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'Super-sewer' connecting Londoners with the Thames
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I INFRASTRUCTURE Intelligence

Produced for the industry by the Association for Consultancy and Engineering



TOM GRAHAM

Delivering the new London Bridge station

pages 8-10

PLUS: ● Regional hotspots ● Skills Summit 2018 ● Roundtable report ● Celebrating our 30th issue ● Sporting legacy



INFRASTRUCTURE Intelligence

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MESSAGE FROM THE EDITOR

Welcome to the 30th issue of *Infrastructure Intelligence*. We've now been going for four years and we're delighted to be celebrating that fact on page 19 by reflecting on a significant milestone for our publication and website.

Elsewhere, the magazine is packed full of the usual informative mix of news, features and intelligence about infrastructure that you've come to expect. Major projects feature strongly this issue. We have features on the impressive new London Bridge station (p8-10), the Thames Tideway project that will reconnect Londoners with the River Thames (p16-18) and we report on the potential for a new bridge from Scotland to Northern Ireland (p20-21).

Speaking of potential, we preview the Skills Summit 2018 futureproofing the industry event that takes place in London in June (p6-7) and we also take a look at the fascinating proposals for HS4Air, which if realised promise to create "an M25 for high-speed trains" (p24-25).

Our latest Think Tank piece sees Mott MacDonald's Richard Shennan wax lyrical about digital transformation in the construction and infrastructure sector (p11), a theme echoed by AECOM's Richard Robinson in an opinion column on page 31. We also take a look at the contribution that regional UK markets are making to construction output (p5) and what Birmingham needs to do to ensure its Commonwealth Games legacy (p30).

News, views, comment, information, great pictures, infrastructure and intelligence – still going strong after 30 issues!

Enjoy the read.



Andy Walker,
editor, *Infrastructure Intelligence*

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Government's £400m car charging infrastructure plans delayed

The government's plan for a fund to help finance electric car charging infrastructure is running behind schedule.

Despite an announcement in last year's autumn statement that a £400m government fund would be set up to finance the building of electric car charging points, the delivery of much-needed infrastructure is set to be delayed, following a statement to MPs by junior Treasury minister Robert Jenrick.

This could be bad news for car manufacturers and to efforts to tackle air pollution in UK cities. To support the shift to zero-emission vehicles, the government's £400m fund would be made up of 50% from the taxpayer, with

the rest match-funded by the private sector. However, the government has yet to appoint anyone to raise the £200m of private investment and is way behind on its plans to secure the funding.

In a written parliamentary answer to shadow transport secretary Andy McDonald, who asked how much of the £400 had been raised, Jenrick said: "The government is engaging with the private sector to ensure that it (the fund) is set up in the most effective way. We expect to launch the procurement for the private sector fund manager in summer 2018, who will be tasked with raising the £200m of private investment. Further details will be announced in due course."

McDonald criticised the government's inaction, saying: "The government's electric vehicles policy has run out of power before leaving the driveway. Ministers failed to admit they hadn't secured a penny of investment and didn't intend to raise anything in the near future. They have announced £200m that isn't theirs and hasn't been promised to them."

With some polls showing that more than a third of people would consider buying a fully electric car, the need for fast-tracking national charging infrastructure is more important than ever.



Housing crisis forcing London workers to quit jobs

The shortage of affordable homes to buy and rent in the capital has been described as a "ticking time bomb" and is damaging firms' ability to recruit and retain staff, according to the latest CBI/CBRE *London Business Survey*.

According to the research, two thirds of the firms in London are struggling to recruit and keep staff as a result of high prices and low-availability of homes. The London Business Survey found that 66% of the 176 respondents said that housing costs were having a big say on how their recruitment, a record high percentage for the survey.

Significantly, 28% of firms said that some of their employees had left because they could not afford to live in the local area. The housing shortage is also an issue for more senior employees, with three fifths (59%) of the capital's firms citing it as an issue for recruiting mid-level managerial staff (compared with 45% in 2015).

Eddie Curzon, CBI London director, said: "This survey speaks loud and clear – London's housing shortage is a ticking time bomb. The potent combination of lack of supply and high prices means businesses themselves are being priced out of the market, as they can't afford to recruit and retain their workers, from entry-level to senior staff. And with two thirds of firms not optimistic the housing market will become more affordable in the next three years, we have a stark challenge on our hands."

NIC picks young professionals to sit on infrastructure panel

Sixteen young architects, engineers, designers and energy specialists in the first few years of their careers have been handed a unique opportunity to have a real influence over how the UK's infrastructure is developed over the next three decades.

More than a dozen of the UK's top young professionals have been selected to sit on the National Infrastructure Commission's (NIC) Young Professionals Panel after a judging team trawled through more than 500 applications.

The panel was launched in April by NIC chair Sir John Armitt with the aim to provide a platform for the infrastructure sector's future leaders and give them a chance to inform and have a say on the commission's work.



Armitt said he looked forward to working with these talented individuals who "could end up designing and managing world-leading infrastructure" long into the future. "The commission exists to identify what infrastructure the country needs up to 2050, so it's right we give the next generation of infrastructure leaders a say in our work," he said

● To find out more visit www.nic.org.uk/ypp/



Ogunshakin to leave ACE to lead world engineering federation

ACE chief executive Nelson Ogunshakin is to leave the organisation after 14 years at the helm to become chief executive of the international engineering federation, FIDIC. *Andy Walker reports.*

Nelson Ogunshakin is stepping down as chief executive of the Association for Consultancy and Engineering (ACE) after 14 years in the role to take over as chief executive officer at the International Federation of Consulting Engineers (FIDIC).

The announcement of Ogunshakin's departure was made at the end of March and it's fair to say that it caused a bit of a stir in the industry, given his longevity at ACE but also the considerable success he has achieved since arriving at Alliance House well over a decade ago.

On his arrival, ACE was losing members and searching for a role in a changing industry. Ogunshakin led the organisation with some gusto and reconnected ACE with the industry's key players and embarked on a transformation programme which saw the organisation increase in size, influence and effectiveness to an effective industry lobby group that punches well above its weight.

Commenting on his decision to stand down as ACE chief executive, current ACE chair and managing director of Ramboll UK, Mathew Riley, said: "On behalf of ACE's members, the board, advisory board and entire staff, I would like to thank Nelson for his outstanding contribution to the transformation and development of ACE over the last 14 years. His achievements and unflinching dedication to the organisation have been both remarkable and inspiring.

"He has successfully positioned ACE at the top table where it has been able to influence government, investor, developer and stakeholder decisions on

infrastructure, ensuring a sustainable future for our industry. We wish Nelson the very best in his new role as chief executive officer of FIDIC and look forward to working with him in our ongoing efforts to promote the business interests of professional consultancy and engineering companies globally."

Ogunshakin said: "I have seen many progressive changes during my time at ACE, but the one constant has been the regard in which the association is held by its members, by government and by our many stakeholders in the construction and infrastructure sector. Given the growing importance of infrastructure, and the key contribution of consultancy and engineering companies in driving economic and social prosperity, leading ACE is a hugely significant role. My successor will be taking over an organisation working in a business sector with a bright and exciting future.

"Leading ACE has been an enormous privilege and an amazing experience. I am immensely proud of the fantastic board and staff members I have been lucky to work with over the years. Whoever takes over as chief executive will be working with a brilliant, diverse and talented corporate and operational team."

Ogunshakin will replace current FIDIC managing director, Enrico Vink, who is

"FIDIC is an organisation with massive potential and it's clear that Ogunshakin is relishing his new challenge."

retiring. FIDIC has 102 member associations representing the consulting engineering industry globally and promotes the business interests of firms supplying technology-based intellectual services for the built and natural environment. Given its size and scale, FIDIC is an organisation with massive potential and it's clear that Ogunshakin is relishing his new challenge.

"FIDIC is a well-established global brand with diverse expectations from its stakeholders and urgently needs to respond to the emerging challenges facing the global consulting engineering industry," he said. "Internationally, our industry faces a number of key challenges associated with the emergence of China's economy, price volatility in the oil and energy markets, urbanisation of cities, embracing digital technological innovation, market consolidation and growing economic and political instability across the globe.

"My priority, as a change agent, will be to take a root and branch review of FIDIC's activities, initially focusing on its core activities and deliver them very well. In the medium to long term, I look forward to working with the FIDIC executive committee to establish appropriate strategic objectives, effective governance structures, services proposition, closer membership engagement and the implementation of operational efficiencies to ensure we are responsive to an ever-changing international marketplace and fit for the future," Ogunshakin said.

ACE's board has already started the process to find a replacement and ACE and FIDIC have agreed to a smooth transition, with the exact timings of Ogunshakin's departure to be confirmed once a replacement is lined up. Ogunshakin will then move to join ACE's advisory board as its vice chair.

Regional construction markets appear to be benefiting from devolution deals and greater autonomy, writes *Andy Walker*.

Construction markets in the north west, West Midlands and the south west have seen output increase despite Brexit uncertainty and appear to be benefiting from devolution deals and greater autonomy.

According to the *UK Market Intelligence* report from professional services company Turner & Townsend, construction output increased by 30.7% in the north west, by 27.8% in the West Midlands and by 27.2% in the south west during the period immediately before the EU referendum through to the end of 2017. In contrast, construction output in London fell by 5.7% during this time.

The north west, West Midlands and south west are identified by the report as 'hot markets' where high demand and insufficient contractor supply has pushed up tender prices.

Contractor order books in the West Midlands are 92.9% full for the current financial year, 12.4% above the national average. This buoyant market is being stoked by a raft of HS2 infrastructure projects, strong manufacturing sector demand from Jaguar Land Rover and brisk levels of activity in commercial sector construction.

Devolution is also playing a key role in driving that momentum. Last November the West Midlands Combined Authority signed a second devolution deal, securing £6 million of central government funds for a housing delivery taskforce, £5 million for a construction skills training scheme and £250 million from the Transforming Cities fund to be spent on local intra-city transport priorities.

In addition, around £10bn of major construction projects including the complete redevelopment of land around new High Speed Two stations has been brought to the market by West Midlands councils. An investment prospectus, unveiled in March by West Midlands mayor Andy Street, outlined 20 different projects in the region.

In addition to their solid rate of output growth and strong order books, these regions are also showing the classic signs of hot markets – in which high demand and insufficient contractor supply drive up tender prices. From the period immediately before the Brexit referendum to the end of 2017, tender prices rose by 4.8% in the north west and 4.6% in the West Midlands and south west England.



Construction output is up in the West Midlands (pictured above) and the north west (below).



Regional hotspots boost construction growth amid Brexit uncertainty

However, Turner & Townsend's report forecasts that tender prices will only increase modestly this year even in these hot markets with 2.3% growth forecast in the West Midlands, 2.2% in the north west and 2.1% in the south west. London is forecast to have tender price inflation of 1.7% this year.

The prospect of such modest increases in tender prices is likely to keep the pressure on a supply chain that's already seeing its margins squeezed by systemic skills shortages and high material cost inflation. This challenge will be at its most acute in London, where contractors risk being caught in a double bind of sharply rising labour costs and weaker demand that gives less scope for tender price inflation.

Paul Connolly, Turner & Townsend director, commented: "As market

uncertainty continues to weigh heavily on the construction industry, output data in several regions gives early signs of a correlation between regional autonomy and resilience to the confidence-sapping impact of an uncertain political future. The data also reveals the nuances of the London market. Despite a slowdown in the office sector, the residential and infrastructure markets in the capital remain very buoyant."

While there remains regional variations in construction output, an emerging national trend is the rise of single-stage tendering. In the first quarter of 2016, 27.4% of projects were offered on a single-stage basis, compared to 36.5% on a two-stage basis.

That split has now changed, with single-stage tendering having increased by over 10% at the end of 2017 while two-stage fell by over 5%. The trend reflects the increased contractor appetite to take on additional commercial and schedule risk.

"Notwithstanding, this increased appetite, clients need to remain cautious on what risk is actually being taken on and managed by contractors. The failure of Carillion and the rising number of insolvencies suggests risk transfer in the current environment can be illusory," said Connolly.



"Data gives early signs of a correlation between regional autonomy and a resilience to confidence-sapping uncertain political futures."

Paul Connolly

Skills Summit 2018: future

A new industry event will focus on the key skills challenges facing the infrastructure sector.

A new event to highlight the skills and attributes of the industry's engineers and technicians has been launched by the Association for Consultancy and Engineering (ACE).

The inaugural *ACE Skills Summit: Future-proofing consultancy and engineering*, takes place on Wednesday 6 June 2018 at the Marriott Grosvenor Square, London and will focus on the key skills issues facing the industry. Issues including how to attract and retain the next generation, the challenge of filling the skills gap and how best to deal with the loss of knowledge as more experienced generations retire will all be given an airing at the event.

Key speakers from Ramboll, Engineering UK and the Royal Academy of Engineering will explore these issues in the morning session of the summit, while the afternoon will be split into three separate workstreams for emerging leaders, apprentices and HR professionals. The afternoon also includes practical sessions dedicated to improving commercial and business skills, as well as knowledge of the wider industry.

Taking place during the Year of Engineering, the ACE Skills Summit will



“We need to open people’s eyes

Two of the speakers at the forthcoming ACE Skills Summit, Dr Hayaatun Sillem and Mark Titterington, spoke to *Infrastructure Intelligence*.

Dr Hayaatun Sillem, chief executive of the Royal Academy of Engineering

Q: Are you looking forward to ACE's Skills Summit and how important are events like this to ensure the industry focuses on recruitment?

HS: This is an exciting new event designed to look at future-proofing consultancy and engineering. I hope we get the opportunity to discuss how the nature of work and the role of engineers will change in the future. The profession faces a significant skills shortage, so the more we can bring industry together to align and increase efforts to address this, the more impact we will have.

Q: Does construction and engineering have a problem with recruiting new talent and how

worried should we be with the skills shortage that many point to?

HS: According to EngineeringUK's latest analysis, the construction sector is expected to see a demand of over 750,000 workers between 2014 and 2024. That's 75,000



people a year assuming a level annual distribution over the ten-year period. 70% of that demand is replacement demand – either people retiring or leaving the sector for other reasons. For many ACE members, who represent some of the world's leading engineering companies,

this data might not tally with their experiences. Many top companies will have hundreds, if not thousands of applicants for positions advertised. But in smaller companies, finding good, skilled engineers is a challenge.

Q: Does the industry have more of an issue recruiting and encouraging women? And how can firms go about ensuring women climb the ladder and fill more senior roles?

HS: At less than 10%, the UK has the lowest proportion of female professional engineers of any other European country, well behind countries such as Italy at 19.5% and Sweden at 25.9%. Encouragingly, our analysis of women who graduate from engineering degrees shows that around the same proportion go into engineering jobs as men. So, it suggests that once, we get young women into higher education and doing interesting engineering degrees, they are keen to take jobs in the profession.

re-proofing the industry



explore ongoing concerns around the skills gap in the UK construction sector. Estimates project that there will be a demand for 265,000 skilled employees in the sector, including 186,000 engineers until 2024. The situation is further exacerbated by the ongoing uncertainty around Brexit and its potential impact on the free movement of Europeans which has traditionally helped to meet this demand.

The event will also look at strategies to attract and retain millennials who will soon make up 50% of the global workforce. The new ways of working that need to be developed to appeal to a generation of highly-educated, digitally-native, socially-conscious and confident self-starters will be examined at the summit.

ACE has collaborated with a range of stakeholders in putting together the summit's agenda, including ACE's Progress Network and HR Taskforce, the Technician Apprenticeship Consortium and a number of CEOs and HR professionals who have helped to devise an engaging and informative agenda to explore the issues in-depth.

The event is aimed at a number of audiences:

- CEOs who want to gain insight on the major skills issues facing their industry;
- HR professionals who would like to learn more about the innovative ways of recruiting and retaining the next

generation; and

- Engineers, technicians or apprentices who want to improve their business and commercial awareness, knowledge and leadership skills.

The skills summit will provide a unique opportunity for the sector to come together to address the skills issues it faces and will collectively identify solutions to future-proof consultancy and engineering and ensure it remains both an attractive career choice and an industry which continues to deliver to its fullest potential.

At the summit, ACE will also reveal the results of its innovative reverse mentoring project where senior leaders and senior executives (mentees) learn about current trends and behaviours from junior staff (mentors) who in return gain valuable insight into the knowledge and experience of senior executives.

The project, the first cross-company pilot in the infrastructure industry, included 11 mentor pairings from Arcadis, BWB, Mott MacDonald, Max Fordham, Peter Brett, Tony Gee and WSP. All delegates at the skills summit will receive a complimentary copy of the reverse mentoring report which will highlight recommendations for any company interested in launching their own reverse mentoring scheme.

● **Full details on the ACE Skills Summit at <http://ace-skills-summit.co.uk>**

es to engineering"

Mark Titterington, chief executive of Engineering UK

Q: Is more education needed to make young people aware of the opportunities available to them?

MT: The *State of Engineering* report we have produced shows just how far engineering skills are woven into the fabric of the economy. It's not just engineers working for engineering companies, it's engineers working for the Syntegas of this world and it just challenges what you think an engineer does and the careers available to them. But yes, absolutely we need to challenge the perception of what it is to be an engineer. When I talk to young people they automatically respond with digging tunnels and building bridges, it's heavy industrial work. We have an awful lot to do to open young people's eyes to the modern, exciting world of engineering.

Q: Is recruitment a British problem? Are our

European counterparts managing to encourage more young people into the industry?

MT: This is my opinion and not necessarily fact, but from my observations in the role so far, and looking across the world, one thing that stands out is the degree to which countries like Germany view the apprenticeship as a technical route into a career. There seems to be a greater value placed on them and their status, compared to what we have in the UK.

I think we have got to try and emulate that and hopefully the apprenticeship levy will go some way to improving things. Apprenticeship programs are a terrific pathway into engineering and allowing someone to get to the very top of



the tree as well as university pathways. It must be seen as a credible alternative to university and I'm not sure we have been as good at that as our European neighbours.

Q: What messages or topics of discussion will you be raising at ACE's Skills Summit?

MT: I'll be looking at the overall skills pipeline and the need from both a societal and economic perspective to ensure that our education system is equipping young people with the skills they need to pursue these career pathways. I'll be talking about the need to join up our employers with the activities in schools as one way of doing that.

The diversity question will also be raised and how I believe the engineering workforce of today does not reflect the diversity of the UK. We need to focus on getting more women into the sector and those from ethnic minorities and socially disadvantaged areas. This is really important with reservoirs of talent being untapped.



With London Bridge officially opening this month after a five-year redevelopment, *Ryan Tute* speaks to some of the design leaders from WSP on how it remained operational throughout.

“Open-heart surgery” delivers a new London Bridge station

Designing and constructing major infrastructure projects is far from easy. But imagine being tasked with completing the redevelopment of a 180-year-old station while ensuring some of the country’s biggest train operators continue to run services and more than 50 million commuters still enter through its doors every year.

That is exactly the predicament a cross-section of architects, designers and contractors faced when carrying out the £1bn transformation of London Bridge station. The work at London’s fourth busiest station is part of Network Rail’s £6.5bn wider Thameslink Programme and one of the most complex and ambitious rail station redevelopments in the UK.

The official opening took place in May. The upgrade work which began in 2013 can be sectioned into stages, but years of meticulous planning started back in 2008 to ensure the station could still be operational as sections were ticked off usually in 18-month segments.

Now complete, passengers can benefit from new trains running every two to three minutes through central London in peak hours and a fit-for-purpose new station which should meet the needs of passengers. The fundamental aim of the project was to increase capacity and this has been achieved by creating new platforms, building a new concourse, and

developing a bigger and better station for passengers.

The plan behind the programme was to remodel the track and platform layout from nine terminus and six through platforms to six terminus and nine through platforms. The redeveloped station is now capable of coping with 75 million passengers a year.

When Network Rail first proposed the Thameslink Programme to transform north-south travel through London, there was little idea of how it could be achieved due to the many complexities teams would face. To overcome the huge number of challenges, success would only be guaranteed through close collaboration, innovative thinking and a nine-stage process which needed to be adhered to at every point.

The staging involved demolishing the old platforms and a proportion of arches below the platforms and then



progressively reconfiguring the tracks to construct the new station in nine stages, each section of which had to come into service before the next stage can commence to avoid the overall schedule overrunning.

Design leaders from WSP have been part of the process from the beginning. Technical director David Carter explains how the remit was to find a way of delivering the new station while ensuring London Bridge remained open so the travelling public could still use it.

It was Carter who came up with an idea central to the progress of work. He floated the suggestion to have non-stopping train services through London Bridge which could allow work to be completed in certain sections.



TOM GRAHAM

Commenting on the idea, Carter said: “We proposed to train operators at what level could we stop train service at London Bridge and what would be acceptable in terms of passenger flow. We asked whether having non-stopping services on the Charing Cross and Cannon Street services at the same time was possible but understandably this was politically unacceptable and not viable for the train operators. After discussions, Network Rail came back and said it might be possible if we kept one at a time running. These discussions were a key development in the first two years as it allowed us to push onto station designers that not only is this the structure but this is what you need to be doing at the various stages of the process.”

The idea of having these non-stopping

A common description used by those involved in the project was “performing open-heart surgery on a patient that is jogging”.



NETWORK RAIL

services was responded to with a certain level of scepticism by Network Rail and the Department for Transport (DfT) on whether this was a credible case and whether enough passenger capacity could be proved.

“We had to look at passenger footfall, how the station operates and whether any minor infrastructural changes at other stations could be made. The non-stopping services were met with a level of resilience but it was our job to prove how we could make it work. The last thing Network Rail and the train operators want is to say yes that’s a great idea and then six months down the line have the media writing stories of Charing Cross in chaos with the barriers and entrances closed because they are flooded with people.”

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>>> continued from page 9

But like any redevelopment of this size, a number of construction and civil engineering challenges were encountered. A common description used by those involved was “performing open-heart surgery on a patient that is jogging”.

To overcome road bumps in the process, communication and collaboration with all the workers, stakeholders and train operators was immensely important. WSP was the lead consultant in a joint venture with Arcadis, working for main contractor Costain, Network Rail, Balfour Beatty Rail, Siemens and Grimshaw, the original architectural team.

Employees working on the station were located in one office next to the station, with the design team peaking at more than 240 full-time equivalent staff at any one time.

Adrian Tooth, a design director for WSP, said it was the best co-working environment he has experienced during his career. “I have worked in other co-located offices before, but this was the best in terms of levels of engagement and speed of communication. Anything that is highly complex in nature is always potentially going to be difficult to achieve so the way you work your way through any challenges is to ensure you are working very closely together. A phrase that was coined to demonstrate this was “stand and talk, don’t sit and send” which summed up the principle of going to find the person you needed so you could not only talk through it but draw through it.”

Tooth’s thoughts are echoed by Carter who said that only by all parties buying into the delivery dates could London Bridge be kept to schedule.

“Programme is king,” Carter adds. “Anyone from Costain, to someone signalling for Siemens, or laying track from Balfour Beatty Rail, needed to buy into it and hit the dates in the staging process, as if one doesn’t then it pushes the whole strategic programme out. It’s a massive piece of work which everyone bought into because they knew that them being late down there, screws everything else up here.”

Another important principle from the start has been to retain some of the Victorian heritage of the station which has brought back some of old structural assets into public vision.

Tooth said: “The station’s original Victorian features have been sympathetically incorporated within the final design where possible. Part of the planning conditions meant historic elements of the station had to be retained but there were some parts where this

London Bridge station from the outside. Photo: Tom Graham.



couldn’t be achieved and they were recorded in lots of detail with the Museum of London. The new design pays homage to its Victorian roots and existing arches have been brought back into public vision after most of them being hidden away for about 100 years. Wherever we could we tried to re-purpose and re-use.”

The project has been hailed by those involved as a major success with many milestones hitting schedule along the way. In August 2016, teams celebrated the

delivery of the second stage on time, with two-thirds of the street level concourse and three new through track platforms opened. The start of the year also saw the final section of the new concourse open along with the final five platforms after ten days of major engineering work. The concourse measures up larger than the pitch at Wembley and united all 15 platforms for the first time.

Summarising the success of project, Carter believes the teams can be proud that they managed to avoid a train operator’s nightmare of changing the timetable monthly during the length of redevelopment.

He added: “When you look on the whole over a five-year period, there was only three fundamental changes in service pattern and when you consider there are four service groups running through and each one only affected once through the process that’s quite an achievement, especially due to the complexity of the work.”

“The new design pays homage to its Victorian roots and existing arches have been brought back into public vision after most of them being hidden away for about 100 years.”

Adrian Tooth, WSP

In the latest of our *Infrastructure Intelligence* Think Tank articles, Mott MacDonald's global digital business development director *Richard Shennan* looks at six key areas he believes are central to digital transformation in the construction and infrastructure sector.



Paving the way for digital transformation



Increasing demands, limited resources. The age-old task of our industry has been to find the most efficient solutions to the world's toughest problems, and this challenge has only become more acute due to pressures as diverse as population growth, climate change, urbanisation, and the need for social development.

We know that the digital transformation of our industry will provide the crucial step change needed to deliver this vital infrastructure in a way that is socially, economically and environmentally sustainable. What is harder to ascertain is just what this digital transformation will entail, and how to get from where we are to an infrastructure industry that is 'digital by default'.

Provided in association with Mott MacDonald, the Digital Transformation Hub on the *Infrastructure Intelligence* website aims to answer this question, and our content will be divided into the six key areas we believe are most important:

Digital transformation: How do we define 'digital transformation'? Many organisations interpret it as an IT project, but it should really sit within the overall business strategy as a *business transformation project*. Legacy structures controlling how information is stored and managed often lead to separated silos, duplication and incompatibility, problems which are magnified when you consider the wider supply chain. Embedding new business processes to better store and manage information is essential to realising the potential benefits as the digital revolution disrupts our industry.

Digital twins: Using digital technology to unlock hidden value from our assets starts by creating a digital representation of that asset which can then be modelled, analysed and value engineered. While BIM models for individual elements or assets are common, this can be extended to digital representations of whole systems, and even cities as 'systems of systems'. With exponential growth in the amount of asset data available – and as asset systems rarely work in isolation from other systems – massive scale digital twins are a crucial 'next step' in delivering more for less.

Smart infrastructure: The digital transformation of our industry enables smart infrastructure – the application of digital assets, dynamic data from multiple sources, and data management systems to our physical infrastructure. In mature economies, where there is little scope for new build solutions, smart infrastructure will unlock extra capacity from existing assets. In countries where the infrastructure base is less developed, smart infrastructure will ensure what is built is fit for the long term. While smart assets are characterised by user interfaces and decision support tools, central to getting it right is the deep domain expertise that leads to a true understanding of infrastructure.

New processes in construction: From prefabrication and automated construction to cloud-based modelling and the use of immersive solutions, new and exciting changes are taking place in the way we design and build

infrastructure. Embracing these changes is a key element in the digital transformation of our industry.

New contract models: The focus is shifting: from the delivery of physical assets to the handover of digital assets such as datasets and information models, and from minimising capital costs to embedding whole-life value. The very notion of a 'successful project' is changing, and our contract models need to change too in order to standardise, incentivise, regulate and reward the use of information to create value.

Blockchain: One of the most exciting developments of the digital revolution has been blockchain and distributed ledger technology which enable and record secure peer-to-peer transactions. By identifying information transactions and the delivery of value across the delivery team and supply chain, reward can be distributed accordingly – incentivising digital design and delivery.

The digital revolution has completely transformed other industries, including finance, media, healthcare and manufacturing. As the infrastructure industry undergoes its own inexorable change, organisations must adapt to remain relevant. This hub will act as a key place for the discussion of the main ideas in digital transformation. We look forward to exploring these ideas with you.

● **Access the Digital Transformation Hub at www.infrastructure-intelligence.com/digital-transformation-hub**



Phil Wilbraham, expansion programme director at Heathrow and chair of the capable owner strand of Project 13

Breaking the spiral of low-cost value on infrastructure projects

Project 13, a collaboration between the Infrastructure Client Group and industry partners with support from the Institution of Civil Engineers, is looking to revitalise the current operating model of infrastructure development.

The new approach will be built upon innovation and collaboration, increasing productivity and reducing wastage. The project and the community that has been built around it covers five key strands – governance, organisation, integration, capable owner and digital transformation.

Each of these strands is being developed and designed currently to be rolled out in due course. However, as this work could lead to a significant change in the way that projects are delivered, it is certainly worthwhile sharing some of the thinking that is going on within the Project 13 community.

Each strand has begun to define itself against some of the problems that the current model for delivery throws up. Of particular interest here is the role of the ‘capable owner’. The role of the infrastructure owner is critical to ensure that the right infrastructure is created, operated and maintained. The Project 13 community and working groups have defined the new role of the capable owner as including:

“[With Project 13] a capable owner will be aware of the outcomes defined by the customer and therefore be able to define the value of the project against those. This will help to break the lock-step toward low-cost value that has dogged the industry.”

- Articulating the voice of the customer
- Value-driven mindset
- Articulating the voice of operations
- Relating to the ecosystem
- Creating and maintaining complex systems
- Recruiting, building and maintaining talent

In the brave new world of Project 13 we would expect the capable owner to articulate the voice of the customer making sure that this is heard throughout the supply chain and that feedback from the customer is being properly analysed and applied to delivery.

Furthermore, the capable owner will be aware of the outcomes defined by the customer and therefore be able to define the value of the project against those. This will help to break the lock-step toward low-cost value that has dogged the industry.

By defining values and objectives in this way the capable owner will be able to ensure that everyone involved in the project from programme managers, to asset operators and asset maintainers fully understand the ultimate objective and outcome for each project. This will create a well-informed business operation that is able to deliver what is required rather than what is assumed.

These characteristics have emerged from the work being done currently and begin to establish what it truly means to be a capable owner and how the outcomes and objectives can help to define the value of any given project.

This means that senior executives of infrastructure organisations who are reviewing their organisation can raise awareness of capabilities through discussion and gap analysis. Successful analysis using these characteristics would help guide recruitment, inform senior management of capability maturity, spot development opportunities, and identify the next level of maturity.



Mike Rogerson, UK chief operating officer at WSP

We need to make apprenticeships more attractive

Given that 2018 has been designated as the Year of Engineering, it’s an ideal time to broadcast to teachers, parents and school leavers the value of an apprenticeship in engineering.

There is a well-documented skills shortage in the sector. As a leading engineering professional services firm, WSP invests significant time and energy promoting the value of apprenticeships in schools, as we want to attract talented young people into the sector from varied backgrounds, and we understand the importance of children being inspired

by those young men and women who made that choice before them.

Clearly, more needs to be done to make the apprenticeship route an attractive proposition to young people, especially female students. The number of women in STEM apprenticeships has remained static since 2012 with only 3% in engineering apprenticeships, and research by Prudential shows the extent of the challenge. Six out of ten school leavers believe apprenticeships are in sectors with mainly male workforces, one in three parents say



Ben Lewis, infrastructure and energy director at Barton Willmore

Looking through the NSIP crystal ball

We all know that NSIPs (nationally significant infrastructure projects) are large scale, complex development projects subject to a consenting process enshrined in the Planning Act 2008 (as subsequently amended). Typically, applications for projects are prepared by teams of skilled consultants assisted by equally skilful lawyers.

Given the costs and risks involved in the development consent order (DCO) process, promoters like the security of a definitive date for submission as they will know that usually around 16 months later they will have a shiny new DCO in their hands. Equally, the Planning Inspectorate (PINS) like to have some visibility of likely submissions dates so that they can ensure appropriate levels of resource are available for these projects to proceed through acceptance, examination and decision.

However, the timings of large, complex development projects have a habit of being something of a moving feast – an unavoidable characteristic of a project with so many inter-related elements! Not all schemes will experience slippage (due to a range of factors including unforeseen technical issues, scheme amendments, stakeholder objections, land ownership issues, etc), and some will submit a slightly under-cooked application in order to meet an artificially imposed submission deadline (we all know the ones!).

In 2017, there were five new submissions and seven decisions. So, we, like the rest of the sector, are hoping for an uplift of this trend in the year ahead. I have looked into my crystal ball to see how many NSIPs are due to land at PINs in 2018, based on published timescales at the time of writing.

According to the 2018 NSIP year planner of likely submissions, a total of 33 applications for NSIPs are expected to be made this year, with 12 pencilled in for Q2. Highways England is the busiest applicant with no less than ten schemes scheduled for submission this year! Excitingly, 2018 will also be a year of firsts. The first two

business and commercial projects (Sunderland IAMP and the London Resort) and the regime's first solar farm are scheduled for submission before the end of the year.

We understand these timescales have been provided by project promoters to PINS, with all the best intentions, however, it is clear that a number of these will not make it across the submission finish line. We suspect that none of the proposed tidal lagoon schemes will make it anywhere near application stage until a decision is forthcoming on Swansea Bay.

As for the others, that is a little bit more difficult to call, and I do not intend to name any particular schemes, but you do wonder if some of those that have slotted submission in within three months of statutory consultation ending will make it, particularly if you allow for draft document review by PINS – a crucial step (in my view) towards a less tortuous examination.

Of the 33 applications identified for submission in 2018, we therefore predict that only 16 will make it through the doors of Temple Quay – so just over twice as many as were submitted in 2017. Of those, we predict eight will be energy projects, seven will be transport-related, and one will be a business and commercial project. You may think that this sounds pessimistic, but preparing and submitting a DCO is not a walk in the park.

“I do wonder if some schemes that have slotted submission in within three months of statutory consultation ending will make it, particularly if you allow for draft document review by PINS – a crucial step (in my view) towards a less tortuous examination.”

apprenticeships are suited to boys, and female students think most opportunities are in nursing, healthcare, and childcare.

Our outreach is paying off, and we are delighted to have almost tripled the number of female apprentices at WSP in the last year. But we know there is much more to do. I'm pleased to hear the chancellor is open to reviewing the flexibility of the Apprenticeship Levy, as this would give us the freedom to spend our levy on even more training opportunities, such as refresher

“I'm pleased to hear the chancellor is open to reviewing the flexibility of the Apprenticeship Levy, as this would give us the freedom to spend our levy on even more training opportunities, such as refresher traineeships for those who have taken a career break.”

traineeships for those who have taken a career break. We would also welcome dialogue with government on solutions to challenges like the funding cap for engineering degree qualification delivery.

And it's not just about engineering. WSP also offers apprenticeships in transport planning, surveying and business administration to name a few. Apprenticeships offer school leavers a fantastic career option. As a former apprentice myself, I could not agree more.

Claridge's was the venue as industry leaders discussed the future of UK infrastructure investment and digital transformation at the latest executive roundtable organised by Infrastructure Intelligence and supported by BST Global. *Andy Walker* reports.

Seeing change as an enabler, not a disrupter

Two key topics were up for discussion at the latest roundtable event – the future direction of and investment in UK infrastructure and the challenge facing the industry of ongoing digital transformation of business.

Those present said it was important to focus on the wider economic and social benefits of infrastructure investment. Amey Consulting's Mark Brown thought there needed to be more emphasis on project economics, which he said had been overlooked. "If you take the view that funding ultimately comes from either users of the infrastructure or from government that places a greater emphasis on the project economics, which I think is much overlooked as a credible discipline.

"For users to be funding infrastructure, the planning and design has to provide for their needs and for the government to fund it the planning must also address the wider economic benefits. One of the constraints on matching the funding to the needs of the users or the government is a declining emphasis on project economics," said Brown.

Neil Bennett of Farrells agreed. "There is a need to think more widely about the economic benefits of infrastructure and who benefits in order to make a better business case. There may then be a way of looking at a much wider range of funders. We also



Mark Brown: "One of the constraints on matching the funding to the needs of the users or the government is a declining emphasis on project economics."

need to think earlier about projects," Bennett said.

"There's a definite need to factor in the regeneration benefits of infrastructure," said Michael Coombs from Alan Baxter Ltd, "but to get that right you actually have to design it correctly. There are a lot of problems with our major infrastructure where we made decisions and then have a debate about how we implement it, instead of thinking about how best to configure it and design it

for the best overall benefit. If we can maximise the economic benefits then that would make the case for funding from more sources," he said.

A much more joined up approach was needed, with more coordination and dialogue between all the partners and also a role for government. "You need to be thinking about what society



Ben Lewis: "The NIC needs to have a more independent and stronger footing."

needs, to think ahead and not be reactive," said Vivian Sin from Hawkins\Brown Architects. "A lot of money is still wasted through bad planning and not thinking ahead," she said.

The National Infrastructure Commission (NIC) had a key role to play in this said Ben Lewis from Barton Wilmore. "The NIC needs to have a more independent and stronger footing," said Lewis. "We need a national infrastructure plan that has a long-term, cross-cutting outlook because that would give investors certainty because projects would be set in stone and be more bankable," he said.

Jeremy Owen from Land Use Consultants said the role of the government was crucial. "The government can consider broader social, economic and environmental benefits that a private investor, even a pension fund, cannot do. The government has a crucial role to play, even it is just funding that gap to kick start projects," said Owen.



Roundtable participants

- **Neil Bennett** – partner, Farrells
- **Mark Brown** – business development director, Amey Consulting
- **Michael Coombs** – managing director, Alan Baxter Ltd
- **Brian Furr** – director strategic account development, BST Global
- **John Geeson** – director, Haskoll

- **Ben Lewis** – infrastructure and energy director, Barton Wilmore Partnership
- **Eduardo Niebles** – managing director, international business, BST Global
- **Brian Nolk** – commercial director, Victoria Street Capital
- **Nelson Ogunshakin** – chief executive, ACE, chairing the meeting

- **Jeremy Owen** – managing director, Land Use Consultants
- **Vivian Sin** – associate director, Hawkins\Brown Architects
- **Andy Walker** – editor, *Infrastructure Intelligence*
- **Ray Williamson** – regional director, Stride Treglown



Claridge's was the venue for the latest BST Global roundtable.

While agreeing, Amey Consulting's Mark Brown said there was huge frustration that the investment community is way ahead of government. "There is a lot of money around. Pension funds and others now 'get' infrastructure and they understand that the long-term returns are well worth having, but you still need government to have clarity about its investment policy, clarity about the role of the private sector vis-à-vis the public sector in developing infrastructure



John Geeson: "Public sector organisations haven't upskaled the knowledge and the people that deal with digital and we suffer from that."

and also to provide some security for investors," he said. There was wide agreement on the need for more longer term thinking and a belief that the industry could do more to nudge the government in a particular direction, through better and more coordinated lobbying.

Turning to the issue of digital transformation, how ready was the industry to embrace that? "You need to change the way you run an organisation to exploit digital technology and therefore it's a soft issue," said Mark Brown. "Technology enables change but that change comes through people," he said. Haskell's John Geeson thought that some public sector organisations were under prepared to deal with digital



Jeremy Owen: "The government has a crucial role to play, even it is just funding that gap to kick start projects."

transformation. "They haven't upskaled the knowledge and the people that deal with digital and we suffer from that," he said.

Eduardo Niebles of BST thought that the industry had it within its grasp to make digital change happen. "It will be an existing player not someone coming in from outside who will make the changes that up-end the industry; it won't be an Amazon," he said. "The AEC sector is seen as the

least digitised and we are missing a trick. We have to change the economics of the way we do business and see technology as an enabler, not a disruptor," he said.

Ben Lewis stressed the need for collaboration between the infrastructure sector and tech businesses. "There needs to be more collaboration between our sector and the tech sector because we don't know what the tech can do." He also thought that there needed to be more urgency to act. "Look at the technology being used in the nuclear sector. They have innovated because they have had to and come up with bespoke solutions. There's no big push in our sector but someone will do it first," he said.

While collaboration was all well and good, it was important to get the relationships right, said Michael Coombs. "Technology in the creative design industries is really interesting but the tech has to serve us not dominate us," he said. "We need to do the creative thinking too and it has to come from firms who are looking to be more efficient and improve their productivity. As soon as one does



Michael Coombs: "Technology has to serve us not dominate us. We need to do the creative thinking too."

it then others will have to follow suit or die," Coombs said.

There was a widespread view from those present that increased use of technology had the potential to pave the way for new business models to arise in the industry. "We need to change the things we do with the technology and don't forget that it is the people who are disruptive, not the technology," said Mark Brown.

According to Eduardo Niebles "If we don't change the business model and collaborate more then we won't change the industry. We need to see a change in the business model where data becomes knowledge. We're working in a constantly changing environment and it comes down to change management and how you deal with it," he said.

Those present were clear that change also needed to encompass how infrastructure was planned and delivered and that reforming the procurement process needed to be a key part of creating a new business model. Allied to digital transformation, this could be a real game changer for the industry, they said.

A more enlightened approach to

procurement would also call for a quality-based tendering process, rethinking what "value for money" means as well as the adoption of new or emerging technologies. That would make the industry more joined up and deliver better infrastructure. As Vivian Sin said: "We need to be more collaborative and bolder and we need to do it now".



Eduardo Niebles: "It comes down to change management and how you deal with it."



Vivian Sin: "We need to be more collaborative and bolder and we need to do it now."



About the sponsor

BST Global provides integrated business management software solutions for the world's leading architects, engineers, and environmental consultants. More than 100,000 professionals across six continents and 65 countries rely on BST solutions each day to manage their projects, resources, finances, and client relationships. The company's latest offering, BST10, is the world's first multi-lingual business management system to be built exclusively for the architecture and engineering industry and made available both in the Cloud and On-Premises. For more information, visit bstglobal.com.

The 'super-sewer' reconnected Londoners with the



With tunnelling set to commence this summer, *Ryan Tute* takes a closer look at the Thames Tideway project, which will sustain the capital's sewage network for the next 125 years.

As one major infrastructure project, Crossrail, approaches the end of the line, another is just about to embark on a defining year as Thames Tideway prepares to launch tunnel-boring machines (TBMs) in a matter of weeks for the construction of a 25km 'super-sewer'.

The £4.2bn Thames Tideway Tunnel scheme is being constructed to tackle the problem of sewage pollution in the River Thames with the promise of "reconnecting Londoners" by preventing 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 – before humans started polluting it.

Tideway will employ up to 4,000 employees across 24 sites of various sizes, stretching from Acton in the west to Abbey Wood in the east and is entering a major milestone moment. The sewer's connection is being split into three parts; with contractors Bam Nuttall, Morgan Sindall and Balfour Beatty carrying out the

work in the west section; Ferrovial and Laing O'Rourke centrally; and Costain Vinci and Bachy Soletanche in the east.

The end of summer is being pencilled in as the start of the much-anticipated tunnelling process with 1,300 tonne TBM's lowered 53m deep at the organisation's central site in Battersea. It is currently a hive of activity with the main focus on assembling gigantic sections of the machines which currently sit in the yard. The TBMs named Millicent and Ursula, will measure more than 100m long when fully assembled. The first shipment made the 500-mile journey at the start of February from the across the Channel after being built in Le Creusot, France.

Lessons learned from Crossrail

While Tideway gears up for the major tunnelling process, Crossrail has not long finished completing their own excavation work. Those behind the massive water project say there are "lots of lessons to be learnt" from their counterparts with many involved in the rail project now adding



Work continues to assemble and test the TBMs (left); the 53m drop down the shaft to where the TBMs will begin tunnelling (right); the TBMs arriving at Kirtling Street on barges from France (top right).



connecting Thames



similar knowledge and expertise to Tideway.

Michael Appleton, communications lead for the central section of Tideway, said: “Construction is a continuous improving process. It’s all about finding new and better ways of doing things. Anything you can glean from other projects is priceless and something you should be doing. The experience of Crossrail has been invaluable with things like stakeholder engagement, skills we need as well as the construction process. For example, one of the complaints from Crossrail was that the control box within the TBMs was not big enough so we have increased the size of it and that is just one small practical example of a lesson learnt.”

The TBMs were transported along the Thames to keep in line with Tideway’s commitment to transport over 90% of waste by barge and will result in reducing the amount of trucks on the project by 72%. Sustainability was highlighted as a key target from the very start by Tideway. If

“Thame Tideway will rid sewage to levels never seen for 250 years – before humans started polluting it.”

learned” from their counterparts with many involved in the rail project now adding similar knowledge and expertise to Tideway.

Michael Appleton, communications lead for the central section of Tideway, said: “Construction is a continuous improving process. It’s all about finding new and better ways of doing things. Anything you can glean from other projects is priceless and something you should be doing. The experience of Crossrail has been invaluable with things like stakeholder engagement, skills we need as well as the construction process. For example, one of the complaints from Crossrail was that the control box within the TBMs was not big enough so we have increased the size of it and that is just one small practical example of a lesson learnt.”

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bosses behind the project decided to transport everything by road then approximately half a million truck movements would be made.

The tunnel itself will work by intercepting sewage from 34 Combined Sewer Overflows (CSO) before it moves into the Thames. The CSO discharge points will be connected to the tunnel under the river and rather than flowing into the Thames, the dirty water will be stored in the sewer. It will then be pumped to the Beckton Sewerage Treatment Works and once treated, the clean water will be finally released into the river.

Huge challenges ahead

The task at hand is a huge one that requires constant collaboration and communication between the various teams on site. But the project remains on schedule with workers managing to negate challenges arising.

"There are always huge challenges when it comes to a project like this," Appleton said. "Crossrail used to say that a project like that in central London is like doing open heart surgery on a person still walking round and it's very similar here. It's always things that you are not prepared for which crop up, so last year we found a Second World War explosive bomb which we believe rolled into the site from the tide. It's those sorts of things which can throw your plans out of kilter," he says.

Another big marker in the project this year has been the start of diaphragm walling at the Greenwich pumping station construction site in preparation for digging the tunnel shaft which will be constructed from the Greenwich through to Tideway's Chambers Wharf site. The concrete structure diaphragm wall will be inserted into the ground and will maintain an excavation open, which is described as an essential element of digging a tunnel shift.

Tideway delivery manager Jim Avant said: "After several months of hard work the completion of the diaphragm wall works at Chambers Wharf marked a significant milestone for the project. It was no mean feat, around 35,000t of material excavated during the works, all of which was removed from site by barge in line with Tideway's commitment to remove as much material as possible by river. Similarly, all reinforcement cages for the walls have been delivered to site by barge."

Community engagement

Like any other major project that runs through the heart of a city and near the homes of residents, community relations play a vital part. The ability for teams to lessen the environmental, noise and visual

Diggers in operation at Tideway's Chambers Wharf site.



impacts when possible can make or break how a development is perceived and accepted.

Trigger Action Plans have been a crucial component of keeping people on board from the start with Tideway prepared to listen to its neighbours across London. For example, discussions have been had when residents will have been told a noise limit and if work was to go over that level then Tideway would provide the necessary mitigation in the form of secondary glazing or mechanical ventilation. Regular community meetings which give people the opportunities to air their views have also been commonplace. Maintaining good links with the community has been "absolutely vital" according to Appleton.

"Community relations can be very much misunderstood but I think Tideway gets it right," he added. "We are not as controversial as other projects in London and I think that is helped by our approach. There will be times when we make noise but that is a fact of construction but we have done is try to be fair to people with mitigation and compensation."

"We are not entirely sure what will happen with a cleaner Thames as no one has any experience of that. For the past 500 to 600 years it's been polluted. I envisage people using the river more."

Michael Appleton

A monumental year for the project

But as work progresses across various sites, 2018 has been dubbed as a monumental year for the project and once that will go a big way in defining how much of a success it is.

Andy Mitchell, Tideway's chief executive officer, said: "This is going to be a big year for Tideway and we're working hard to get tunnel shafts completed in preparation for the start of tunnelling later this year. The arrival of Tideway's second and third TBMs was another exciting milestone, signalling that work is gearing up on London's super sewer."

Tideway's strapline is "reconnecting Londoners to the Thames" and that is exactly what the lasting legacy is hoped to be so that the general public won't simply use the river for transportation but enjoy it as the asset it once was for the capital.

"The aim is a cleaner and healthier River Thames," Appleton said. "We are not entirely sure what will happen with a cleaner Thames as no one has any experience of that. For the past 500 to 600 years it's been polluted so we can't say ecologically what that will look like. I envisage people using the river more."

"If you talk to rowers down at Putney then they say if they fall in, they have to go to A&E because you end up with all sorts of diseases. The attitude to the river in the past has been almost something of an obstacle or inconvenience. But really, it's the reason we are here and is the lifeblood of London so cleaning it up is really important. People don't use the river as a place to enjoy and allowing Londoners to reconnect with the river will be the lasting legacy," says Appleton.

This current issue of *Infrastructure Intelligence* is the 30th edition of our print magazine. Editor *Andy Walker* reflects on a significant milestone for the publication.

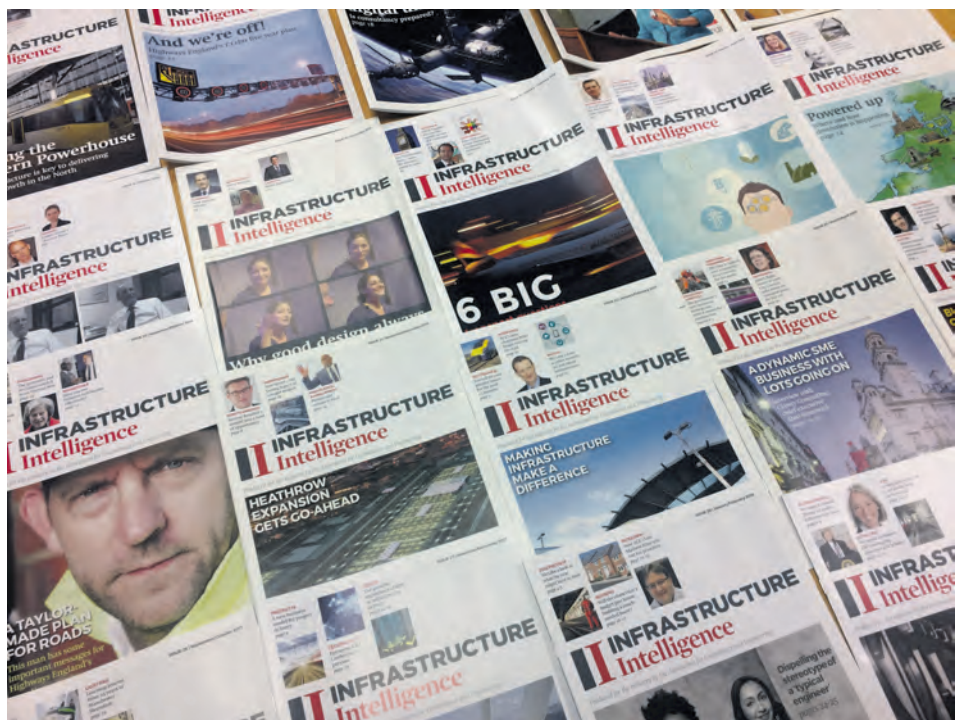
Exactly four years ago, in May 2014, *Infrastructure Intelligence* published its first ever issue. The front cover featured a smiling HS2 boss David Higgins, who had just seen the second reading of the HS2 bill approved by parliament. In an editorial, Issue 01 of the magazine highlighted the potential for major infrastructure projects to create enormous national benefit and we have sought to highlight that benefit over the last 30 issues.

Publishing 30 issues as well as a topical and up-to-date website for four years is no mean achievement. Throughout that time, we have given a platform to the key issues – business and political – facing the industry and interviewed many of the personalities that make the infrastructure business such a fascinating place to work in.

From that very first issue we set out our stall to highlight the key benefits that a healthy and vibrant infrastructure sector brings to society. We've done this by showcasing major projects like Heathrow, the strategic highways programme and major schemes on the rail network, but also increasingly by trying to show the economic and social benefit that the sector brings and why politicians should do all they can to ensure that infrastructure is properly planned and above all funded.

Politics and politicians has certainly been a running theme, particularly over the past two years of *Infrastructure Intelligence*.

When I took over the editor's chair in July 2016 (issue 19) our front page led with "Brexit – what does it really mean?" Talk about a baptism of fire for your first issue! Two years down the line,



Still going strong after 30 issues

do we yet know what Brexit really means for the industry – and the country? I'm not sure that we do.

I wrote back then that it was "hard to overstate the impact of the UK referendum decision to leave the EU" and that the "pace of events, political and economic since the result was declared has been truly astonishing". I

think it's fair to say that the pace of events since then has continued to be frantic, but at times of uncertainty, it is vital that we promote strongly the role of infrastructure investment as a way to stabilise and grow the economy and give confidence to businesses.

At *Infrastructure Intelligence*, we have continued to do that by enthusiastically highlighting the good things that the industry is doing but also not shying away when things go wrong. The Carillion collapse earlier this year which is continuing to have far reaching ramifications for the sector is just one example where we have asked the difficult questions of industry leaders

and politicians to help map out a clear way forward.

The past four years have seen many changes which continue to challenge the industry. We look forward to reporting on those challenges as businesses and the people who work in them grapple with issues like digital transformation, automation, diversity and inclusion, increasing devolution and regionalisation and who knows what else in the months and years ahead.

As one of the most important industry sectors in the UK, infrastructure has never been more important. With both major political parties convinced of that importance in creating economic prosperity and keeping the national economy buoyant, there's never been a better time to be writing about the sector.

A massive thank you to everyone – companies, interviewees and contributors – who have helped get us to our 30th issue. We couldn't have done it without you.

Here's to the next 30!

Andy Walker is the editor of Infrastructure Intelligence.



Bridging the gap for



Leading urban architect professor Alan Dunlop speaks to *Ryan Tute* about the possibilities of a bridge which connects Scotland and Northern Ireland as political desire grows.

After Boris Johnson proposed in January that England could be connected to France by a 22-mile bridge, a media storm ensued asking whether the uncoded suggestion of building a concrete structure across the world's busiest shipping lane could be true.

Inevitably within a day of Johnson floating the idea out to the masses, the idea was quickly greeted with if not ridicule, a large dose of scepticism. But if nothing, it did get the UK thinking and other possible channel crossings were postulated.

Media north of the border soon picked up on the press attention the suggestion received, leading to one of Scotland's leading urban architects, professor Alan Dunlop, being contacted to give his thoughts about a bridge crossing connecting Scotland and Northern Ireland, something which was first theorised by the Democratic Unionist Party in its 2015 manifesto. While it never got off the drawing board, the idea has not faced the same pessimism.

Dunlop, who is a professor at Liverpool and Robert Gordon universities, is one of the few to research the idea in any great detail. He claims that a road and rail crossing from Larne to Portpatrick is architecturally possible and something which would boost tourism and trade for both sides of the crossing, while providing an extra needed physical link for Brexit and any future Scottish independence.

"A connection between both countries would be really advantageous as who knows what will happen in the next 10 years with Britain moving away from the European Union?" Dunlop said. "Any physical closer ties between two countries which makes it easier for goods to be transported is a positive for both sides of a bridge. We don't know what will happen with Scottish independence either so if it indeed ever happens then the physical connection to Ireland would be a massive



The bridge that connects Denmark with Sweden across the Oresund Strait.

boost and building a bridge reinforces the idea we are a forward-thinking country," said Dunlop.

Another proposed route for the bridge is between the Mull of Kintyre and Torr Head on the Antrim Coast which are just over 12 miles apart. However, the professor believes it would not be as beneficial with it maybe failing to attract a sufficient number of vehicles because of the four-hour drive to Mull of Kintyre from the central belt.

One major problem that would need to be navigated should any construction take place is Beaufort's Dyke, a deep-sea trench around 300m deep. The trench which is 10km off the Scottish coast was used as a dumping ground for explosives after the

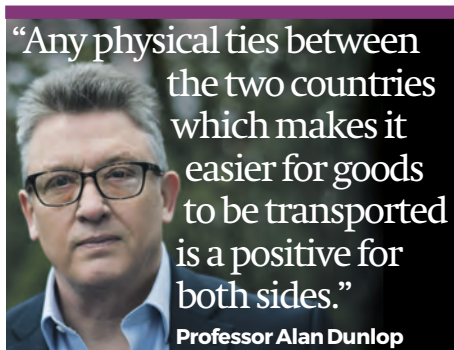
end of the Second World War.

But Dunlop has proposed suggestions using the concept of floating bridges used in different areas of the world to overcome the depth and necessary non-contact with the sea bed.

"Norwegians are pioneering something called floating bridges," Dunlop explained. "Connecting sea orbs which are 500m deep, so I have suggested a floating bridge, more or like that are being proposed by Norway which could be done and connected to the sea bed in the same way an oil rig is connected through a series of tension cables," he said.

The architect has also proposed a similar bridge to the one that connects Denmark with Sweden across the Oresund Strait. The bridge runs for 8km and the tunnel for 4km. The combined railway and motorway bridge is "cable-stayed" with two 204m high pylons supporting the 490m long bridge span across the Flinte channel. Most of the bridge structures – the bridge piers and bridge spans – were built on land and subsequently towed out to the bridge alignment by a large floating crane. Dunlop believes the necessary knowledge and talent is here to carry out such a project.

He said: "Don't get me wrong it would be a significant engineering and



"Any physical ties between the two countries which makes it easier for goods to be transported is a positive for both sides."

Professor Alan Dunlop

a Celtic powerhouse?



Possible options include an underwater tunnel (above left) and a floating bridge, like that proposed by the Norwegians (above).

architectural challenge but I think that the UK and Ireland have excellent engineers that can overcome that but how you make that connection would be part of an extensive study and I have merely suggested one example of how it could be done after researching the Norway example. If you take for instance the bridge that connects Denmark to Sweden, it has the floating element and underground elements which could be applied here.”

Since the idea was mooted, questions over funding have been quick to arise. The professor has said that he’s been quick to remind people he is an architect and not a politician or an economist but he believes that based on the size and construction of other bridges, a £20bn ballpark figure could be projected.

Dunlop said: “The conversations I’ve had with politicians and various people in Ireland is that lots of children are travelling back and forth to Scotland four or five times a year and every journey costs them around £300. That means there is an economic equation to be made and a need to look at how you might privately finance the idea to make it economically viable. What really needs to happen is an economic feasibility study so we can get that definitive information.”

“What really needs to happen is an economic feasibility study so we can get definitive information.”

Professor Dunlop

The idea of an underwater tunnel has also been floated in response to Dunlop’s thoughts and while he is not against the idea of a tunnel to connect Ireland and Scotland, the architect believes it will not incite the same inspiration as a bridge being constructed.

“If you take recent structures that have been built like Norman Foster’s in France then these become iconic, a marker and a positive indicator for a country’s future moving forward for the next 100 years or so. Nothing does that like an impressive structure that sits above the water rather than below it. It’s much more interesting and something that people can get encouraged by. I don’t know many people to be infused by the Channel tunnel so while I don’t have a problem with the idea of a tunnel, I don’t see it being inspirational or imaginative for the public.”

The Liverpool University professor believes that apart from the obvious physical connection incentive, a bridge being constructed could lead to a “Celtic powerhouse” and massively improve both trade and tourism.

Dunlop added: “I honestly think it would be a wonderful idea and anything which improves physical connections should be explored. The two nations share a lot of history together, we have similar ideals, we really are very alike. I watched the TV reports following the debate being opened and so many people said they would travel across nearly every weekend if the connection was made. The business potential is exceptional, the chance of really making an investment in what would be the true north is something that should be looked at.”

Making one final comparison to the English Channel bridge possibility, Dunlop says the conservative estimation of £20bn for the Celtic bridge would be just a fraction of the £120bn for the alternative continental comparison to France.

“We don’t have the weather problems and it would not be built across anything quite significant or as large a shipping lane,” Dunlop added. “Apart from possibly the ferry companies, the Celtic bridge would have huge benefits for not just trade, but tourism too. No doubt it would be creating much more opportunities for trade too with the direct link.

“I have been incredibly surprised by the amount of interest not just in Ireland and Scotland but from all around the world too. Our ministers have also supported the idea since it gained attention so there is growing support. The overwhelming reaction in favour shows there is will and a desire to create a bridge that would be a dramatic marker in aspiration for the country going into the 21st century.”



Turner & Townsend UK managing director Patricia Moore and David Whysall, managing director of the firm's UK infrastructure business.

Exciting times ahead at Turner & Townsend

Turner & Townsend's appointment of two new managing directors – for its UK business and infrastructure division – is a further signal of intent for a company that's going places. *Andy Walker* visited their London office to catch up with both of them.

It's not often you get to interview two people with new roles where one has replaced the other, but that's exactly what I did when I visited Turner & Townsend's London offices to speak to new UK managing director Patricia Moore and David Whysall, who has replaced her as managing director of the firm's UK infrastructure business.

I started by asking Moore how her new role will differ from her old job. "The span is different; I'm now sitting across everything that we do in all our markets in the UK," she tells me. That includes our real estate business, which is a comparative size to the infrastructure business and also our natural resources business, which is a huge part of our global empire and most of our global natural resources clients are headquartered in the UK. So, there's new sectors for me to get more involved with than I have been before."

Moore's new role also sees her promoted

to Turner & Townsend's executive board.

"As a truly global consultancy – a partnership with around 90 partners across the world – we operate as one global business, so I have a wider holistic remit there too. And the UK has a massive influence in the global company because it is 50% of the global business," she says.

Given the size of the UK operation, Moore is sure to play an influential role on the global board. So, how did she feel when she got her new role?

"When you progress as a woman in the industry you get a sense of responsibility on taking big opportunities because so many women need to see that path."

Patricia Moore

"A bit of trepidation and a bit of excitement, but also, I could see the opportunity to grow and develop," says Moore. "Also, I think that when you progress as a woman in the industry you get this sense of responsibility around taking those big opportunities because so many women need to see that path. I struggled to get my head round this for years because I never needed to see the path or see those role models, but I realised through the mentoring I do and through the many discussions I have had with many of our women, that they need to see that path. It's really important to most women actually," she says."

Both Moore and Whysall have risen through the ranks to assume leading roles at Turner & Townsend, with Whysall progressing from playing a key role in Constructing Excellence's junior arm, Generation 4 Change. Clearly the firm believes in developing people and

promoting them quickly to leadership positions.

"As soon as I joined Turner & Townsend I felt as though I was home," Moore says. "The big thing that always got me was the complete breadth of opportunity and the meritocracy of the organisation. You didn't have to speak with the right plummy accent, you didn't have to have come from the right school. It was really about what was in your head and what was in your heart and how much you wanted it," she says.

Moore has been with the company for 19 years and has seen some changes in that time? "Phenomenal changes; in our business and in the workplace," Moore says. "The most exciting change is that everyone wants women in our industry now and it's a fantastic time to be a woman. Celebrating diversity and bringing on women in the business is really important," she says.

Turning to David Whysall, what was his response when he got the role as managing director of the UK infrastructure business? "Excitement. I've been with Turner & Townsend for 14 years and the growth of the business means that I don't think I've ever had a role for more than two or three years. So, there's always a new challenge, new major programmes, new things to lead, new teams.

"Without doubt this is the most exciting point the business has ever been at. You are connecting with a very buoyant infrastructure market and we have positioned ourselves at the heart of that. Since the infrastructure business was set up we have seen it grow from a smallish business to one with around 1,000 people. The potential ahead is huge," Whysall says.

With politicians seeing infrastructure as central to improving growth and prosperity, it's clearly an attractive time to be involved in infrastructure. "Infrastructure has never been in vogue like it is today in terms of the economic benefits it brings," says Whysall. "We also need to stress more the social purpose of infrastructure – the ability to drive social change and mobility in the areas that infrastructure affects is really exciting," he says.

I ask about their respective key priorities in their new roles.

"One of the things that makes us quite unique is the diversity of our offering, geography and reach," says Moore. "One of my key aims is to use those collective opportunities and strengths. One of the things that drives our culture and our behaviours is our 'one business' philosophy and it's a massive differentiator for us in the market," says Moore.

"Clients are interested in people who are doing things a bit different. Cross



Three Turner & Townsend projects – Wimbledon, the Scott Base at Antarctica and Crossrail.



engaged in those activities is part of who we are as a company," she says.

The firm is also active in several industry bodies, institutions and associations and plays its part in industry improvement organisations. "It is another key pillar of our corporate social responsibility and we are increasingly conscious of our responsibilities in that area," says Moore. "Involvement in industry organisations is very much part of what we do and who we are," she says.

As a business with 17 offices across the UK and a wide geographical spread, how important is the devolution agenda to the firm and what effect is it having on the business? "Very important," says Whysall. "There's a real recognition from the devolved bodies that great infrastructure will be the key to future economic growth and social stability. In the north west, the West Midlands and in Bristol where they have those devolved powers right, you are seeing some positive movement forward," he says.

"It's broader than just devolution, it's about that whole decentralisation agenda," Moore adds. "We have local connections in our regions and one of the great things about Turner & Townsend is that we have a truly national business that is regionalised, so we are in a great position to respond. We have great relationships with our local authorities and the new combined authorities and we are embracing that," she says.

It's clear that Turner & Townsend is very well positioned to take advantage of a fast-evolving business and political landscape and in Moore and Whysall they have people in charge with the experience, skills and enthusiasm to grow the business further and make an even greater impact than they already have.

fertilisation of experience is important. We know that if there is a downturn then we are better placed to deal with it than many of our competitors because of the diversity of our offering and our markets," Moore says.

"There are three priority areas," says Whysall. "What we do and getting better at what we do technically. The second is to have the best people working for us and the third is to remain relevant in the marketplace by innovating and shaping client thinking and thinking about the long term and how they operate their assets, fund them and see a path forward," he says.

One thing that strikes you about Turner & Townsend is their commitment to corporate social responsibility. "This has a hugely unifying impact for our people," says Moore. "We raised £150,000 last year for Action for Children as our charity partner and we have a schools programme and encourage our people to go into primary and secondary schools and drive aspiration and inspiration in underprivileged children. Getting people

"There's always a new challenge, new major programmes, new things to lead, new teams. This is the most exciting point the business has ever been at."

David Whysall



After receiving national attention for a proposal that pledges to bring about a high-speed railway version of the M25, Alistair Lenczner spoke to *Ryan Tute* about the project and the future.

HS4Air – an M25 for high-speed trains

“You don’t need to be big, to have big ideas,” says the designer and strategic planner who is leading the charge for a new transformative high-speed railway which would connect the major airports of the UK and provide a link for the north and Midlands to the capital and further beyond to the continent.

Alistair Lenczner is the director of Expedition, the London-based engineering consultancy which is behind the HS4Air project, that proposes to connect the existing HS1 rail line to the planned HS2 rail line along a route that passes via both Gatwick and Heathrow airports. The project would also provide fast and direct rail access from major cities north and west of London including Birmingham, Manchester and Cardiff, while “dramatically reducing journey times”.

Those behind the scheme believe HS4Air would provide welcome relief for London’s rail network, the M25, the number of domestic flights involving Heathrow and Gatwick and better value for investments currently being made in the UK.

The 140km-long proposed network would run between its connections with HS1 at Ashford and its proposed connection with HS2 near Denham. Approximately 20% of HS4Air would run in tunnels to avoid adversely impacting on environmentally

sensitive areas such as the Surrey Hills.

The Expedition boss says that the thinking behind HS4Air is about joining-up projects around the country which remain unconnected and describes it as a “high-speed railway version of the M25 around London, except that it allows much faster journey times with no congestion and with far less impact on the environment”.

The major infrastructure project proposal remains in its early stages, but the idea has already received national media attention and has led to numerous interesting parties coming forward to learn more about the possibilities. While Lenczner is keeping his cards close to his chest on who exactly discussions might be with, public bodies and consultants involved in previous large infrastructure projects have been suggested.

He added: “We’ve had all sorts of people in contact with us and I imagine it’s because

“If you’re going to spend £10bn on infrastructure then the benefits are spread across the country, it’s not just London reaping the awards.”

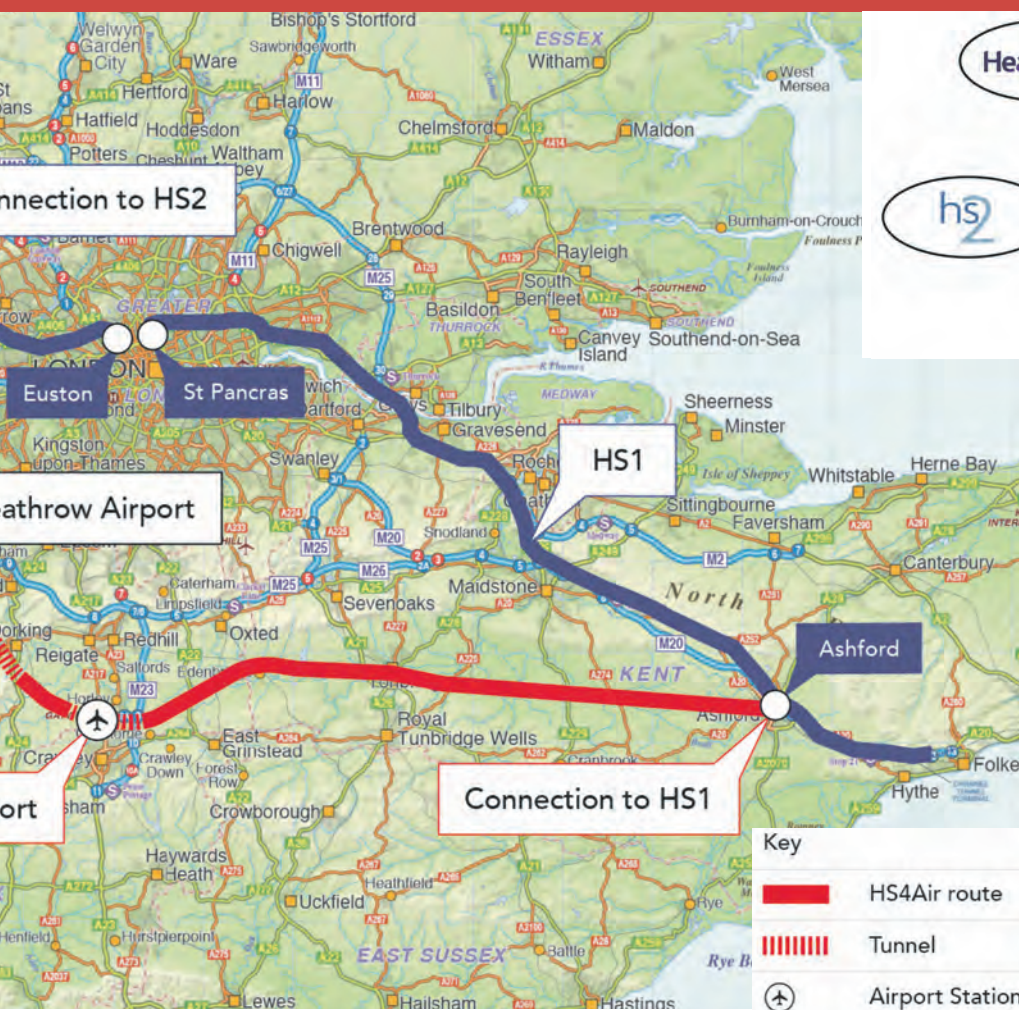
Alistair Lenczner, director of Expedition



potential investors or organisations can see it makes a lot of sense and could provide a vital network for the country. The idea became headline news in Kent when they heard they could be arriving into Gatwick in half an hour. We are having discussions over the next few weeks and months with various people and the feedback we’ve had has been extremely positive. Expedition is a fairly small team so this is not something we can deliver on our own.”

The seed of the idea for the scheme came from a proposal Lenczner worked on when he was at Foster and Partners. The group created the Thames Hub infrastructure proposal which featured a high-speed orbital railway around London that passed through a major hub airport. However, Lenczner sees the HS4Air proposal as a perhaps more pragmatic proposal that responds to current and committed infrastructure plans.

The motivation to create something that could connect London and beyond was reignited late last year when Heathrow Airport went out to consultation again. The Expedition chief said it encouraged him to start thinking whether there was a way of optimising national infrastructure, rather than just looking at airports and HS2. With no obvious solution to connect HS1 and HS2, the designer said he simply started looking at the map, the terrain and topography and



sketching lines for possible connections.

Like any other major infrastructural network, funding is a key question. The cost has estimated to be around the £10bn mark, based on HS2 phase 1 costing models as done by the National Audit Office.

“We didn’t enter a bottom-up pricing model to get to this figure,” Lenczner said. “It’s based on HS2 phase 1 costing and doing the comparisons in terms of how much tunnelling cost, stations that were built and track price. Adjustments based on this were how we go to £10bn. I’m not saying it’s cheap or a little amount but compared to other schemes, you get a lot of bang for your buck. If you’re going to spend £10bn on infrastructure then the benefits are spread across the country, not just London reaping the awards.”

Lenczner believes SMEs like Expedition have a big role play to in influencing bigger organisations and governmental departments when it comes to delivering infrastructure that could benefit the UK.

“Independent voices like ourselves who can play the role of agent provocateur to shake things up in the process are vital,” he added. “Especially when working with government departments or big organisations who will present more of a corporate image. You don’t need to be big to have a big idea. We’ve dropped a pebble and

the ripples have spread far away; we are demonstrating the possibilities and looking for partners to make it a reality.”

The designer believes that the time has come to take a more long-term approach and hopes decision-makers will become more inclined to take on board proposals.

“One of the big things that the UK has been poor at post-war has been planning national infrastructure. If you go around the country, you cannot show me a long-term approach. Network Rail work in as much as five-year periods and react to whatever party is in power at the time. There is no plan though for 30 or 50 years and what it may look like. The French, Germans and Dutch have long-term plans which are less susceptible to changes of government. The Department for Transport’s civil servants won’t always have vast expertise in delivering infrastructure projects so I think it’s encouraging if they are willing to listen

“We’ve dropped a pebble and the ripples have spread far away.”

Alistair Lenczner



and be receptive to outside ideas.”

An interesting development for the project came just over a week after Lenczner fronted Expedition’s plan. Transport secretary Chris Grayling announced in March that the government was seeking third party involvement for proposals for a new southern rail link to Heathrow.

It’s suggested it would be one of the first projects under government plans to invite private investors to fund rail projects. It provided a big statement of intent moving forward and an indication of how the government sees large rail projects being funded in the future. Grayling argued the new approach would “relieve the burden on taxpayers and fare payers”.

“It certainly got a few more emails being sent out around the office,” Lenczner said about the government’s announcement. “We are looking to see how we can respond to that window of opportunity and it definitely put the cat amongst the pigeons. The current government obviously want to get non-public funding into infrastructure and my suspicion is that internationally the money and interest is there, but investors need to see a clear path for it to be deliverable in the UK.”

Moving forward, Lenczner says he has been extremely pleased by the positive response from both the public and media. He says he hopes discussions will continue throughout the year and is desperate to ensure the high-speed rail network progresses from drawings to something real.

He added: “HS4Air provides multiple benefits within one project. By connecting HS1, HS2, Heathrow and Gatwick in one project, the numerous benefits offered are greater value for money. But like anything else, we rely on more support from the public and government and have to formulate funding models that can achieve it. But the benefits spread across the country, the biggest barrier between the north, the midlands and Europe is not the Channel Tunnel, it’s London and this network solves that. By creating HS4Air, you are gifting more space to the London network for Londoners. Take out the freight trains and take out the people who don’t want to be travelling there in the first place then you might have 10% further capacity for Transport for London to work with.”

ACE's rail group on track

With parliamentary committee appearances and consultation responses, it's been a busy first quarter for rail, writes ACE policy manager *James Robertson*.

The chair of ACE's rail group, Alan Price of Jacobs, was invited to give evidence to the House of Commons transport committee on 26 February. Speaking on the topic of rail infrastructure investment he appeared in the second session to share ACE's views on the subject. The session was streamed live and can be replayed on the *Parliament TV* website.

In March, transport secretary Chris Grayling MP announced that Network Rail would be looking at market-led proposals for enhancements to the rail network, highlighting the potential of projects such as the southern link to Heathrow Airport. Responding to the news, ACE chief executive, Nelson Ogunshakin, said: "We're delighted that our calls for increased investment through complementary private funding have been heard. There is a huge opportunity for market-led proposals to unlock rail projects which will improve frequency, capacity and connectivity across the rail network."



In related news, ACE also responded to the Office of Rail and Road consultation on Network Rail's upcoming control period (CP6 which runs between 2019 and 2024). With only 14 working days given to examine the nearly 1,800-page document, ACE focused its efforts on a high-level overview, rather than detailed and technical feedback.

In its response, ACE was critical of the

short time period offered to respondents to the of the £47.9bn plan highlighting that it: "isn't the way to engage stakeholders, nor to produce robust and properly thought-through plans."

Members interested in shaping ACE's output in this area and joining the rail group can contact James Robertson directly:

jrobertson@acenet.co.uk

Progress as network expands to devolved nations

ACE's group for emerging industry leaders holds events in Scotland, Wales and Northern Ireland, writes *Anil Iyer*.

ACE's group for emerging industry leaders, the ACE Progress Network, has made some significant steps forward recently with the launch of groups in Scotland, Wales

and Northern Ireland. The network now has six groups representing different areas across the United Kingdom.

Progress Network Northern Ireland launched on 1 February with an informal

networking event including a quiz at the iconic Dark Horse pub in the Cathedral Quarter in Belfast (pictured above).

Progress Network Cymru | Wales launched on 14 March with an event in Cardiff. Attendees discussed the priority areas for the National Infrastructure Commission for Wales with the deputy director for infrastructure delivery at the



Reverse mentoring pilot concludes

A cross-sector pilot has “smashed unconscious bias”, writes *Rebecca Wooding* of ACE’s Progress Network.

Like all the best ideas, reverse mentoring is a simple concept. Turning the traditional mentoring model on its head, experienced colleagues are mentored by members of staff from either a younger generation, background or experience.

While many schemes focus on generational issues, such as differing understanding of technology and emerging business trends, reverse mentoring can also be used to help companies break through unconscious bias, reduce discrimination and positively improve workplace diversity in terms of gender, ethnicity or age.

Unlike in a conventional mentoring scheme there is mutual benefit to both the mentor and mentee. Whilst the mentee learns new skills and perspectives, the mentor gains valuable insights into company culture, business strategy and can tap into years of industry experience. All are key skills and knowledge for strengthening and diversifying the future of the work place.

A nine-month reverse mentoring pilot, which has just concluded, brought together 11 pairings across seven ACE member companies. The participants from Arcadis,

Welsh Assembly, Andy Falley.

Finally, on 24 April, Progress Network Scotland organised an informal “pre-launch” networking event at Brodies in Glasgow. The event galvanised interest in Scotland before a more substantial full launch event later this year.

Progress provides the opportunity to establish a strong network across the sector, share views and ideas, develop new skills and hear from influential organisations and people in the industry. Members are early career professionals in the industry across the full range of disciplines, including: civil, structural, mechanical and electrical engineers, lawyers, architects, accountants, project managers, cost consultants and more.

The Progress Network is enabled by ACE but managed by its members. Those interested in joining are encouraged to get in touch at aiyer@acenet.co.uk.

Anil Iyer is chief operating officer at ACE.



BWB, Mott MacDonald, Peter Brett Associates, Max Fordham, Tony Gee and WSP shared their experiences with the wider group over the period.

There is huge potential for reverse mentoring in our industry. It can help at an operational level and encourage the uptake of new technology and ideas, but it also has the capacity to help with career progression for the emerging generation of employees and can help us to bridge the industry’s skills gap. We found that our pilot had strengthened participant companies, allowed leaders to look at their organisations in new ways and had completely smashed pre-existing unconscious bias.

The full findings from ACE’s nine-month reverse mentoring pilot will be presented at the upcoming **Skills Summit** on 6 June 2018 at Marriott Grosvenor Square, London. A report with recommendations will also be produced to help other companies interested in introducing their own reverse mentoring programmes.

Rebecca Wooding is vice-chair of the Progress Network, ACE’s group for emerging industry leaders.

European CIO Conference

The second European CIO conference takes place on 20 June 2018 at the Royal Academy of Engineering, Prince Phillip House, London. The two-day event brings together the sector’s IT leaders with experts from the world of technology to discuss the major issues facing the sector, including digitisation, big data, and their impact in changing business models. Bentley Systems are the founder sponsors of this conference, alongside BST Global.

The keynote speaker is Eric Charran, chief architect of data and artificial intelligence at Microsoft. He will explore the innovative technologies powering the digital transformation and share his experiences of artificial and ambient intelligence, machine learning, advanced analytics and implementing these

technologies with clients across the globe.

Other sessions will feature speakers from international sector leaders including CMD Smith, Dar Group, Mott MacDonald, Multiconsult, Ramboll and WSP. Clients and technology providers will also discuss the issues from their perspective, while breakout sessions will allow attendees to drill down to topics of particular interest.

In between the full programme, there are ample opportunities for networking and a VIP evening dinner will take place at Le Balcon in St James’. This two-day conference is a must-attend for c-suite executives working in IT and digital delivery for large-scale infrastructure projects.

Tickets for this year’s European CIO conference are available now from www.acecio.co.uk



Lasting reform needs practical solutions



Only tangible ideas shared with a unified voice will deliver post-Carillion reform and a sustainable model for all, writes *Nelson Ogunshakin*.

In my last column, I shared my perspective on the demise of Carillion and its impact on our industry. As well as expressing my disappointment to see an iconic household name with a long and proud history collapse, I set out a vision for a major debate on the future direction for the industry. I received many positive comments following publication. My call for a reappraisal of our broken industry model seems to have resonated with many of ACE's members and more broadly from a range of industry stakeholders.

The magnitude of Carillion's downfall is such that it must reframe our thinking and our engagement. Its fall impacts on the market, political landscape and as a business association, on ACE's output and initiatives. As an industry we have to move beyond "business as usual" to a state of more proactive thinking, agile operations and industry-wide collaborative engagement.

The immediate aftermath has seen key public-sector clients such as the NHS, Highways England, Ministry of Defence, Network Rail, HS2 and Transport for London, to mention a few, stepping in to ensure disruption is kept to a minimum and on-going contracts are honoured. Sadly, we have also seen a number of redundancies across projects as budgets are reassessed. We still do not know, nor can we quantify the impact in the longer-term on the project pipeline, nor how government will engage with the industry on new infrastructure spending.

While the collapse of Carillion shone a brief media and political spotlight on issues such as exposure in the supply chain, appropriate levels of risk, contract retention clauses and protection of SMEs, we are yet to see any real change in approach. It is for this reason that ACE will be working with its members and clients to put forward ideas on an improved procurement process and will engage other industry bodies to reach cross-sector consensus.

I strongly believe that providing the government with clear answers and ideas, coupled with greater understanding of the supply chain and procurement

process, will help deliver a robust and sustainable business model for all.

An enlightened approach to procurement calls for a quality-based tendering process, a reappraisal of the notion of "value for money", as well as the adoption of new or emerging technologies such as digital design, BIM, artificial intelligence, offsite construction and blockchain.

We need to also look at risk management and the unnecessary demand for inappropriate levels of professional

"While the collapse of Carillion shone a brief media and political spotlight on issues such as exposure in the supply chain, levels of risk, contract retention clauses and protection of SMEs, we are yet to see any real change in approach."

indemnity, fitness-for-purpose, parent guarantees and the allocation of risk to companies that are poorly suited to deal with it. Finally, we need to have access to the right skills in our sector to turn this new innovative approach into reality. We must embrace this vanguard of change to secure a sustainable business sector.

These are topics that will no doubt come to the fore at ACE's upcoming major events. The second European CIO Conference and our inaugural Skills Summit, both taking place in June 2018, will touch on these issues and provide an opportunity for the industry to discuss how technology and skills will both be vital to solving this industry conundrum and seeing the emergence of a healthier business model.

As the Brexit negotiations reach their conclusion over the coming months, we should be ready to re-engage government with clear calls to action, tangible proposals and a unified voice across project promoters, delivery agencies, professional consultancy and engineering companies, tier one and two contractors and product suppliers.

ACE members pride themselves on designing and creating solutions in their day-to-day work for their clients. We need to make sure that our whole industry applies its considerable intellectual muscle to perhaps the biggest challenge of all – ensuring a sustainable business model for every stakeholder.

Dr Nelson Ogunshakin OBE is the chief executive of the Association for Consultancy and Engineering.





UK companies can produce retrofit exhaust treatment systems such as this for buses.



Why the environmental sector needs a project pipeline



The infrastructure sector has come a long way in getting government to recognise the need for a steady pipeline of projects. The environmental technology sector needs to get better at doing the same, says *Matthew Farrow*.

Due to EIC's links to ACE, I am often an interested observer at ACE conferences and events, and am well aware of the importance that the infrastructure industry places on having a 'pipeline' of projects. The problems of 'feast and famine' have become well-known, in terms of retaining skills, attracting investors and the like. And in no small part due to the work of ACE, the government machine now appears to understand this. The sequencing of Crossrail, HS2 and then Crossrail 2 is a step forward.

This problem though is also found in many of the environmental sectors that EIC members work in. Take for example the companies that develop and manufacture retrofit exhaust treatment systems for diesel engines.

This SCR/DPF technology can bring an old Euro IV bus or truck right up to Euro VI standards in terms of cutting NOx and particulate emissions. Clever technology, and an area where the UK has strong expertise, but in reality, the demand for this piece of environmental kit (each one of which costs several thousands of pounds) is almost entirely dependent on regulation – bus and fleet companies will not pay for them unless they have to, not least because retrofit systems also make engines slightly less fuel efficient.

It's also worth noting that truck and bus engines are complex beasts, coming in many different types and variants, and

packaged in chassis in different ways, all of which means that bespoke R+D can be required to develop and fine tune a system so that it delivers consistent real-world performance – all of which must then be accredited at a testing centre which may be overlooked.

Most of the companies in this niche sector are medium-sized manufacturing firms, often family-owned. They tend not to have huge financial resources and don't find it easy either to weather several years of low demand, or to suddenly scale up if half the freight industry comes asking for a low emission fix. And yet this is exactly what often happens.

In the mid-2000's as the Low Emission Zone (LEZ) in London came into force and a government-funded Clean Bus Technology Fund was created to support bus retrofit in other cities, order books were good. But for several years air pollution dropped down the agenda, and there was less business (the lack of effective enforcement of the LEZ also meant little in the way of an aftermarket

of maintenance and repairs of the filter systems).

Compare that to now, when in London the Ultra Low Emission Zone is less than a year away, some 30 English and Welsh cities are being told to implement Clean Air Zones, and the Scottish Government, not to be outdone, is rolling out its own Low Emission Zone scheme. Depending on the details of each scheme, and whether they include HGVs and coaches as well as buses, orders for tens of thousands of systems could be coming, which the industry would struggle to deal with.

If, instead, the various government players had co-ordinated and set out a long-term strategy of cleaning up heavy vehicles, this could have been the basis of steady growth in an innovative, UK-based manufacturing sector which has huge overseas demand. Isn't that just what the government's industrial strategy is supposed to be encouraging?

Of course, this sort of un-joined up government is nothing new, but that doesn't make it any less frustrating when it happens. The infrastructure sector has come a long way in getting government to recognise the need for a steady pipeline of projects – in the environmental technology sector we need to get better at doing the same.

“Demand for this piece of kit is almost entirely dependent on regulation – bus and fleet companies will not pay for them unless they have to.”

Matthew Farrow is director of the Environmental Industries Commission, the leading trade body for environmental firms.

Creating a lasting legacy from sporting infrastructure

Following the Commonwealth Games, Mace's *Simon Dale* looks at how sporting infrastructure can provide a lasting legacy for cities and the local communities.

Birmingham City Council leader Ian Ward first announced his intention to host the Commonwealth Games 15 years ago. Now Birmingham has secured the 2022 event, councilor Ward has set the city the lofty ambition of hosting the best Commonwealth Games ever.

In addition to that bold aspiration we also need to make sure the games create the greatest possible legacy for Birmingham, the West Midlands, British sport and specifically UK Athletics.

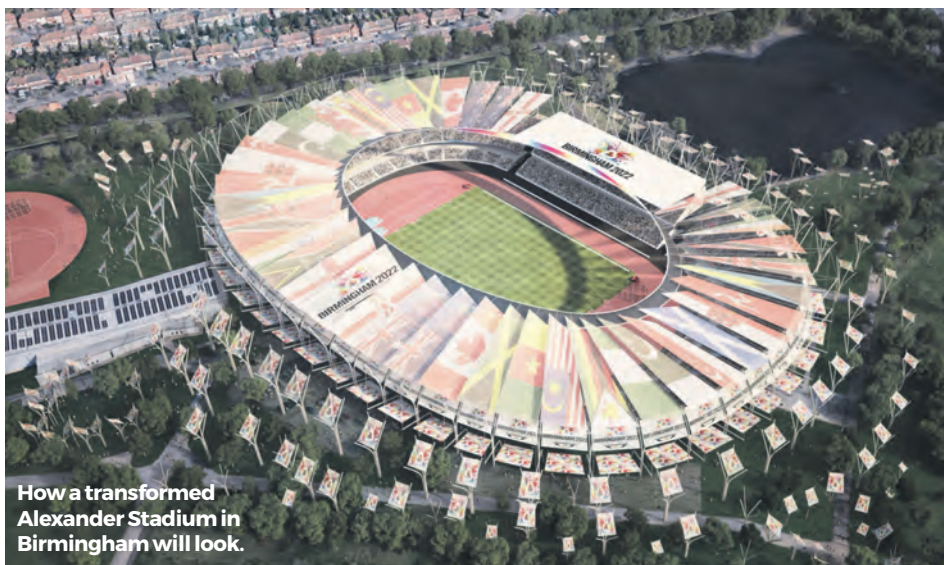
During the 2018 Commonwealth Games, it is estimated that more than two billion people saw the new £80m stadium in the Gold Coast, which afterwards will become the home of the Gold Coast Suns Aussie Rules side.

Through Mace's experience of delivering the Aquatics Centre and the stadium for the London 2012 Olympics, the transformation of Hampden Park for the 2014 Commonwealth Games as well as the City of Manchester Stadium for the 2002 Commonwealth Games, we know that first and foremost every sporting venue needs to provide a lasting legacy for the local people who share their community with the stadium.

Venues being commissioned for the 2022 Commonwealth Games must be created with their after-life in mind, once they have finished hosting 11 days of world class sport. One of the keys to that is designing and delivering venues which incorporate facilities the community can themselves use, once they have been inspired by watching the sporting action unfold on their doorstep.

When transforming the Alexander Stadium, which will host the Birmingham Games, there is an additional need to consider. As the home of UK Athletics the Alexander Stadium needs to be configured to the needs of elite athletes and can only be considered a true success if it creates a long-term legacy for British athletics for years to come.

UK Sport as a whole has thrived at the past two Olympics, but apart from the continued performance of a couple of exceptional sportspeople, UK Athletics has underachieved. Of the 14 world titles



Britain has won in the past decade, Mo Farah and Jessica Ennis-Hill account for nine of them. While at the London 2017 World Athletic Championships, Mo Farah, won Britain's only individual medal.

A world class athletics facility is needed to provide a catalyst for change and create a platform for excellence in the way that the Manchester Veldrome has for British Cycling and the Institute for National Football at Clairefontaine has delivered for the French national football team.

The need to create facilities which cater for both elite athletes and the local community is certainly a challenge but by no means an impossible one. Gyms and changing rooms which serve both markets can be cleverly incorporated into designs in various combinations while the trade-off between the needs of spectators and needs of the community can be tackled in the design of the planned decommissioning of the stadium.

"Mace delivered the London Aquatics Centre – an iconic, world-class venue that sits at the heart of the local community."



By 2017, in the three years it has been open to the public, the London Aquatics Centre had welcomed more than 2.5 million visitors. At this Olympics-grade facility, Mace delivered an iconic, world-class venue that genuinely sits at the heart of the local community - a sporting facility used for school, club, regional and national galas and meets throughout the year. More than 14,000 people visit on an average each week, making the most of the two 50m swimming pools, dive pool and gym as well as the café.

We know from our work transforming leisure facilities across England that high-quality facilities need to be put in place to drive footfall. Not only does this create a sporting and community legacy but also an economic one. The 20 leisure centres we've delivered over the past 12 years are not only generating £16m of additional income for local authorities each year, but they are estimated to have saved the NHS around £115m over that time with a healthier population making fewer hospital visits.

In addition to delivering the greatest ever Commonwealth Games, Birmingham 2022 must create the greatest possible legacy for the local community and equip the Alexander Stadium so that it provides a springboard from which we can usher in a new golden era for UK athletics.

Simon Dale is director of the Midlands at Mace.

Innovation and technology will help unlock the future

Combining new delivery models and the smart use of technology can usher in a more productive future for the construction industry, says AECOM's *Richard Robinson*.



Adopting new technology and best practices are vital.

It's no secret that the delivery of critical infrastructure assets is crucial to a country's economic growth and the wellbeing of communities. Yet around the world, infrastructure issues such as highway congestion and unreliable rail networks continue to persist.

The 500 industry professionals surveyed in AECOM's recently published *Future of Infrastructure* report say they have suffered significant yet avoidable delays on 40% of recent projects. This could be a thing of the past if a combination of technology and alternative delivery is adopted, both key to tackling the productivity issue and accelerating much-needed projects.

Currently, many infrastructure projects are slowed down due to inefficient and outdated project delivery methods that lead to delays and schemes that run over time and budget. The effect on the UK economy is damaging, with the cumulative impact of stalled projects during 2015-16 alone projected to dent investment-related GDP to the tune of £35bn.

There are many reasons for a drag on productivity, but one important issue we found in our *Future of Infrastructure* report was limited adoption of new technology and best practices. Worryingly, the report found that only 56% of industry professionals consider themselves "good" at adopting and scaling innovative delivery models.

This all results in a domino effect where

buyers get inefficiency, often resulting in delayed projects and poor-quality assets, and suppliers struggle to survive financially. This is even though there are several tools and approaches available to produce a positive transformation in the delivery of major infrastructure projects. We need to effectively learn lessons from the past, to build a new industry dynamic.

A two-step approach to solving the productivity issue is needed, which firstly sets up projects to incorporate a more integrated approach, linking across the life cycle of an asset and reducing total cost of ownership. This would also create assets that are more constructible and fit for purpose. Secondly, using digital tools to unlock the full power of this integrated approach.

To achieve the first objective, breaking down the familiar approach of plan, design, build, operate and maintain will be key. Infrastructure organisations should seek to align all objectives and rewards across the

"AECOM has used virtual reality solutions on projects to deliver schemes more efficiently than ever before."



supply chain to meet the client's key success factors. A more honest dialogue around risk is needed, with suppliers providing greater transparency around the true nature of risk in their schemes and infrastructure owners willing to take on risks they are better positioned to manage themselves.

Well-designed and performance-based partnership models that are incentivised to deliver the best for the project and client are crucial. It's about getting the basics right – robust project setup; streamlined governance; and continuous stakeholder buy-in.

Next in the two-pronged approach is the use of digital tools. These can bring efficiencies in each individual service line as well as enable the full power of an integrated approach. Enhanced and automated value engineering to create a more buildable and operable asset is just one example.

For example, virtual reality (VR) solutions have the potential to merge separate delivery phases by offering an interactive and easily accessible digital design model. AECOM has used this technique on projects as diverse as the Wessex Capacity project at Waterloo and the Serpentine Pavilion in Hyde Park, enabling us to deliver schemes more efficiently than ever before.

Other digital tools that are growing in impact include artificial intelligence that replaces repetitive manual tasks and provides a more reliable outcome. This enables new construction techniques such as the use of modular construction, 3D printing and increased use of robotics. Asset intelligence is also on the up.

The volume of data and the ability to effectively analyse and draw conclusions is taking a step change when AI and other data mining techniques are coupled with today's computing power. This allows new tools to capture and analyse performance data to drive more efficient operations and truly feed back into future designs.

After years of industry wrestling with the productivity gap, the time has come to fully embrace innovation. We now have the keys to unlock the future – and they lie in the combination of new delivery models and the smart use of technology.

Richard Robinson is the chief operating officer at AECOM.



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