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I INFRASTRUCTURE Intelligence

Produced for the industry by the Association for Consultancy and Engineering

Towards digital transformation





INFRASTRUCTURE Intelligence

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MESSAGE FROM THE EDITOR

Welcome to this *Infrastructure Intelligence* special Digital Transformation supplement which is looking at the challenges facing consultancy and engineering firms as they grapple with the business and organisational implications of 'going digital'.

In this special supplement, we speak to senior executives from the leading technology providers whose are assisting professional services firms on the transition to a more productive digital environment. They offer their insights and advice on how firms working in infrastructure should best respond to today's digital challenges. We also focus on some key sectors, including transport, and look at how increasing digitalisation is creating major opportunities for all companies.

We also examine the crucial role of the chief information officer (CIO) and highlight how it is evolving more and more to become a key leadership position in consultancy and engineering firms. This evolution, from being regarded as the old IT department 'guardians of the systems' to being a strategic business leader helping their firms thrive in the new marketplace, will be a key topic at the European CIO Conference series, which the Association for Consultancy and Engineering is organising.

What's clear from all the interviews and articles in this supplement is that professional services firms operating in the infrastructure sector will need to work smarter and more efficiently in the future to keep up with the pace of change. Embracing digital is a business necessity that will transform the way firms work for ever.



Andy Walker,
editor, *Infrastructure Intelligence*

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Change management is key to digital transformation

Neil Davidson is vice president of enterprise at Deltek. He spoke to *Infrastructure Intelligence* about how firms should respond to the challenge of digital transformation.

What are the key digital issues that infrastructure professionals need to be considering?

Digital transformation is at the forefront of every CEO's agenda. Our recent *Insight to Action* report on the future of professional services revealed that 81% of CEOs were unprepared for the risk of disruptive technology, so there is clearly an issue there in terms of firms' readiness to adopt digital technology.

There are three areas to this. Firstly, there's a basic understanding that digital transformation is about changing business strategy, it is not simply an IT transformation. This needs to be at the heart of everything. Second, firms need to start with what the client's needs are. Our survey said 49% of firms were unprepared to meet customer needs, so there must be a better dialogue with customers to find out what their changing needs are for digital services. Because the opportunity is there to respond rapidly and companies need to embrace this. Finally, innovation is extremely important. Having the right innovation practices in the business to bring the right services to market at the right time is crucial.

What are clients demanding from the organisations they work with?

Clients are always looking for the best value and the best service and digital is opening up new and enormous possibilities. Clients are demanding different ways of looking at the service they receive and there is a trend away from billing for hours towards a more fixed fee, outcome-based model. Firms are looking at recurring revenue models and clients are looking for certainty of outcome, tight control of costs and making sure the service they receive is ruthlessly efficient on value and delivery.

What does best practice look like?

Firms that have a real, well thought out digital transformation strategy sponsored from the top, by leaders who are communicating this clearly across the business is absolutely imperative for change and delivering it successfully. Firms that are really investing in being best in class will also have a clear focus on project management and efficiency of delivery and costs. A strong change management focus and looking at every angle in which to achieve efficiency will be key.

What are the common challenges facing firms?

There is resistance to change in organisations so change management is becoming the number one skill that businesses need to be good at in a digital world. People read about jobs being lost because of digital, but new jobs will also be created and leadership teams need to bring people with them on the journey, to show that change is happening but it's a wonderful opportunity to grab that digital future.

What is the role of the CIO in digital transformation

The role is now often called head of digital

“Infrastructure providers need to establish a business model that can be agile, that can change and respond to a very dynamic environment.”

Neil Davidson, Deltek



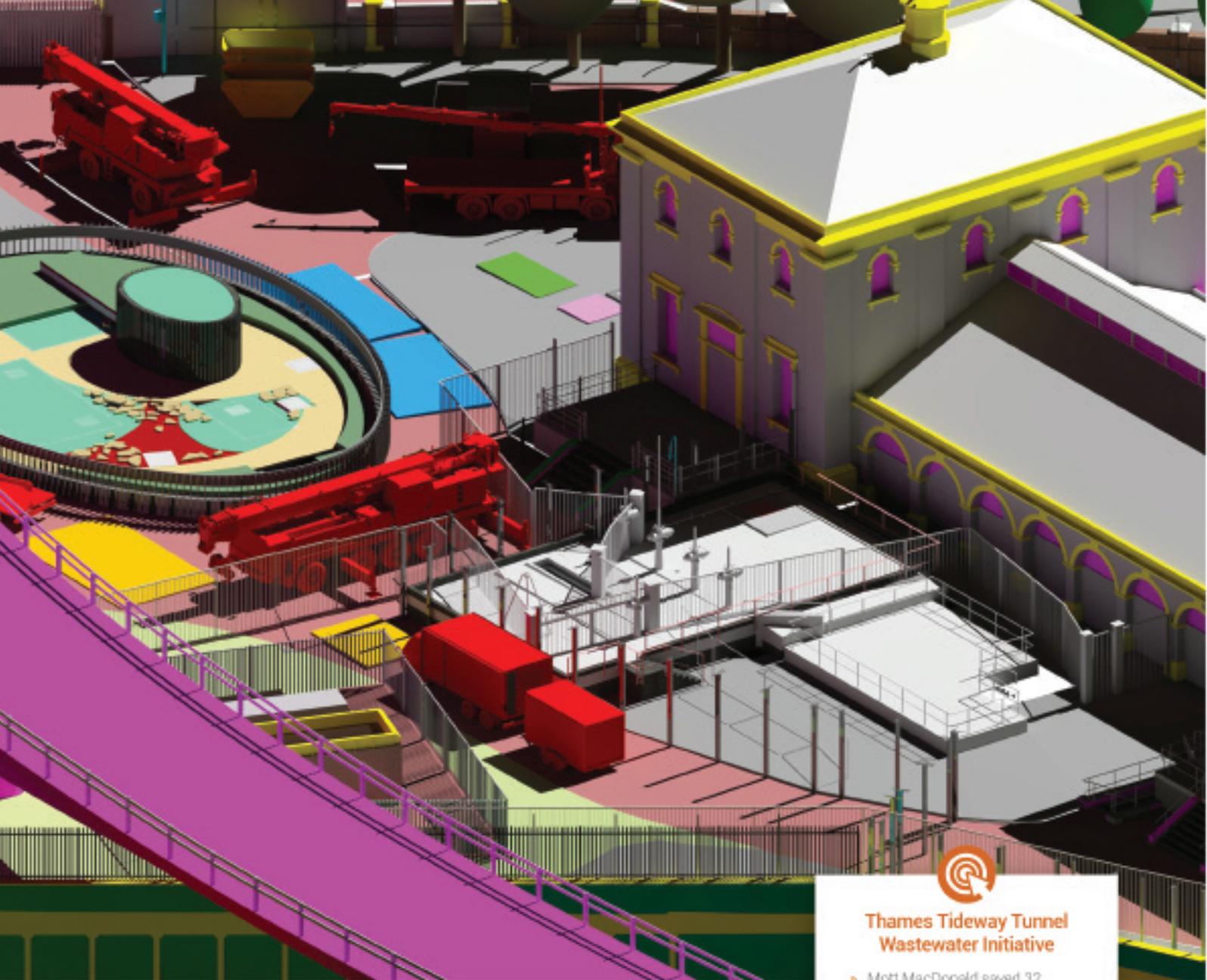
transformation to reflect that CIOs are now much closer to the business and business strategy. This reinforces the need for change, shows leadership, and it's essential to drive that change throughout the business. Because digital is an initiative that organisations will start and continually evolve. So, the role is a crucial one.

How are you working with firms currently?

We are uniquely focussed on the professional services market and consultancy and engineering firms in particular. We partner with our clients to deeply understand their strategy, and help them to deliver the digital backbone of their business. We make sure they understand the cost of delivering to their clients, that they are ruthlessly efficient in the projects they are running and can deliver them with the right risk profile and a high chance of success. Using the specialist capability that Deltek brings, we also facilitate innovations around augmented intelligence and staff mobility to ensure firms understand and accurately forecast the workforce they need in three to four months' time.

Where is the sector headed in the next five years?

There will be huge change, but we don't yet know the technology that is going to shape that. It's very much about agility. Infrastructure providers need to establish a business model that can be agile, that can change and respond to a very, very dynamic environment. So, building a company that's built for change and built to be agile is probably the best insurance policy against the incredible digital disruption that we are seeing and will enable firms to seize immense opportunities.



Thames Tideway Tunnel Wastewater Initiative

- Mott MacDonald saved 32 percent in design production time
- The client accepted 76 percent of packages on initial review due to improved collaboration
- ProjectWise saved 80 percent of information delivery time, reducing it from five days to one

"The ProjectWise CDE allows CVBJV to easily access detailed, up-to-date project information and improve and simplify design approvals."

Chebbi Matta, CVBJV Design and Engineering Manager, Mott MacDonald

Delivering Projects with Digital Workflows

Mott MacDonald Accelerates Project Delivery on East Tideway Tunnel

Mott MacDonald accelerated the delivery of the largest infrastructure project undertaken by the UK water industry. This GBP 4 billion project benefited from a connected data environment (CDE) based on Bentley's ProjectWise CONNECT Edition. Digital workflows helped to improve collaboration for numerous design disciplines, supply chain companies, and project stakeholders by bringing all design information into intelligent 3D models. This helped to accelerate design, improve communication, and deliver digital engineering models to the client.



To learn more and try it out yourself visit www.bentley.com/tideway



Going digital is not simply about leveraging the latest technology to meet current and future business and economic challenges, it's about enabling different outcomes that will likely include increased capacity, reliability and performance, while reducing risk for stakeholders, says *Steve Cockerell*.

Going digital in transportation

Today, a significant part of the digital journey for many organisations involved in creating and managing our roads and railways is in embedding building information modelling (BIM) standards and procedures, via a common data environment, within their businesses.

It is now widely accepted that when embraced by all, BIM methodologies can transform traditional project planning and delivery – where data is unstructured and team members work independently – into a truly collaborative digital workflow and environment. However, while real-time sharing of structured information reduces the potential for time and cost over-runs on projects, its true potential is far greater.

Integrating technology within BIM's digital workflows enables engineers to simplify the delivery of complex projects. However, those same digital assets created during planning and design can enable more informed decisions, boost reliability and optimise performance of physical assets throughout their operational life.

Transforming travel across London

Commonly recognised as a global exemplar, construction of London's Elizabeth Line by Crossrail Limited is now 80% complete. The organisation continues to focus efforts on leveraging the advantages of digital technology through digital BIM workflows, including those outlined in the PAS 1192 suite of standards and Bentley's connected data environment (CDE).

The visionary team at Crossrail realise that while BIM provides it with a streamlined approach to the creation and management of information during project delivery, it can also ensure the efficient and effective handover of valuable information to the railway's future owners.

In 2016, Crossrail moved its CDE to a hybrid cloud-computing platform powered

by Microsoft Azure, providing a single location for storing, sharing and managing information for approximately one million assets. The project remains on-time, on-budget and on-track to be the first major infrastructure project in the UK to fully realise the value of BIM across the whole asset lifecycle.

Mass rapid transit in Malaysia

Malaysia's Mass Rapid Transit Corporation (MRTC) will be one of the first organisations in Asia to leverage digital solutions throughout the asset lifecycle on its Klang Valley Mass Rapid Transit (KVMRT) system's Sungai Buloh–Serdang–Putrajaya (SSP) line. The second of three planned lines, the SSP Line, includes a total of 37 stations and a 13.5-kilometre underground section serving a population of around two million people along its 52.2-kilometre corridor.

Embracing digital technology is central to MRTC's vision of providing relevant, trusted information wherever and whenever it is needed. As the major infrastructure project in Malaysia, it requires the UK government's BIM maturity Level 2 be met on the project, more than two years ahead of the Malaysian Construction Industry Development Board's mandate for its use on government

“Organisations with a digital strategy and who act decisively will flourish. Those who don't will struggle.”

Steve Cockerell, Bentley Systems



projects. Team members leverage the same digital workflows outlined in PAS 1192 and Bentley's CDE, moving beyond 3D modelling and 2D deliverables to enable handover of digital as-built information to operations.

Better decisions and improved outcomes

Crossrail and MRTC are just two of many excellent examples from around the world that show how visionary transportation owners and supply chains are embracing digital technology today, to deliver different and improved outcomes for tomorrow.

Why are they doing this? Because with technology and innovation moving at speeds never before witnessed, continuing to work in the same way is no longer enough. The organisations involved need solutions that enable them to deliver increased capacity, availability and performance of existing and future infrastructure assets.

Every one of us is touched by transportation and technology. Every one of us is on a “digital journey”. It is how we plot and navigate our route that will separate us from our peers or competition. It will not be easy, but those organisations with a digital strategy and who act decisively will flourish. Those who don't will struggle, fall farther behind and in extreme cases, risk extinction.

It will likely require a profound shift of business and organisational activities, processes, competencies and models for those involved. Without it, however, we will never fully realise the opportunities going digital in transportation can, and undoubtedly will, deliver in the future.

Steve Cockerell is director industry marketing road and rail at Bentley Systems.

Time is right for all CIOs to reconsider their role

Ramboll CIO *Torben Kjaer* speaks to *Infrastructure Intelligence* about how the individual tasked with leading a digital transformation programme needs to be a catalyst for change and provide clear direction moving forward.



“CIOs have a unique opportunity to redefine their role and make themselves and the company more successful. But they need a long-term approach so teams can see how the journey develops over the next five to ten years.”

“I have had the pleasure to lead a transformation programme from local to global IT during the past four and a half years and at a given point in time you could say we got to a point where we thought that we made good progress and it was finished,” says Kjaer. “I personally have seen a complete shift and focus in the role, I don’t think this needs to be done in the same way everywhere but I think we are at a crossroads where the chief information officer (CIO) must consider the way they play the role and interact, so they take advantage of the digital agenda and facilitate the business side of technology,” he says.

The role of the CIO is ever-changing according to Kjaer and he believes those in the position have opportunities to deliver change where others can’t. “We have a huge opportunity to become nurturers of

innovation,” he says. “Our position is fairly unique, we are amongst the few that have led changes across many business units in comparison to others within senior management teams. I think we come with a very good cook book and we should make sure that with the trust and confidence hopefully gained that we lead with a clear direction,” says Kjaer.

But despite all the progress being made in the digital agenda, the Ramboll CIO believes transformation will fail to happen if not properly resourced and backed. “I think we have found the missing framework for innovation,” Kjaer says. “What we might have historically done is celebrate good, innovative ideas in year one, year two, year three, but sometimes we have looked back and thought what happened to those ideas and maybe they

never took off because we have not built a machine room and resourced it properly. So, a framework to get these ideas in place would result in the company being much more efficient and productive to make sure not only innovative ideas are produced but the outcomes too,” he says.

Kjaer also believes there has never been a better time for change and for CIOs to lead their companies towards a more digital future. “CIOs have a unique opportunity to redefine their role and make themselves and the company more successful,” he says. “But to do so they need to articulate their wishes within a long-term approach so teams can see how the journey develops over the next five to ten years. They need to build on action plans that will facilitate change and I’m a big believer that these should be high level plans,” says Kjaer.

But Ramboll’s CIO also believes that a commitment to new technology will not only result in new jobs and services but help bring through a new wave of younger employees attracted to fresh opportunities. “If we embrace transformation from the top then new technologies embedded into companies will play an important role in branding us to new employees which will ensure we continue to get the skills to make us the most outstanding firms in the world,” says Kjaer.

“Operations have to be smooth to be successful and if they are not then this needs to be fixed before you start any digital transformation journey. It’s imperative that a CIO has the trust and confidence of the business to be in the position to lead,” he says.



How digital is making Gatwick fit for the future



Cathal Corcoran, Gatwick's chief information officer, discusses how the airport has undergone a major digital transformation in a bid to improve the experience for its 45 million annual passengers.

As the busiest single-runway airport in the world, Gatwick faces challenges on a daily basis operating at or near capacity most of the time. With ambitions to expand, it's vital those behind the airport's digital programme continue to embrace new opportunities to ensure the airport remains at the forefront of aviation.

Gatwick's CIO Cathal Corcoran is the man responsible for leading the digital agenda and is just over two years into the role. He spoke to *Infrastructure Intelligence* about how embracing change has led to further efficiencies. "To enable our digital transformation, we have just future-proofed our entire IT network for the next decade and it can now take advantage of new, modern technologies for the benefit of airport users – including more than 250 onsite businesses, 30,000 staff and 45 million annual passengers," he said.

According to Corcoran, the need for change became clear when there was a realisation that the airport's IT network

was becoming dated and taking up too much staff time resolving issues. "As one of Europe's busiest airports and a critical national infrastructure site, it was also vital that we installed a resilient, fault tolerant network that could better cope with or adapt to disruption," the CIO said. We have a talented, international IT team at Gatwick and I want them to be delivering the latest exciting innovations instead of sorting out issues. Our new



"It was vital that we installed a resilient, fault tolerant network that could better cope with or adapt to disruption."

Cathal Corcoran

network means they can now do that."

A pioneering trial is set to start this summer whereby the airport will use autonomous vehicles to create the "Uber of the airfield" and as a result reduce the need for such large vehicle fleets, emissions and saving on costs. "Gatwick's 300 airside vehicles are stationary 90% of the time – as staff attend to aircraft and passengers – however our trial of electric-powered autonomous vehicles will soon allow workers to use them on our airfield," Corcoran explains. "We think this trial is the first of its kind for any airport in the world and – if successful and scaled up – it could lead to airfield transport needs being met from a much smaller pool of autonomous vehicles," he says.

The process of change, while ensuring the airport remained 100% operational in just a period of 18 months, was always going to prove tricky but Corcoran has lauded collaboration between teams working on transformation. "Transitioning from old to new networks while keeping the world's most efficient runway operating was a delicate balancing act," he says.

"HPE, the company that provided our new network, had a strong team embedded on site throughout the transition and they worked seamlessly with Gatwick's IT team to avoid any impact to the day-to-day running of the airport. The importance of how well the HPE and Gatwick teams worked together cannot be stressed enough," says Corcoran.

But while the last few years have seen various technologies embedded into the airport's daily operations, the airport is not resting on its laurels and those behind the digital transformation programme continue to look at new opportunities available. "We are transforming the way airport information is communicated and will soon connect passengers to intelligent chat bots using Facebook Messenger, Skype, and other popular apps," Corcoran says.

"Other initiatives going live soon include augmented reality wayfinding and superfast Wi-Fi for passengers. Behind the scenes we are also using machine learning to bolster security and develop passenger journey mapping so gate staff can track late running passengers and send notifications via a range of apps," he says.

Technology has revolutionised the engineering and construction sector down the years. Today, the digital revolution is changing how firms operate, presenting new challenges for companies as they strive to digitally transform their businesses.

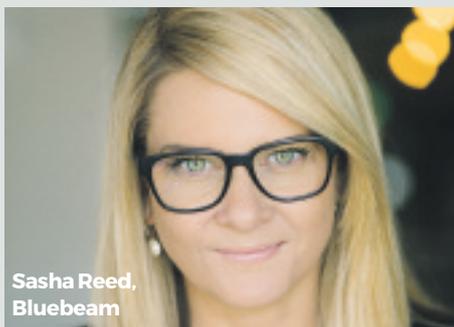
Creating a digital state of mind



The growing pace of digital change is affecting all businesses. In the infrastructure sector, new technology has the potential to usher in new ways of working that can transform how infrastructure operates and the way it is designed and delivered. This digital transformation brings with it new challenges for technology professionals – and all leaders in the sector – who will need to sharpen their focus on the issues that matter to keep pace with change.

Technology company Bluebeam has a key focus on enabling transformation in the built environment. Its vice president of industry advocacy, Sasha Reed, says: “For digital construction professionals the focus needs to be – what is the current state of delivering projects, communicating on projects and what is that desired future state, whether that’s based on what clients and owners want or the demands of the project timeline.”

“Transforming a business isn’t a side-line activity, it needs an active role by leaders because of the rate that technology is evolving.” the process.”



Sasha Reed,
Bluebeam

“What are those firms doing to create a roadmap to digitalise their processes, not necessarily swapping analogue for digital, but really looking at what are the new ways of working that the tools have enabled us to do. Transforming a business isn’t a side-line activity, it needs an active role by leaders because of the rate that technology is evolving the process,” Reed says.

According to Mert Yesugey, project principal at Mott MacDonald on the Thames Tideway project, it is critical for firms to embrace digital transformation. “It gives us an opportunity to try and test new technologies, he says. “Technology plays a part in everything we do and some are more effective than others. On major projects, a lot of staff can get valuable experience of using new technology which creates a legacy for the future. Staff leaving the Tideway project and joining HS2 can take a lot of 3D and BIM knowledge with them to take it the next level. It’s all part of the snowball effect which we took from working on the Northern Line extension and Crossrail,” Yesugey explains.

Javier Baldor, executive vice president at international software company BST Global, said: “It’s easy to get excited about the latest technologies, but it’s important to think beyond the technologies themselves and look into how digitisation will impact, and potentially transform, your business as you know it today. How do you need to change as a company – your processes, structure, all the way down to your core business model itself – to take advantage of these new technologies? Because if you just implement new technologies, without holistically assessing how your business needs to shift, you’re not realising the full potential of digital.”

Increasing digitalisation is having a

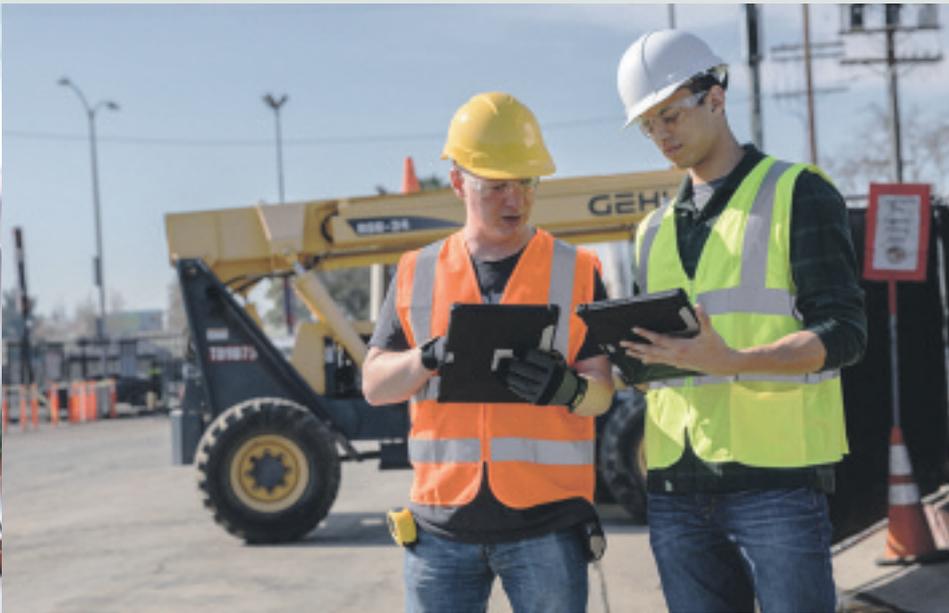
massive impact but it’s one that needs to be measured, says Reed. “We see firms that are investing in the talent and technology and defining how it will be implemented on their projects and then those who are frankly very overwhelmed and feel that they don’t know where to start,” Reed says. “For those firms that are inactive in this area we should stop to say: ‘what is keeping you from moving forward with creating a digitalisation roadmap and even determining if technology is something you want to invest in,’” says Reed.

Mert Yesugey sees efficiencies in digitisation. “The modelling environment is bringing stakeholders together allowing them to view the same information,” he says. “The ability to set up a virtual site within an office environment made up of all the different parties involved means we don’t have to send 25 different people on site to look at something. Being able to picture something in a collaborative

“Think beyond technologies themselves and look into how digitisation will impact, and potentially transform, your business as you know it.”



Javier Baldor,
BST Global



environment saves time,” says Yesugey.

There are some common challenges facing firms embarking on a digital transformation strategy. “Not knowing where to start is something we hear often,” says Sasha Reed. “Just being so overwhelmed with all the technology that’s available and all the workflow processes. The other issue is budget and talent – not only to be able to procure the technology but to have the talent who will define what the key performance indicators are and how to measure whether the technology they have invested in is even performing,” says Reed.

In all of this, the role of the CIO in digital transformation is critical and the role is evolving, from one focused on purely technology to a leadership position with much greater scope. “The CIO needs to have a seat at the boardroom table,” says Baldor. “Typically, the business turns to the CIO for implementing technologies to support existing practices. But the CIO who will truly prosper is the one who not only manages the firm’s ecosystem of business technologies, but also aligns that ecosystem with the business’s current and future models and practices, to positively impact – and even change – the course of the business.”

Bluebeam has spent the last 15 years in the US market helping design and construction firms to manage digitalisation transformation. “The lessons that we’ve learned are you must start small with tangible pilots and attack one part of the workflow at a time, implement technology, create a feedback loop and be able to measure what’s working and what’s not,” says Reed.

“We now have some best practices that have been created from working on digital

transformation,” Reed says. The most critical component we have learned is not necessarily the technology but the buy in and trust of those leveraging the technology. Building trust and quick wins builds confidence and value in the process. Then you create a groundswell of support for new approaches,” she says.

So, what one piece of advice should firms contemplating a digital leap forward follow? Remain focused says Javier Baldor. “When considering a digital initiative, you must keep your firm’s core in mind. The core of AEC firms is and has always been projects. With that in mind, how can you leverage your ecosystem of present and future technologies to create a digital project centre that allows you to deliver better project outcomes in a more efficient and integrated way?”

“Start with where the work happens, follow the paper and the process of whatever information is being shared or

“On major projects, a lot of staff can get valuable experience of using new technology which creates a legacy for the future.”



Mert Yesugey,
Mott MacDonald

brought into the firm and then follow that paper trail,” says Reed. “Where paper is printed, evaluate if it needs to be printed. What is the cost and benefit of going outside of that digital workflow into paper?”

“Instead of just assuming that everything should be digital, really understand the value to that project team member for whichever medium they are choosing at that point. Then, create a digital flow of information from beginning to end and start focusing pilot groups to create those small wins you need, because it doesn’t then take long for the rest of the organisation to create momentum to push through,” says Reed.

“By creating those small wins today, we have a better chance of really evolving the entire way we look at project delivery in the next five years, but we won’t get there if we don’t start to build trust with those individuals who actually do the work,” Reed says.

Mert Yesugey says that leadership is crucial. “One thing I have experienced about firms looking to embrace digital is the need for it to come from top-down. It needs strong leadership from the people driving the strategy so a firm can start embracing the digital future that the younger generation are looking to be involved in,” he says.

It’s clear that digital change will continue at pace and it will be vital for consultancy and engineering firms to stay at the forefront of change. “We need to find ways to do more with less,” says Yesugey, “and make better use of the tools available to us and the ones that will be available in the future that we don’t even know about yet. I think the mentality is the critical element here,” he says.

Embracing digital change on a major project



The £4.2bn Thames Tideway Tunnel scheme is being constructed to tackle the problem of sewage pollution in the River Thames and will prevent millions of tonnes of untreated sewage flowing into the Thames each year. It is the largest infrastructure project ever undertaken by the UK water industry and will rid sewage to levels never seen for 250 years.

“The Thames Tideway project sets the standard for construction projects,” says Mert Yesugey, project principal at Mott MacDonald. “By utilising building information modelling (BIM) we were able to produce 3D digital engineering models and share with all parties which ultimately drove collaboration based on up to date information which was key to its success,” he says.

Mott MacDonald was tasked with providing leadership on a digital strategy within the planning and design stages on this UK mega-project. The firm was a lead designer for the CVB JV on the eastern section contract from Chambers Wharf to Abbey Mills, as well as a connection tunnel from Greenwich to central London.

Yesugey claims that adopting a digital agenda and prioritising a collaborative working environment was essential for all parties. “We got together with the Tideway client early on and asked how we can make our engagement meaningful and use available tools and models to benefit us,” he explains. “From this led to BIM Wednesdays where each Wednesday we got together in a location or had people Skype call in and view models on smartboards. This meant that when we got to the point of submission we had collectively resolved all the issues,” says Yesugey.

Mert Yesugey, project principal at Mott MacDonald on the Thames Tideway scheme, explains how a shift towards digital has improved efficiencies and a collaborative working environment between teams.

Lessons and knowledge gained from previous major project work helped Mott MacDonald on Tideway. “There was a lot of learning from the Northern Line extension programme and one thing we were quite keen to do was to bring all the parties together and use the principle of collaborative working,” Yesugey adds. “A key decision was to put all our data together providing access to key stakeholders and clients and from there we could drive meaningful collaboration and work in the modelling environment,” he says.

Technology used in the design process of the tunnel provided teams with an

“Each Wednesday we got together or had people Skype in and view models on smartboards. This meant that at the point of submission we had collectively resolved all the issues.”

**Mert Yesugey,
Mott MacDonald**



insight into any problems and allowed clear visualisation of progress on a regular basis. “By using the models, we could look at the design in real time on a weekly basis and that built a lot confidence between parties because we were trying to get to know each other and by focusing to a single point in the model environment we could actually visualise the problems much easier and talk through them,” the project leader said.

The digital programme adopted not only drove significant change in process and culture, but also brought about significant time savings which Tideway aimed to achieving from the outset. “Working collaboratively in the model environment allowed us to focus into any problems and we realised early on that we did not need to produce 2D drawings because we were engaging so much in the model environment and 3D,” Yesugey says. “We could do the same information exchange and design assurance through the 3D models. By doing that we saved quite a bit of time and there was a vision from Tideway to shave two years off the programme and we supported that through our way of working.

“The client accepted our earlier designs in the model environment only and I think that’s the first I am aware of in a major project within the UK, I think that provides a legacy for the future,” says Yesugey.

Boost your business by going digital

We have long harnessed digital tools to create more efficient projects that better serve our clients and their customers.

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Keeping digital

Network Rail's managing director, group digital railway, *David Waboso*, explains why changing the relationship between Network Rail and its supply chain partners is crucial to transforming the network.

You could be forgiven for thinking that the recently published Digital Railway strategy is solely about deploying new forms of signalling and train control on the network. Naturally enough the media headlines that followed focused on the potential passenger benefits of replacing the old trackside 'traffic light' signals with train control technology.

Nothing wrong in that and it's certainly true that introducing modern signalling systems is the key to unlock the much-needed additional capacity across the network and improve the performance of our railway, which is full to bursting on many of our busiest routes. And I am pleased to say we are making great strides to bring this about.

We've come a long way in addressing all the major risks and there have been three important strategic developments: first, we have begun the process of fitting the entire fleet of go anywhere freight trains with the technology to enable them to operate on a digital infrastructure; second, working closely with our colleagues in the Department of Transport, we are using the franchise process to ensure that new passenger rolling stock is manufactured as digital or at a minimum 'digital ready', allowing for full conversion simply and cheaply in future; and third, Network Rail has announced – with the active endorsement of the Transport Secretary – that from CP6 onwards all signalling renewals of life expired analogue systems will be digital.

These are important building blocks that will underpin the Digital Railway. But they are only half the story.



“The scale of the challenge facing Network Rail and the wider rail industry will require radical changes to the way we interact. No change is not an option.”

Digital Railway is more than just technology improvement. It's about delivering a change in approach to the way we do business with our supply chain partners. The feedback from the supply chain is that the scale of the challenge facing Network Rail and the wider rail industry will require radical changes to the way we interact. No change is not an option.

Introducing disruptive technology is challenging and clients must accept we



don't have all the answers. We need to work collaboratively with our supply chain partners and also encourage new entrants to harness their expertise and help develop solutions to deliver the best results for passengers.

When I joined the Digital Railway programme I established the Early Contractor Involvement programme to find new ways of working with the supply chain and also to encourage disruptors to help us find solutions to difficult challenges.

Working collaboratively in this way with the supply chain has been very successful in formatting our plan and approach and is



Helping deliver better results for passengers.

change on track



Left: The new Class 700 digital railway train that operates with in-cab signalling through central London on the Thameslink route. Below: A digital signalling screen in the Thames Valley signal centre at Didcot.

continuing as we enter the delivery phase of Digital Railway. Our partners are involved with the programme's joint design group which brings together a community of suppliers, with a wide range of skills and capabilities. This will allow us to draw upon a diversity of ideas and experience as we tackle a variety of challenges in renewing complex signalling systems.

We face a bow-wave of signalling renewals with more than half of our major signalling assets needing to be replaced within the next 15 years. Achieving this level of signalling is unaffordable at the current pricing levels – and the level of

access required is also probably unsustainable.

The supply chain recognises this and is committed to working with us to drive down the cost and level of disruption

This will require innovative procurement based on whole of asset life and outcome based contracts. It will mean Network Rail becoming smarter at designing contracts, focusing on in-service performance and achieving outputs. Procurement that is too prescriptive reduces innovation and discourages new ways of working.

An early example of this new approach to working with industry is the deployment of Resonate's "Luminate" digital train management system on our Paddington to Bristol route. This isn't just about the technology, but a novel form of contracting arrangement. It needs only a small upfront investment and is based a shared benefits agreement whereby the supplier will be rewarded if the new system delivers performance improvements and a corresponding reduction in delay compensation payments.

This is just the beginning and we will see more of that kind of approach as our plans emerge in the months ahead. These are exciting times to be working in the rail industry and we have a once in a generation opportunity to change the network for the benefit of passengers and other users. But we will only succeed if everybody comes together to make change happen.





The UK needs infrastructure which connects more people to more opportunities more quickly and more reliably. That means thinking digitally, says *Josh Dickerson*.

Transforming UK infrastructure means thinking digitally

“**R**oads, rails and cables boost productivity by developing networks and enabling businesses and individuals to connect more quickly, cheaply and efficiently,” so says Robert Jenrick, the UK exchequer secretary to the Treasury with responsibility for infrastructure delivery.

Jenrick has much on his plate. There is HS2, which is now looming large on the industry’s agenda as work on the first leg between Euston and Birmingham gathers momentum and regions across the country prepare for future stages of this hugely ambitious project. We also have continuing investment in smart motorways and the ongoing work of organisations like Midlands Connect in making sure that strategic, cross-regional route networks have better links and fewer bottlenecks.

Critical as physical infrastructure is – and it’s as important we invest in protectors like flood defences as we do in enablers like airports – there isn’t a single project that will on its own solve the regional productivity puzzle that plagues the UK’s economy.

So, we need to stand back from necessary big bang projects and ask whether there is something else we should also be doing to make our city regions match-fit for the future. This is where the networks Jenrick referred to above come in to play – the drive for a national digital infrastructure.

The need for a digital transformation of the built environment goes beyond its ability to deliver a step-change to productivity. It is a fundamental part of the drive to reduce carbon emissions and improve environmental sustainability. Most of all, it’s an opportunity to make

what we’ve got work better and what we build deliver greater returns.

How do we do this? We need our built environment to generate data which allows us to better understand how it functions and how it’s used and to use that data to develop dynamic, real-time solutions which enhance their performance both as economic arteries and as physical assets.

The scale of the opportunity has been alluded to by the National Infrastructure Commission in its exploration of potential for creating digital twins of the UK’s critical infrastructure (detailed in its Data for the public good report). This is also what the wave of technological developments known as ‘Industry 4.0’ can help us achieve – a dynamically-managed physical infrastructure which is more resilient and responsive to changes in society and environment.

This is a huge, perhaps transformational opportunity. It touches on technologies that are becoming more commonly known – artificial intelligence, machine learning, augmented reality, big data, internet of things, even blockchain – even if their potential is not yet fully understood.

“Better methods for accessing and sharing data will be critical to achieving the step-change in infrastructure performance.”

Josh Dickerson



It’s also important that we understand what a national digital infrastructure is and isn’t. Yes, it could be transformational, but it won’t be a single project running at a consistent speed. It will involve behavioural and cultural change and moving away from technological silos towards common technology standards (in the same way, for example, that the mobile communications industry did with 3G and 4G). At the most basic level, we need mechanisms for data sharing; in the longer term, a framework which drives common standards.

Better methods for accessing and sharing data will be critical to achieving the step-change in infrastructure performance that our economy needs. So will a fast, robust digital communications infrastructure.

It will also be about public engagement – encouraging people to understand that if they adopt behaviours which enable better use of infrastructure we can all gain and demonstrating that there are adequate safeguards covering data and privacy. This touches on everything from through-ticketing to autonomous vehicles to the shape of the world around us and assumes people will be willing to change some of their basic habits.

Whether it’s road, rail or digital networks, we need infrastructure which connects more people to more opportunities more quickly and more reliably. And such an infrastructure will deliver best if we think digital first.

Josh Dickerson is an associate with Deetu, the data and technology development hub launched by design engineers BWB Consulting and is a member of the National Infrastructure Commission’s Young Professionals Panel.

A Wake-Up Call for Business Leaders in Professional Services

We surveyed 700 decision-makers from the professional services industry to uncover their current and future challenges and priorities.

Firms across the globe say they feel unprepared for future risks

79%

for regulatory risk



75%

for talent shortages



74%

for disruptive technologies



A key reason is a lack of access to the information they need to properly prepare

53%

do not know if they need to hire or fire in three to four months

57%

don't have a clear view of which projects or clients are profitable

51%

do not measure resource utilization rates



57%

say reports for important decisions come too late

Deltek.

How does your firm compare?

Download the full report for further insight and key action points to help your firm stand up to the future:

[Deltek.com/keytrends2018](https://deltek.com/keytrends2018)

Source: *Insight to Action, Deltek, 2018*

Base: 700 global senior decision-makers in professional services industries

Hilson Moran Turns to Bluebeam Revu and Studio Prime to Drive a 60% Increase in Production Efficiency

As an international multidisciplinary practice offering design consultancy services for the built environment for over 40 years, UK firm Hilson Moran has significantly increased their investment in digital solutions. A change in philosophy came with the successful implementation of Bluebeam® Revu®, as the firm embraced technology and customised its usage to open a new chapter in the industry-leading firm's timeline.

The Revu Phase

When Hilson Moran first rolled out Revu, the firm went from 10 licences to an enterprise-wide set of 229 licences within a calendar year. Engineers quickly gravitated towards the sophisticated PDF markup technology in Revu, drawing review, batch overlay, and even custom tool sets, which "the lab" designed exclusively for use by Hilson Moran. Paper use also greatly declined, saving the firm money in the form of lower printing and shipping costs for drawing approvals. "We found real benefits, and I did some measuring looking at just paper use," says Ugarow. "As a company we do measure how much paper we use across the business. We've done that for the last three or four years now, and it's a fact that we are using less paper. Reducing that constantly about 30% over three to four years."

Using Studio and Studio Prime

The Studio capabilities of Revu provide the added ability for multiple users to sign in to the same drawing review sessions, offering simultaneous, real-time editing for users who can be located hundreds of miles apart. "What this



has given us the opportunity to do is to collaborate with our other offices," explains Ugarow. "We have offices here in the UK in London, Farnborough, Cambridge and Manchester. We also have two offices in the Middle East; in Qatar and Abu Dhabi. We use two or three of our offices to coordinate the design, so again, Revu's Studio feature is actually perfect for that." Given the need for regular cross-office collaboration, the firm decided to add the cloud-based subscription for Studio Prime, which offers all the collaborative possibilities of Studio, but with secure administrative controls and the ability to customise the product using an open API for cross-software collaboration.

"I think adopting Studio Prime certainly gave us a bit more level of comfort because you know these days cyber security is a massive issue. A lot of our clients are very sensitive in terms of the projects they do but at the end of the day, you can't sort of push against the tide," says Ugarow.



The Results: An Undeniable Comparison

Hilson Moran's focus on project efficiency played into the firm's effort to measure the impact of incorporating Studio Sessions in Revu into their process. "We did have two projects very similar to

one another for the same client," says Ugarow. "The first one, which was done a year earlier, was really designed using the traditional sort of methodologies. We had workshops and discussions about how to coordinate those. With Revu's Studio features, and the second project, we did all that work in the collaboration environment. What we found is that just the sheer number of hours we had recorded during the first version was a lot more compared to the hours spent using the Studio feature. We actually found that if you look at just the production process, [using Studio] was almost 60% more efficient, which was quite a positive surprise!"

Where Do They Go From Here?

The value of the Studio capabilities and subscription-based Studio Prime in Revu has opened the door for more intensive project standardisation within the organisation. "There's going to be some real benefits once we start engaging with external partners, whether it's architects, or structural engineers on the project, or even clients as well. We see huge benefit in that, and I think we're pretty much there to do that on projects now," elaborates Ugarow. Given the 60% efficiency increase in production, earned by using the Revu application's Studio and Studio Prime on projects, working and communicating with project partners will only get easier, giving Hilson Moran a clear advantage within the highly competitive construction industry.

Learn more about Bluebeam Revu at www.bluebeam.co.uk.

