5 million magnetometry data points. We thought we could never do better, but at Stonehenge we probably passed that by the fourth day of surveying,

and the latest generation of SLAM (Simultaneous Location and Mapping) survey technologies acquire as many data points in seconds. In the North Sea, the data sets will soon be measured in petabytes.

Last year we funded for the first time a fellowship looking at AI applications for archaeological interpretation of seismic data, because we can't get enough seismic specialists. AI is where we're going. The huge digital data sets need AI. The big driver for such analysis in the North Sea is going to be the development of wind farm data. The resolution of the new data dwarfs everything we've had previously. When we start building energy islands in the centre of the North Sea, which we're going to, we're going to have to learn to work with that data pretty quickly. When fully built we're not going to have access to large areas of the seabed, because energy grids are going to be laid down across the whole seabed, across all of our coastal shelves. And, like climate change, that's going to happen globally. Everywhere that has a coastal shelf will start to have wind farms on them. So we have a very short amount of time to learn the new skills to actually do landscape archaeology at sea. We're part of a project called Unpathed Waters (UNPATH), a large AHRC-funded program called Towards a National Collection which aims to open up the heritage collections of the UK to the wider public. UNPATH is mainly for marine collections, and we're doing one part about enabling access to our seismic landscape interpretations. Southampton is building the AI applications, and even the pilot projects are stunning, even though we don't really know how to use the technology to the full as yet.

You have worked on another project with the big data philosophy in mind – the Curious Travelers project which was based on mass participation of the public.

This is another aspect of big data. The Curious Travelers project was a response to ISIS's destruction of heritage monuments. We developed a system to surf the web and harvest images of heritage objects, and use them in automated photogrammetric software for reconstruction. This, again, is an example where we can't work alone, where we have to work with other disciplines in order to take archaeological heritage studies forward. Curious Travelers was, again, a pilot project funded by the AHRC. If we did it these days, it would be different and would certainly have fully embedded AI applications, rather than the semi-automated approach that was adopted. However, the project had many other valuable outputs. We started realizing that many major archaeological monuments which you think are well studied are actually not, and that automated photogrammetry is a great way of capturing stuff in anticipation of destruction or decay. I guess, in the end, everything's going to be destroyed at some point. We just don't know when, but it might be tomorrow. In Fountains Abbey, a big church in Yorkshire, Chris Gaffney, my brother, set up a sign which asked the visitors to photograph a particular part of the abbey and send us their photos. Then he moved the sign

to another part of the abbey, and the result was that he got a complete survey of the abbey, which had never been achieved previously. People are also important – it's not all technology!

So this is a future strategy for archaeology – to involve lots of people?

Perhaps, but integrated with AI. That's where we've got to go.

Perhaps out next interview with you may be done using AI.

Maybe one of us, or both, is an AI. Who knows for sure when an interview is done online?