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BIMTechnologies

Level Three

The quarterly journal from BIM.Technologies

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Introduction

The previous version of Level 3 was published at the beginning of 2020. None of us could have imagined how the year would turn out. Many of our usual business processes and methodologies were made redundant in a COVID environment, but we have found new ways of doing things and new ways to communicate often with very little impact on productivity and, in some cases, an increase in efficiency.

However, the world will never be the same. There is an argument that the pandemic has accelerated progress in many areas. The number of meetings and travel has greatly reduced, which will impact on CO_2 emissions. The need to keep our distance inside and outside has made us look at how we use our spaces and how we connect. In the years ahead, I am sure we will re-assess everything we do and data will play a huge part in understanding what we do and how we can be better prepared for a global pandemic in the future.

In July, the Draft Building Safety Bill was published by the Government. This is the most significant legislation to impact on the construction industry. The Bill responds to the failings of the sector which led to the Grenfell Disaster.

The investment made in digitising property and construction provides an opportunity to address many of the issues highlighted. Undoubtedly digital models and data will be at the centre of our industry in the years ahead.

In this edition of Level 3, we look at the progress made but more importantly, we look at what the opportunities face us in the future.

By Rob Charlton

10 years of BIM

BIM Technologies was established nearly ten years ago. We started off with a small number of modelling projects but our first project was 240 Blackfriars for Great Portland Estates.

This project had been developed in 2D by AHMM Architects before the 2008 recession. GPE were keen to de-risk the project by co-ordinating the fabric and structure. In the first instance, BIM Technologies needed to model the building to allow the clash detection to take place. Mace, the main contractors, were going through a learning process - as were the supply chain. The design and construction team worked together closely and the project was a success.

Within the next year, we completed further projects with GPE, Derwent and Argent. The reason for telling this story is to demonstrate how far the industry has come in under a decade. At the time, there were only a handful of BIM projects in the UK being delivered by only a handful of BIM consultants. Level 2 didn't exist, meaning we had to develop our own documentation through collaboration with the US. Today, the vast majority of large commercial projects are designed and constructed using BIM. All parts of the supply chain - from design through to delivery - use models. Only the private sector adopted BIM initially, but today universities, schools and hospitals all use BIM as part of their standard development approach.

BIM has helped to successfully deliver hundreds of projects and the benefits must have been demonstrated, otherwise we would not have seen the level of adoption increase.

Over the past ten years, the industry has developed some fantastic models which are fully co-ordinated and packed with data using the COBie schema. As an example, our second project for GPE was the Rathbone Square development in Fitzrovia which included 600 models without a single clash.

However, early adopter clients are always looking to see how they can continually improve their processes to maximise value. As BIM continues to mature, they currently have models and data which they are not using beyond the construction phase.

The commercial office market is changing and landlords are realising their tenants have different priorities, such as carbon use and connectivity. With data rich models linked to internet of things (IOT) devices, landlords have far more information to share with their tenants. Millennials want to connect with their workspace through a mobile device and this is now achievable. As the systems in buildings become increasingly sophisticated, users will also want to use their mobile device to connect to services and controls such as lifts or vehicle charging points. They will want to locate colleagues, book meeting rooms or check out café menus within a single app.

The detailed and data-rich handover models have the potential to continue to evolve through the lifetime of a building and become a true Digital Twin in operation. Whilst there is an opportunity beyond handover, there is still lots of potential during the design and construction phase.

Back in 2011, being able to federate models and carry out clash reports was innovative. Today, this is expected on every project. In recent years we have seen the emergence of generative design and even artificial intelligence. On-site opportunities to use VR are also being developed. There's lots more we can do to improve a building lifecycle using digital construction. Let's hope that we can continue to make the same level of progress that has been made since BIM.Technologies was established.

By Rob Charlton

Worlds Collide Proptech + Contech

The year is 2020 and it has now been over three years since the UK Government's BIM Level 2 mandate for centrally procured projects rolled out.

The latest NBS report shows that while BIM is not 100% adopted across the board in the UK, awareness has arguably reached every corner of the industry. Despite the many hurdles projects still go through to deliver digitally, this new way of working is being ever more embraced as the way moving forward.

A fair share of designers acknowledge the benefits for multi-discipline collaboration and expediting design, contractors have jumped on opportunities to plan and de-risk construction, and savvy client organisations are now starting to seek meaningful deliverables to be used after handover. The latter is perhaps the catalyst to an emerging crossover between the property and construction.

These two sectors deal with the same product but have very few interface points, with property developer organisations being one of the few clear examples. Both ends of the property/construction sectors have been digitising themselves, but it is only very recently that meaningful opportunities for integration have sprung.

Despite all the inherent difficulties and resistance to change, construction has been following in the footsteps of aerospace and other manufacturing industries, who achieved digital maturity some time ago.

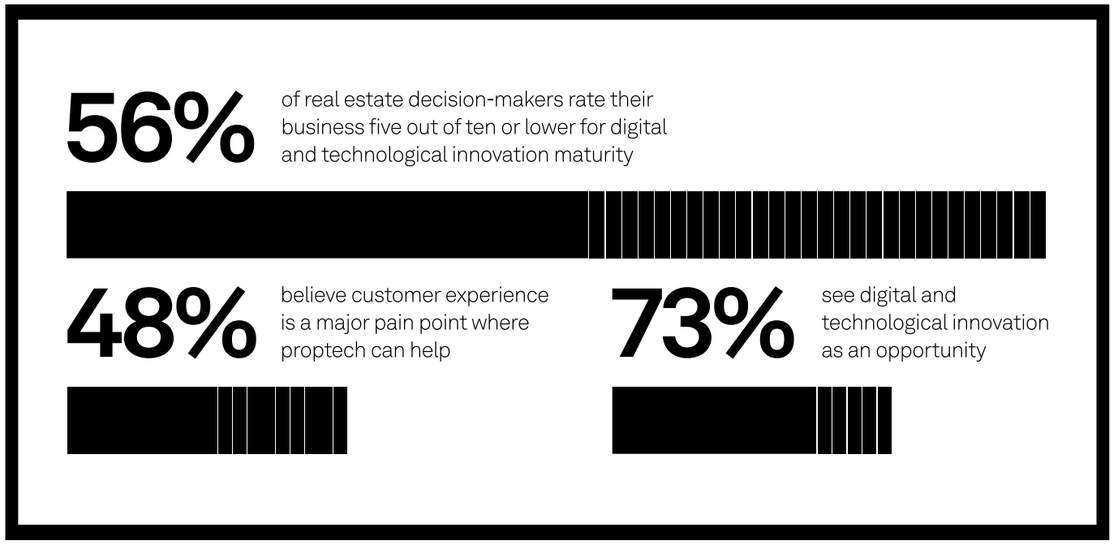
Whenever I have to explain what BIM is, I always find it useful to draw parallels to Digital Prototyping, a term very much mainstream in manufacturing. There are five key stages to digital prototyping, and construction technology (Contech) covers mainly three of these:

- Conceptual Design – Ditto in construction with the early RIBA stages up to 2 or maybe 3. Although it can be argued building designs are nowhere near as iterative and collaborative as other manufacturing products. There are reasons for this, but lets focus on the solutions.

- Engineering – Detailed Design Tendering / Pre-Construction Level of Detail. This is not as clearly drawn in construction as it is in manufacturing, the process is still very linear and contractually fragmented. I will not dare to give my opinion further as this is a very hot topic and not my alleged area of expertise!

- Manufacturing – Construction/Off-site fabrication and site assembly – Here we have very good examples of efficiency, although the nature of the product still demands us to build bespoke parts to then assemble on site, not much different than hypothetical geographically bound and custom-built commercial aircraft though is it?

By Romulo Simionatto



When considering all the above, there are still two areas not covered by Contech, these are namely Customer Involvement and Marketing Communications.

Property professionals on the other hand, are all about the two above and have been gearing up digitally to increase their efficiencies in doing so. The similarities with manufacturing stop there though, as there is very little interface between property and construction professionals (virtually none if these do not fall under the same client/developer umbrella). Take interactive virtual apartment tours as an example, which rely on 3D scans of the built asset and rarely (if ever) make use of an As-Built model of some sorts. This is not the case in manufacturing, where early customer and user feedback is deeply connected to design development and drives different iterations of the same product.

How do we solve this? I wish I knew the answer and it is most likely there will be many different answers that will slowly converge. However, one emerging buzzword does seem to hold a lot of potential: the Digital Twin.

It consists in both an output and input solution for continuous collaboration between all 5 areas of digital prototyping (in fact, it is already used in other industries), which has received a lot of attention during the past year within the construction industry.

Property technology companies are also demanding more reliable and cost-effective information. Why have a very expensive and duplicated set of material that has already been produced over months on end in the design and construction stages? Need up-to-date floorplans, visualisation, an accurate model for an interactive walkthrough perhaps?

Then why not use the actual design information without the need to remodel as it is often done. Same with user manuals, specifications, asset data and the possibility to have a real time interactive 3D interface with your building for management and operation. The technology has all been figured out and hundreds of professionals have spent weeks on end to produce a tightly knit set of information, it is wasteful to lock it away in a hard drive or server somewhere (the 21st century`s file drawer) and not use it.

Again, I understand there are a myriad of ownership and legal complications to this, but we should work to eliminate these and not use them as excuses. Technology has gotten there already; we just need to catch-up in the way we produce and manage information in the built environment. If we choose to reluctantly resist change, perhaps external factors will collectively force the good-will out of us?

As is often the case with property and construction, it takes critical events and new legislation to really expedite meaningful change. In fact, two very likely scenarios loom on the horizon and have the potential to force property and construction to unite and give birth to its future mid-21st century counterpart.

The first will probably be related to the actions taken from the Hackitt Report consultation once it has ended. The "Golden Thread" of information will be enforced to ensure statutory compliance and accountability with the introduction of dutyholders. These in turn will need efficient tools to gather and oversee such information throughout the asset`s lifecycle. The second scenario follows with the UK being the first G7 nation with the commitment to be a Net Zero Carbon nation by 2050.

Transport will be the first to face the crosshairs of energy efficiency and lifecycle carbon regulations, but buildings will not be far off as they are the second largest culprits with just under 40% of the energy demand associated to them in the UK. We will then be forced to design, build and maintain efficient buildings, retrofit the existing inefficient stock and, most importantly, have appropriate technology driven tools that allow us to certify, monitor and understand trends in the built environment.

This will push the newly combined CONTECH + PROPTECH sector to heavily adopt data analytics solutions to make sense of the vast amounts of information that will come from our monitored buildings and infrastructure. These are exciting times to work in property and construction. I could be wrong, but I truly believe profound change is upon us. The groundwork has been happening for some time and the challenges of our time will give us the much needed push in the right direction.

Drone Deployment within the Construction Sector

BIM.Technologies' Anthony Harte talks about the use of drone's within construction.

" It helps new technologies emerge before finally making an appearance in consumer grade products."

I had the pleasure of visiting the GEO Business 2019 conference in London, and it played host to some fascinating presentations on Drones with ARPAS-UK suggesting that UAV's are expected to increase GDP within the UK Economy by £42bn by 2030 creating over 600k jobs. As a hobby, my interest in RC (Radio Controlled) aircraft started from a young age as a progression from competitively racing RC cars.

By the age of 18, I'd learnt to fly both Helicopter and Fixed Wing. So, to see the technology advancements in my hobby and professional career start to come together excites me greatly. I just can't get enough of machined carbon fibre, circuit boards, programmable LED's, video transmitters and firmware!

As the technology has advanced through a relatively short space of time, competitive drone racing has started to become a "big thing" with the likes of DRL Founded by Nicholas Horbaczewski in 2015, attracting some big named media agreements including Amazon, BMW, Swatch and the US Air Force for example. Much like BIM. Technologies (part of Space Group), Horbaczewski claims that DRL is a technology company at its core, whilst creating a new sport DRL is also pushing the boundaries and forcing manufacturers to develop this area of technology. A technology that is rapidly advancing and is already capable of some impressive stuff which is why it appeals to a younger generation.

By Anthony Harte

With any cutting-edge sport, it helps new technologies emerge before finally making an appearance in consumer grade products. We've had a history of seeing this in Formula1, and we will see it in competitive drone racing. The figures discussed during the presentations at GEO Business 2019 claimed that the Construction & Manufacturing industry would account for circa £8.6bn of that figure. It's also suggested that the UK Drone Economy could contribute to £16bn of net cost savings, although it wasn't clear where these savings would come from. These huge figures are backed up by drone data firm DroneDeploy who suggested that Growth in Industry Adoption (YoY) is said to be 239% for the Construction sector with mining and agriculture at 198% and 172% respectively.

The highest usage within Construction has been highlighted as Progress tracking & communication, followed by Site Planning, QS, Bid Process and Job site Risk mitigation. It's been proven that Drone photos, maps, and models improve communication across large teams and help drive smarter decisions and most of this is being performed with drones that cost less than £1,500. Over the last few years, Space Architects (part of Space Group) has commissioned Drones for a variety of reasons from Aerial Inspections in Newcastle City Centre, to capturing imagery of development sites for Planning Applications such as NGI (Newcastle Gateshead Initiative).

" This enabled the buyers to see the exact view from a property that wasn't even built yet."

On the BIM. Technologies side, Drones were used to capture imagery for a showroom Window Scape for renderings and animations. Drones were flown to a height of the apartments, then HD pictures were taken in which were used by the 3D visualisation teams for renderings. This enabled the buyers to see the exact view from a property that wasn't even built yet.

In the Construction Sector we don't really need BVLOS (Beyond Visual Line of Sight) regulations however, as an industry the UK are investing heavily in experimental BVLOS "Corridors" as test beds for the latest technology. For example, the air corridor for UAV testing at the National BVLOS Experimental Centre (NBEC) was made possible by funding from the Department for Digital, Culture, Media and Sports. "Blue Bear" is part of a consortia which is trialling the use of 5G technology used to track and identify UAV's in the 16km NBEC air corridor, allowing manned and unmanned aircraft to share the same airspace.

The challenge construction professionals are going to face in 2020 shares similar issues to the uptake of BIM (Building Information Modelling) and how it relates to scale, regulations, standards and education. Right now, each drone flight needs a trained pilot, and there's only a finite amount of people that will be able to operate these drones, because you can't train everyone in your organisation. The regulations are constantly changing in an industry that's developing quicker than the appropriate Standards Authorities can keep up.

There are some fantastic case uses for UAV's within the Construction Sector, and HS2 appear to be the largest user of this technology having collected a total of 18.4 billion measurement points, captured to an accuracy of between 30mm-50mm across three weeks in March 2018. The drones flew more than 23km every day along preprogrammed autonomous routes and these points were then stitched together to create full 3D digital maps of the Phase One route reports SenSat. A pioneering new technique called Structure from Motion (SfM) photogrammetry, using survey-grade GPS to digitally recreate the world in incredible detail, it's reported SenSat had to factor the curvature of the earth into its digital replica! Capturing such large datasets due to the length of the route not only has its challenges but also breaks records along the way by flying a distance of 12km BVLOS. This is a massive development, as under current Regulations (CAP 722) remote pilots must maintain direct unaided visual line of site with the UAV or a max distance of 500m horizontally and 400ft vertically.

At Drone Show Live 2018, Dr. Dennis Majoe from Motion Robotics suggested that BVLOS implies loss of human control and that they are using AI to reconstruct virtual worlds in which the human can take semi-autonomous control over low bandwidth connections. He went on to suggest that Drone Corridors will have human defined safe landing sites and no-go areas with the UAV's using AI to recognise landing sites and check nothing has entered those sites before landing.

" Drone Corridors will have human defined safe landing sites and no-go areas."

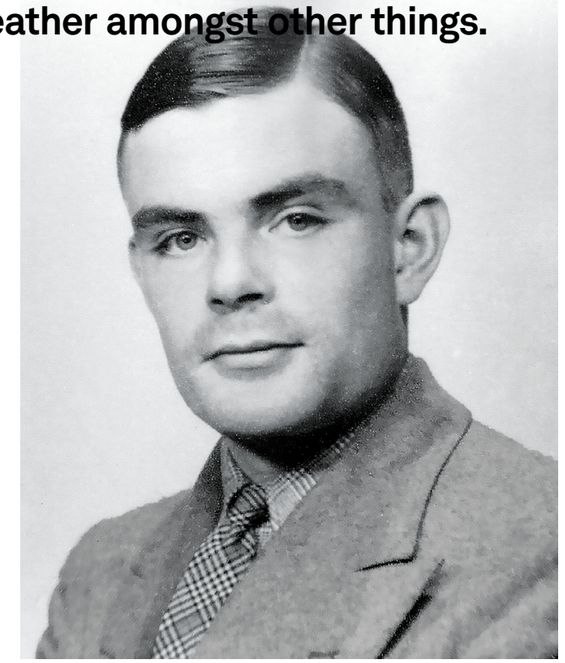
Back to GEO Business, Historic England presented some great material on the positives this new technology brings to Heritage sites, and the impact that drone surveys can have on restoring them should disasters happen or assisting with construction works for landmark Bridges for example.

Whilst National Trust and Historic England sites are designated no drone flying, there can be exceptions to this however you need to be a PfCO holder, have insurance and submit your flight proposals for acceptance.

Historic England have just recently put their first graduate through their PfCO so that she can perform drone surveys for many of the heritage sites around the country. Interestingly, they have already written some guidance documents on surveys and their specific requirements.

Digital Twins

Data is a tool that has played a vital role in the world for decades. Going all the way back to World War II when Alan Turing created the 'bombe' in order to crack the enigma code. Now, we have an abundance of data being processed by our smartphones on a daily basis, providing us with information about transport and the weather amongst other things.



With access to limitless data in every aspects of our lives, it's about time that we really utilise that data to improve the world around us. Digital Twins are unlocking that potential by visualising complex data and making it more accessible to the user than ever before.

A Digital Twin is a virtual model of a real, physical thing which simulates the state of its real-life counterpart. This model then provides value to the user through data visualisation and artificial intelligence which can optimise the performance of whatever the physical asset may be. Digital Twins have been around for a while now but it's only recently that the technology has started to be used across a range of industries. This is due to several factors, including: cheaper data storage, faster wireless networks and more cost-effective sensors.

Due to the high costs of the technology, Digital Twins were originally restricted to the aerospace and defence industries. However, companies today are already generating the data they need to build a Digital Twin. Sensors and data communication systems are now used in common appliances as well as cars and electronic devices.

The Internet of Things (IoT) is what makes Digital Twins possible. IoT products are able to generate a high volume of complex data which can then be analysed by organisations to optimise their systems – but only if they have the necessary tools (i.e. a Digital Twin).

Using a Digital Twin requires a large amount of data storage. Cloud storage is a cost-effective method of ensuring all of the necessary data is securely and reliably stored. The use of open standards and application programming interfaces (APIs) has revolutionised the way systems can exchange data by significantly streamlining the process.

By Rob Charlton

Artificial intelligence (AI) gives the Digital Twin its predictive powers. Using machine learning technology, Digital Twins can calculate the effect any change can have upon an asset. This also means that the systems can now assist with decision making as well as predict the outcome of future decisions. Augmented reality (AR) can be used to render fully interactive 3D environments. Twinview is a Digital Twin which has specifically been developed for the property sector. Digital Twins are capable of completely changing the way the industry operates buildings. With accurate, real time building performance data owners and operations can be confident their buildings are operating efficiently. The use of carbon is a priority to the millennium generation and with data landlords can optimise their building systems to minimise energy use.

There is also an increasing responsibility on building owners to maintain up to date building information. Following the Grenfell disaster there is to be new legislation requiring landlords with buildings over 18m to keep up to date digital records. A major benefit of using Digital Twins is the ability to visualise data and the status of the physical asset. Digital Twins' troubleshooting capabilities can help to optimise performance for both current and future products.

Those that have already adopted the use of Digital Twins commonly refer to the main benefits as the ability to make better decisions due to the access to supporting data and faster, more efficient business processes. As Digital Twins can automate certain tasks such as testing and reporting, it means that the teams working on a project are free to prioritise other tasks.

Cost has been a large obstacle in the widespread adoption of Digital Twins. Investment is required for maintenance and to develop models amongst other things. These costs are falling but there are alternative tools that are still less expensive to run. There is also a requirement for good quality data in order for the Digital Twin to be as effective as it possibly can be. This means that organisations must be able to identify bad data and replace it with better data. Digital Twins for buildings provide a wide range of possibilities.

The twin's predictive capabilities provide the ability to test the effect on a building that any changes would make – resulting in reduced operational costs and more efficient decision-making processes. As Digital Twins can automate certain tasks such as testing and reporting, it means that the teams working on a project are free to prioritise other tasks.

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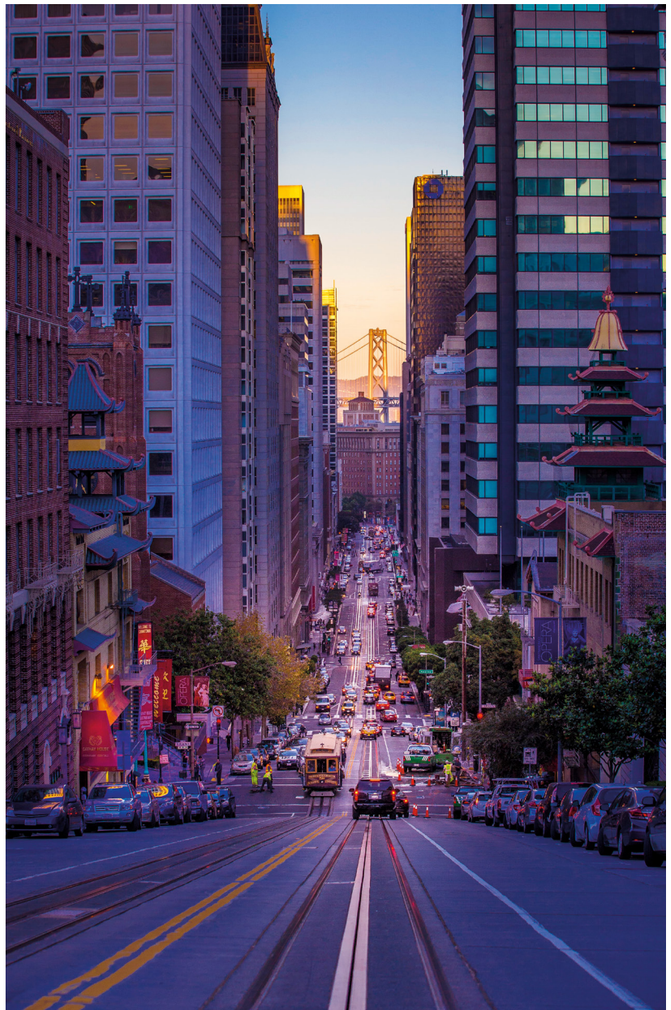
Some of the most sophisticated Digital Twin technology can also troubleshoot and suggest solutions to problems with the building that may arise. During the production stage, Digital Twins have the capacity to allow for collaboration between different teams working on the same project. The Centre for Digital Built Britain's (CDBB) National Digital Twin programme has been planned to improve our infrastructure across the United Kingdom. The idea is that - by creating an eco-system of Digital Twins - the public, the economy and the environment would all reap the benefits. To assist with the development of the National Digital Twin, the CDBB laid out a set of values known as the 'Gemini Principles.'

" The three core principles are: purpose, trust and function. "

The three core principles are: purpose, trust and function. Within these core values are characteristics that further explain the principles: public good, value creation, insight, security, openness, quality, federation, curation and evolution. For a Digital Twin to be recognised by the CDBB, it must fit these criteria.



In the past, facilities managers would be reliant on paper to store all of the information on their assets. This caused obvious problems if the paperwork was damaged or lost. Data storage via the cloud is a major solution that Digital Twins offer to FMs. Other benefits to facilities managers include: remote operation and troubleshooting; reduced energy wastage due to increase in efficiency; enhanced building performance and the ability to predict future performance and failures. Digital Twins mean that estate managers can remotely monitor all of their assets within their estates and have access to every piece of data at their fingertips in an instant. For building operators, inspecting and maintaining a building has never been easier. Digital Twins have the ability to remotely run inspections within their software as well as being able to spot potential issues in advance.

Maintenance and repairs have also been made simpler by a Digital Twin's capacity to troubleshoot and offer solutions using artificial intelligence and the data within the building's model. Digital Twins are now being used in every facet of our society. They help to run our transport infrastructure, manage our energy production and could potentially even be used to prevent heart failure.

In the built environment, Digital Twins can cut costs whilst offering solutions to traditional problems and are now central to innovation in both the property and construction industries. Following the Grenfell disaster in 2017, the Hackitt report on building safety and fire regulations outlined a need for the built environment to embrace the use of data in its processes.

The report's recommendations were focused on a need for the industry to put an emphasis on sharing its data and working collaboratively. It's no coincidence that Digital Twins are now seen as a considerable part of the solution. Digital Twins are also an effective weapon in the fight against the climate crisis. With 40% of the world's energy use coming from the built environment, there is undoubtedly a huge responsibility on the sector to redress the balance.

Reducing energy waste is a key benefit for businesses who implement a Digital Twin. Through monitoring and analysing their building's energy usage, organisations can make tangible changes to the amount of carbon their asset is putting out into the world. The future is here, so how can your organisation use a Digital Twin to affect change for the better? We're excited to find out.

Intelligent Design

It comes as no surprise that the high tech, telecoms and financial services sectors are the leading early adopters of machine learning and artificial intelligence. After all, these industries are well-known for their willingness to invest in and integrate new technologies, in order to gain competitive advantage and achieve internal process efficiencies. But it's painfully noticeable that the construction industry is missing from the list.

Why is it taking so long for construction to catch up with advanced technology? As an industry, we amass huge amounts of data – but it's only now that we are finally starting to understand what we might do with it and where it might take us.

Take, for example, machine learning: this technology might allow us to generate progressive and independent thinking within the machines and computers that drive our industry. In other words, machines are learning to think for themselves, but it's only by feeding them vast quantities of data that we can enable them to learn. From there, computers might analyse that data, to predict patterns and behaviours within occupied buildings and help designers to make more informed choices in the design and prototype phases of a project.

Machine learning is a branch of the wider theory and development of computer systems known as artificial intelligence, or AI. It has many potential applications in construction for the design and operational stages of a project, but it is perhaps building operations that might be our best target. In effect, it's about giving a building a brain. Machine learning operates in a very similar way to the neurological processes of the human brain. By looking at patterns within data, it can make informed decisions on what will most likely happen next and adjust accordingly.

When a child eats sugar, an electrical signal is fired to the brain that says 'I like this'. Over time, when a child eats more sugar, this emotion is triggered again, and over time, a neurological connection becomes burnt into the brain. The brain has essentially been 'trained'. This is very similar, broadly speaking, to how machine learning and neural networks work. The main difference is that a machine gathers information from large existing data sets much quicker than a human can.

By Adam Ward

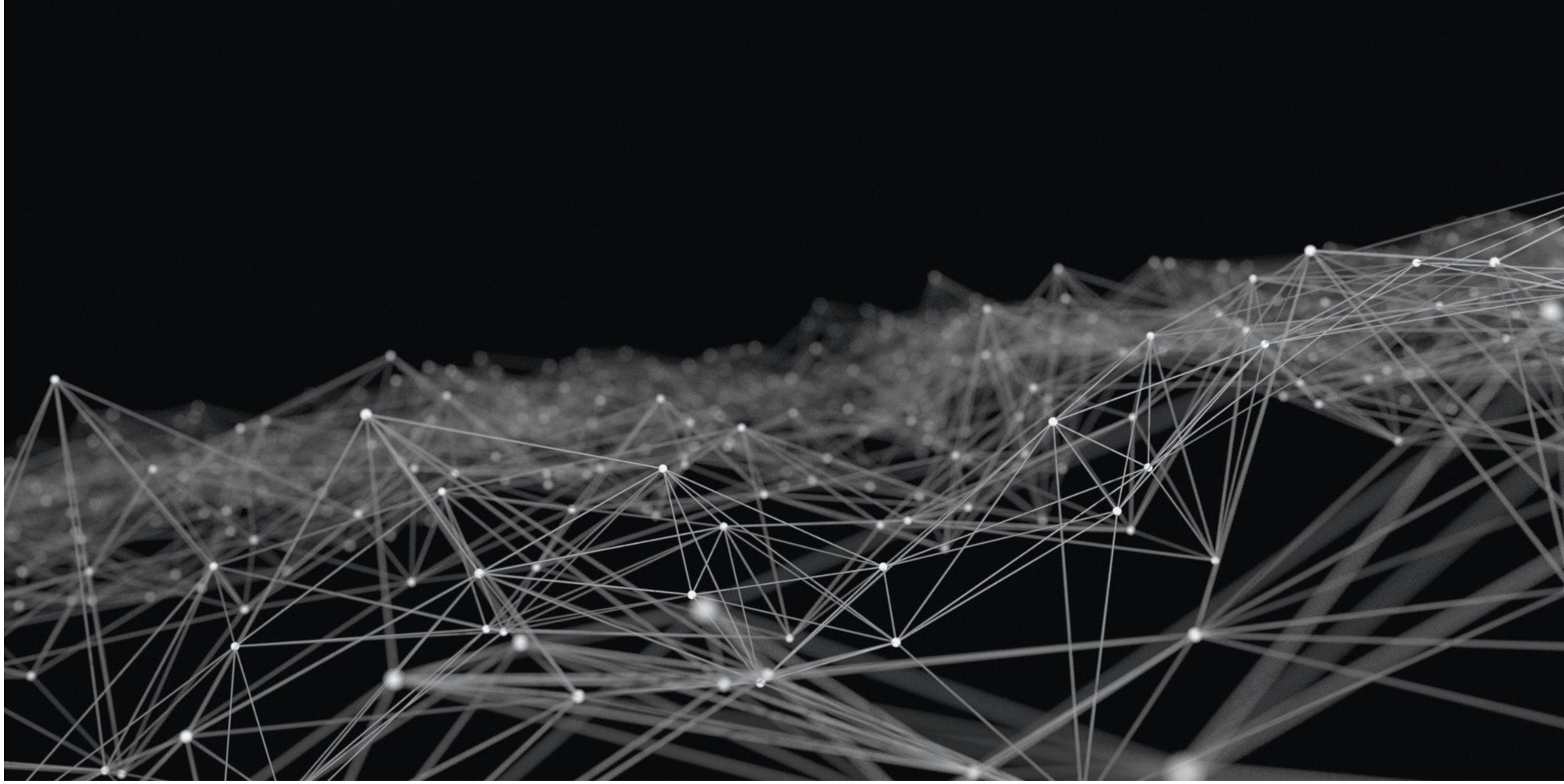
If a computer programme sees thousands of architects selecting a particular type of door handle – for use on a particular door type, in a particular building type, in a particular country – it can use this knowledge to make future recommendations to architects automatically about which door handle they might select. It will also know why it's making that recommendation; its selection is based on the choices of previous architects.

This is why many software companies are transitioning their platforms to the cloud, so that they can start to combine information from many different data sources and connect the dots. The development of smart buildings is on the rise, due to the availability of the cheap sensors and connected devices that make up the Internet of Things (IoT). These are becoming commonplace in our homes, with many everyday gadgets and appliances now available as smart products. Likewise, many buildings already have sensors that measure light, heat, energy consumption, footfall, movement, capacity and more. Many are part of proprietary, closed systems that don't talk to each other, but this is changing as the systems become increasingly able to share data in open standard formats or via application programming interfaces (APIs).

Once data is connected, we can then layer on top those machine learning algorithms that allow us to predict the behaviours of a building and its occupants, not only for efficiencies in operating and maintenance, but also to inform the way we design future buildings to optimise space and flow and select more appropriate building materials.

Equally, many clients are now asking to know when an asset is likely to break down so it can be fixed or replaced ahead of time. Once we have enough data, we can use a linear regression algorithm on the data to predict asset failure.

Machine learning is also used in more everyday tasks, such as providing more relevant search results, by using previous user search trends to influence results. This technique has been used for years by companies such as Facebook or Netflix, which use machine learning to push news stories and recommendations to your feed.



With many buildings now been designed, delivered and operated using digital processes and technologies such as BIM, machine learning is also starting to appear in many of the tools that architects and engineers use daily. Companies such as Autodesk are investing heavily and their technology previews, such as Project Dreamcatcher and Project Fractal, hint toward a future where machines are able to 'design'.

The insight we can derive from data, and the patterns it reveals in our actions, selections, behaviours and choices, combine to bestow great power on those companies that can own, control and interpret it. Data has become 'the new oil' that drives growth for organisations such as Facebook or Google that are competing for your personal information.

New power, new opportunities, new risks and new threats: they are all changing the way our industry operates. In other words, they are all combining to become the 'new normal'.

"New power, new opportunities, new risks and new threats: they are all changing the way our industry operates. In other words, they are all combining to become the 'new normal'."

BIM To Twin

By Rob Charlton

Since the publication of the BIM 'maturity wedge' in 2008, the construction industry has evolved enormously. There was little awareness of building information modelling at the time, with 2D CAD being the norm. That was before the 2011 government mandate thrust BIM into the spotlight, encouraging many to rethink their strategies. The sceptics were also convinced by the young talent joining the industry and advocating for change.

Now, Level 2 is well on the way to maturity. There are some who will say we still have a long way to go to achieve full adoption, but the reality is that we'll never get to a position where it's universally adopted across the sector. So, the big question is: what's next?

Richards and Bew's predicted Level 3 and also referenced asset life-cycle and data management. This was incredibly visionary considering where the sector was in 2008. It's taken a decade but Level 3 is now a reality – which, in relative terms, is incredibly quick taking into account the progress over the previous 100 years. As the wedge was looking so far into the future, it was difficult to be too prescriptive about what Level 3 might include. Now, I would add an additional word: analytics. We have been able to create an infrastructure which allows us to gather data and link or embed it into 3D models. COBie was criticised and misunderstood but I think it has been fundamental in helping the sector to understand the importance of consistency and structure of data. So now that we have fantastic models full of data, what's next?

The Grenfell disaster has pushed digital information even further up the agenda. The reference to the Golden Thread has encouraged building owners to consider the potential of digital handover information.

At the same time, understanding of the Digital Twin has grown and its potential has become apparent. There's a lot of debate about what a Digital Twin is, as there has been about Level 2 and 3 over the years. Social media has helped accelerate understanding and these discussions will always raise awareness. With improved mobile networks, cloud processing and the commercialising of IoT, Digital Twins are easily accessible.

When we add all of this new technology to the models we have been developing over the last 10 years, the potential is huge.

At the same time, the Millennial generation have matured and there are some new kids on the block called 'Generation Z.' The environment is now front and centre for millennials, the Digital Twin allows access to data so that we can optimise the use of resources. Millennials expect answers immediately.

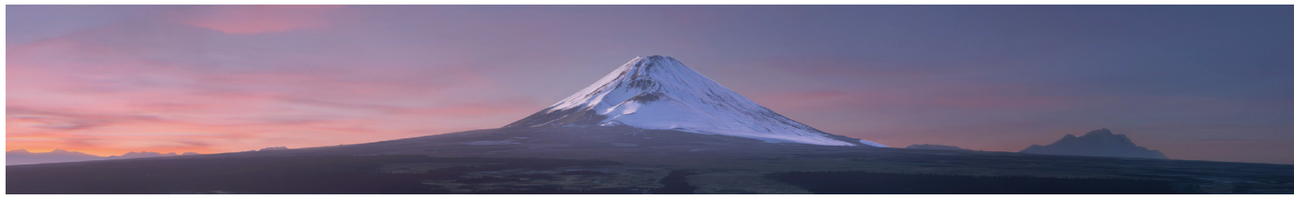
They've grown up with Google which gives them answers in milliseconds - so building data needs to be quickly accessible too. Millennials can't understand why this information is not to hand and they won't accept the failings of the sector in the past.

We're already seeing a more inclusive sector and the culture is changing slowly. So, the linking of our digital versions of our buildings and data within them is the next logical step. BIM feels a little flatfooted now and the future continues to look incredibly exciting.

When the term 'BIM' was adopted, it helped us to understand. I think that 'Digital Twin' will do the same. But whatever we call it doesn't really matter – the opportunity is the exciting part. I expect that the reality of Level 3 has happened far sooner than Mervyn and Mark expected - the wedge is more of an upward.

Smart Cities

Following Toyota's 'Woven City' announcement, Rob Charlton examines the technology being developed in our cities and how we can make them smarter.



As our access to data continuously grows, the potential for smart cities has never been so exciting. Toyota's 'Woven City' concept is one of the most high-profile examples of what smart city technology can do.

Described as a "living laboratory," the Woven City will be built at the base of Mt. Fuji in Japan. The project will be a home to full-time residents and researchers working on the development of technology involving autonomy, robotics, personal mobility and smart homes.

There's currently a lot of buzz around smart city technology on a macro level – things like the optimisation of energy usage and how the technology can have an impact on an area's transport infrastructure – but the amount of technology also being used on a smaller, day-to-day level is seriously impressive.

Look at the apps we use every day: Google Maps, Trainline, Uber, the native Weather apps on smartphones. These tools all provide us with a mass of data about transport and our local environments. Companies such as Great Portland Estates already allow their tenants to manage the lifts and temperature in their buildings. If we take that a step further and think about how we can connect city infrastructure to individual buildings, we could see even more benefits of smart technology.

By Rob Charlton

“Our cities are already pretty smart”

For example, airports could manage people movement within the terminal so that you can plan how long it will take you to get to your gate. If we could access people movement in tube stations, we’d be able to choose which station to use depending on which is the quietest at the time.

Our challenge is to work out how we want to interact with our cities and optimise the new technology. As we gather this information and start to apply artificial intelligence, it could provide answers to questions that we hadn’t even thought of.

The information will, however, need to be open source and accessible in order to encourage innovation. We must also consider that emerging generations prefer to connect with each other through their mobile devices rather than face-to-face. We need to be aware of this when designing our cities but also be aware of the impact of the diminishing social interaction this causes.

Much of the work to-date has been around how we move around cities. I think something for us to start to consider is how we can use this infrastructure and data to tackle environmental issues and how we can make our cities safer for those using them.

We’ve made a great start with smart cities - even if we don’t realise it. The more accessible and commonplace that this data becomes in our society, the more successful that smart city projects will be.