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INFRASTRUCTURE Intelligence

Produced for the industry by the Association for Consultancy and Engineering

Inside the mind of a FUND MANAGER

Why infrastructure is such a turn on

INFRASTRUCTURE Intelligence

Produced for the industry by the Association for Consultancy and Engineering
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MESSAGE FROM THE EDITOR

Businesses in our sector currently operate in parallel universes. In one, there's the industry in overdrive, eyeing up a vast range of mega infrastructure projects stretching on to the horizon. It's a dizzying prospect, driven in part by a swarm of City fund managers increasingly attracted to the ready income stream that assets such as waste-to-energy generation can deliver (see our lead feature, pages 16-19).

Meanwhile, in a different, darker galaxy, alarming signs of implosion abound. Construction output is down and the brakes are tightening on London housebuilding. Slower economic growth means the Chancellor is poised for more spending cuts. And the Jeremiahs are out in force, predicting that we're standing on the edge of global economic collapse.

Navigating a path for the future has suddenly become very difficult. Government's penchant for flicking the on-off switch when it comes to green energy generation is no help either – removing incentives for onshore wind, hydro, solar PV and the funding for carbon capture and storage. There is now a big question mark hanging over tidal power to add to the endless delays and disappointments over Hinkley (pages 6-8). The Secretary of State for Energy & Climate Change, Amber Rudd, has ordered a review of tidal power that is not expected to report until the autumn.

Yet despite a constant stream of reports warning the lights will go off in 2025, there is no evidence of haste being felt in drawing up a proper energy policy and framework for contractors and operators. Let's hope the new report from the National Infrastructure Commission will inject a bit more urgency.

And then of course there's Brexit, or at least its prospect. A possible end to movement of labour, withdrawal of investments and the messy business of how we are to actually extricate ourselves are hugely worrying for the sector. Some leaders have voiced their concerns; many remain reticent lest they upset clients. The contents of the Chancellor's red Budget box might bring UK spending a little sharper into focus – but unless there is a vote to 'Remain' In June, the anxieties will remain for many years to come. And it could be just the one universe that construction and engineering must navigate.

● *For ongoing coverage of the EU referendum and its impact on construction, visit www.infrastructure-intelligence.com.*

**Denise Chevin,
editor, Infrastructure Intelligence**

Contents

Full steam ahead for TfN

Bringing together local representatives from across the region, Transport for the North is enabling the region to speak with a single voice to government for the first time. *Andy Walker* spoke to TfN's chief executive *David Brown* as the organisation prepares to release its latest strategy report

David Brown is a man with a plan; a transport plan for the North that will, for the first time, give the industry some long-term certainty, ending the stop-start approach that has blighted previous attempts to organise transport infrastructure development.

In March, TfN issues an update on its strategy, first launched last October. It's a timely release, coming as it does at around the same time as George Osborne's latest Budget and two reports from the National Infrastructure Commission. As TfN chief executive, Brown will take a leading role in the development of the future blueprint for TfN as it builds towards statutory status from 2017 onwards.

Sitting in his offices in Manchester's Piccadilly, the former Merseyside Travel CEO exudes the calm that will be needed to navigate red tape and regional rivalries to pull off a fully fledged devolved transport entity for the North.

If he could get there overnight, what would it be like, one wonders? Brown has no hesitation in setting out the three things he'd do to improve transport in the region. "We need a brand-new rail system that connects Liverpool in the west across to Manchester, Leeds, Sheffield and then onto Newcastle and Hull. That needs to be a substantially new line, because then you get significant benefits for passengers and freight, and you minimise the disruption.

TfN's chief executive David Brown

"Then we need a clear plan to manage the motorway system to not just cater for the growth that is happening but to encourage people to change their behaviours and travel by public transport.

"The third thing is having a clear plan for freight, because at the moment it's a bit of a patch-and-mend. Having a clear plan which allows us to improve access to ports and airports in particular is really important."

Update provides route map

Brown may have a final destination in mind, but today the conversation is very much about the route map and what we can expect to see in the latest TfN report. "It says there are options for dramatic improvements to road connectivity from east to west, looking at the potential for a trans-Pennine tunnel and trans-Pennine improvements around the A66 and A69 and the rest of the motorway system. There's an update on Northern Powerhouse Rail, the trans-Pennine upgrade, smart ticketing and access to ports and airports," he says.

There are three things TfN wants to show with its new strategy. "The first is to demonstrate progress. The second is to show that we are starting to get a clear set of priorities, and the third is to say, 'Here is the programme of work that we are going to be doing.' We'll be narrowing down the options on potential schemes, so on the trans-Pennine tunnel we have moved from five to three, and on Northern Powerhouse Rail we'll have two or three options rather than five or six."

Establishing powers is crucial

So far so good, but what are the main challenges? Just setting the organisation up in the first place, trying to get people in and trying to work with all the city regions is a challenge in itself, says Brown. The creation of the statutory body is particularly important, because it will give TfN the power to do some of the things now done by central government, such as commissioning rail and roads.

"That's a challenge, because I have to ensure that we reflect the views of the North and then negotiate that with central government as well."

Brown is clearly concerned about how long all this might take. A drawn-out statutory process and full devolution is a worry, he says, as is delay in drawing down the money that has been made available for TfN from central government – £10m a year for the remainder of this Parliament. "We need to go through a process, but we don't want it to take too long," he says. "This is about devolution. We want to get on and deliver the things that are important to the North. We just need to make it happen. We don't want an assault course of an approval process.

"We need that long-term plan so that contractors and private sector can gear up to match that. We are trying to give the industry some longer-term certainty, with a programme of schemes for which we can identify medium to long-term funding. We want contractors to

➤ be able to plan for the longer term, to align that with the skills agenda and make sure that the people we work with have the right workforce and that they're bringing through apprentices."

'There's a lot you can do now'

In the next year Brown says he expects TfN to have a clearer set of priorities about routes and preferred options, alongside existing programmes around smart motorways and Network Rail improvements.

"Quite a lot of the key developments will be in the mid-2020s, but there is a lot you can do now," he says. "There's a load you can do on the motorway network and the rail network to improve journey times and that will be done between now and 2022, while we develop the bigger-ticket items. What you wouldn't want to do is put all your eggs in a trans-Pennine tunnel basket when businesses need to move between Sheffield and Manchester now and not wait until 2022."

Brown says it is important that decisions are being made in the North. "On rail, the new franchises are now being managed by a team based in Leeds, not Whitehall, so that's devolution actually occurring.

That's being done in the North by northern people. It's that logic we are trying to apply in TfN – the North delivering for the North."

I ask about the funding of TfN's plans. "If you're building any new infrastructure you've got to look at all options about getting foreign investment or other investment in. The key question is, how do they get a return on that investment? I've just come from a meeting with a Chinese company which is very keen on investing and doing the work, but how do they actually get a return if they fund the roads and railways? I think there is an issue for central government to work on there," Brown says.

Brown is keen to learn lessons internationally. "Germany and France, where their infrastructure is far better than here and the cities are connected by better journey times and better frequencies, shows what can be done," he says.

From a devolution perspective Brown cites approvingly the example of the Scottish government and Transport for Scotland. "They have determined what they will spend the money on that suits their objectives, which probably aren't central government objectives. They have got the mandate, the funding and they are getting on and doing it."

Delivery is not far off

So what should we expect at the end of TfN's first five years? "We will have produced a plan. We'll have secured the funding for smart ticketing and delivered a substantial part of that across the North, we'll have produced the plan for the rail system upgrade and we'll be halfway through delivering that and the same on the motorways, and we'll know what we are doing on the big schemes," says Brown.

"By December 2017 TfN and Network Rail will have produced a firm plan about what our proposals are, and between 2017 and 2022 we'll be getting into delivery mode. In transport terms that's really not that far away."

Indeed it isn't. It seems that, as far as transport infrastructure in the North is concerned, there will be much for the industry to get its teeth into over the next five years and beyond.

In Brown, the sector looks to have a keen advocate for what it can bring to the table as well as for the virtues of having a plan and sticking to it.

NIPPON KOEI BUYS UP BDP

Multidisciplinary design practice BDP has been sold to the Japanese civil engineering consultancy giant Nippon Koei for £102m. Nippon Koei, which has annual turnover of £430m and employs 3,200 people, will acquire 100 per cent of BDP's shares, creating a new integrated design group.

GREEN LIGHT FOR BIOPLANT

The world's first bio plant for handling unsorted household waste is to be built in Northwich, Cheshire by DONG Energy, following the granting of planning permission for the site. It will be the first bio plant in the world to handle unsorted household waste without prior treatment, using enzymes.

AECOM WINS HS2 ROLE

Fusion JV, the joint venture between Morgan Sindall, Ferrovial Agroman and BAM Nuttall bidding to win HS2 civil works contracts worth £900m, has appointed AECOM as lead designer for phase one activity.

JACOBS BAGS MANCHESTER

Jacobs has won the engineering contract for the £1bn Manchester Airport overhaul. The consultant will provide engineering and architectural services to Manchester Airports Group for the airport's 10-year transformation programme. The £1bn upgrade, being project managed by Arcadis, will significantly increase airport capacity and allow for increased use of its two existing runways.

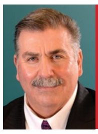
SWEETT FINED

Consultant Sweett Group has been ordered to pay £2.3m after pleading guilty to offences under the 2010 Bribery Act – the first successful prosecution under the Act. The offences relate to Sweett Group's operations in the Middle East.

You can read more about these stories on www.infrastructure-intelligence.com

Gatwick gears up for runway victory

Jon Masters speaks to airport's development director amid fresh lobbying efforts



Two minutes with: Raymond Melee

Gatwick's investment programme up to 2021 has increased to £2.5bn since entering private ownership in 2009. How much of this is dependent on a second runway?
Our £2.5bn transformation programme is to meet existing demand and does not include the second runway. However, our airport planning services framework may also be used for preparatory work associated with a second runway.

Assuming you got the nod to build a second runway, when would you expect to start?
The frameworks last for five years, and given that we expect a government decision by summer we need to be ready to start work as soon as we receive government approval.

Once we get the approval to build a second runway, there will be significant additional funding for projects that will need to be scoped and progressed within these five-year frameworks.

What other work is in the offing for improvements at Gatwick?
All of the works detailed in our three recently published frameworks are for open competition. This work is part of our existing programme of investment. However, when we get the green light to build another runway, our budgets will be increased and the works will start to incorporate scope more specific to the building of the second runway.

It has been reported that Gatwick Airport has not been entirely satisfied with the supply chain management performance of its principal contractors. What are you looking for from framework bidders for a step change in delivery?
Gatwick enjoys excellent working relationships with all of its contractors and we constantly look for ways to build on this, while at the same time keeping an open mind for new ways of working.

The airport transformation programme is quite advanced now and we constantly take lessons from each project we manage. In the future we will be aiming to have more control over our supply chain, so we can manage programmes effectively and ensure projects are delivered on time and on budget. Through the creation of new contracting frameworks, Gatwick will be able to match the variety and diversity of its build programme with a more flexible, reliable, and responsive supply chain.

What will Gatwick bring to the contract procurement and delivery processes as an intelligent client?
Gatwick is aiming for shorter procurement cycle periods, helped by market-reflective terms being agreed at a framework level. Pre-agreed purchase order terms will also be used for lower-value works. In addition, frameworks will be managed proactively, with dedicated people on both sides to ensure consistency and efficiency.

What evidence is there that Gatwick can deliver its ambitious proposals?
Gatwick is no stranger to delivering difficult projects. We are successfully managing 24/7 construction sites alongside our operation. Our focus is to create cross-functional teams working together for a common goal.

Industry heads speak against Brexit

Better for the construction sector to remain in the EU, reports *Andy Walker*

Leading figures from the construction industry have come out in favour of a yes vote, cautioning that leaving the EU would damage the economy and reduce the talent pool.

Nick Roberts, chief executive officer, UK & Europe at Atkins, said: "We rely heavily on the availability of the best-qualified engineers and scientists to support our national, European and international clients. The availability of talent in Europe without restrictions, as well as our European client base, are important factors of Atkins' success."

Atkins chief executive Dr Uwe Krueger was one of the 200 business leaders who signed a letter to *The Times* last month warning of the consequences of withdrawal, alongside leaders of Arup and Mace.

Alan Brookes, UK CEO at Arcadis, is also worried about a no vote. He said:

> "Without the EU transient labour market our industry simply could not function"
>
> **Stephen Fox, BAM Nuttall**

"We saw investment decisions in the private and public sector disrupted by the Scottish vote. If the referendum is a no vote then it will precipitate two years notice of exit, negotiation of type of relationship with the EU and potentially uncertainty for the whole period we negotiate our position."

Chairwoman of the Institute of Directors and new chair of ACE's advisory board, Lady Barbara Judge, said: "Our members were always more concerned with securing commitments on reducing business red tape, making sure the eurozone would not put the UK at a disadvantage as a financial centre, and clear limits on the implications of the phrase 'ever closer union' in the EU treaties. We now have a deal and the prime minister secured very worthwhile reforms. When we asked members to give us their instant reaction following the agreement at the EU summit, 60 per cent said that they intended to vote to remain, compared with 31 per cent who said they would vote to leave," she said.

Stephen Fox, chief executive of BAM Nuttall, voiced concerns about movement of labour. "Our industry, like farming, aviation and hospitality, is heavily dependent upon the EU transient labour market. Without this we simply could not function."

Legal implications, p23; Environment, p33

Battle for the waves

Energy providers are squaring off over rival technologies. *Mark Leftly* investigates

Swansea natives have gathered by the Welsh coastal town's waterfront to show their support for a first-of-its-kind technology they believe will heat their homes for 120 years. They have also signed a petition that has gone directly to prime minister David Cameron, hoping this will persuade him to intervene at a time when hopes for Tidal Lagoon Power's Swansea Bay have been fading.

The world's first man-made, energy-generating lagoon is supposed to provide enough electricity for 155,000 homes and pave the way for the technology to be used in other watery enclaves in Somerset, West Cumbria, and elsewhere in Wales. The team behind the scheme believe they are on the cusp of a technology that will help the government to achieve its renewable energy targets, while financial backers include Infrared Capital, insurance giant Prudential and 26 banks willing to lend up to £800m.

But some experts have questioned the engineering behind putting 16 turbines a mile out to sea, while the strike price – the minimum price guaranteed for electricity produced – is an eye-wateringly high £168 per megawatt hour. By contrast, the strike price at the proposed Hinkley Point C nuclear reactor has been heavily criticised at just £92.50, while the falling oil price makes the economic justification even more difficult.

Last month, the government ordered an independent review into the scheme – Tidal Lagoon had originally hoped to start construction this spring. Yet in Northern Ireland, preparations are moving apace for a deeper water scheme, where turbines will take advantage of faster-moving waves, devised by Cork-based DP Marine Energy. This team hopes to start construction by 2018.

Lagoons vs offshore technology

There seems, then, to be a sea battle between two related, but subtly different, technologies that is seeing lagoons bloodied by their deeper water, offshore rivals. Although backed by big money, Gloucester-based Tidal Lagoon is not a huge company and it is feared that heavy delays could put the project in danger even if the government ultimately gives it the go-ahead.

But talking to *Infrastructure Intelligence*, energy secretary Amber Rudd says she is unaware of the Belfast scheme and insists she is "still interested in lagoon technology". She adds: "We've had a number of people contact us about different projects and if any of these are to go ahead we've got to be clear about what's in the market. In tidal we've got various proposals, and that's why I want an independent report into what's going on."

One of these proposals is from green energy company Ecotricity. It claims it can build tidal lagoon energy sites in Britain for almost half the price proposed for the Swansea Bay project.

Welcoming the government's review

of tidal lagoon energy, the company has urged the Department of Energy & Climate to ensure value for money from the fledgling tidal industry.

Ecotricity founder Dale Vince said: “The government has been agonising for a while about what level of support to give to the first tidal project in Britain. They’re clearly interested in the technology, which is a good thing, but they’ve been put off by the price tag of £168/MWh proposed by Swansea Bay – that’s understandable.

“We welcome the review, because we are confident that tidal power projects can be built around Britain at much closer to £90/MWh – that’s the same price the government are paying to support nuclear energy, but without the risks or clean-up costs.”

Rudd confirms that price is a key concern. “I’ve seen they [Swansea Bay] have raised quite a lot of money recently. They have their issues, I have my issues of the consumer to look after. We have spoken about this, and they are aware that we need to do this.”

The indication that Rudd is approaching this review, which is expected to last until autumn, with an open mind is a welcome one for Tidal Lagoon, yet an adviser to the energy department insists: “There has been a huge degree of scepticism [within the department] about whether this is a runner from day one. The price of other renewables is coming down all the time, so there is the pure economic perspective of whether it stacks up.”

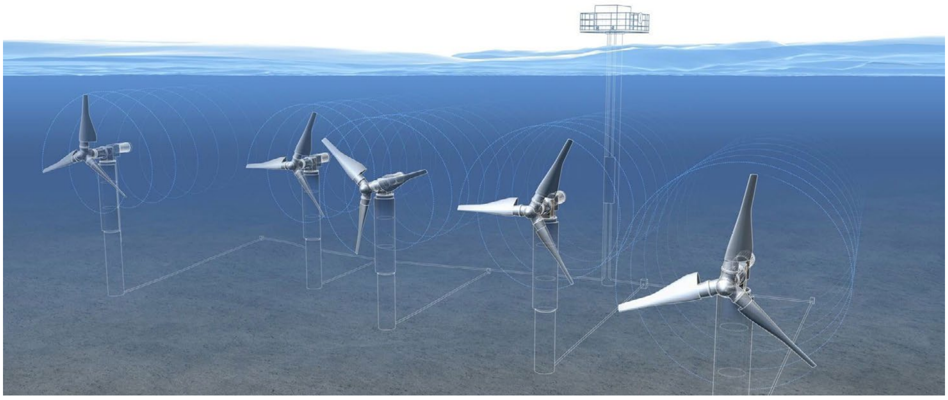
Life cycle over 90 years

The strike price debate irks Keith Clarke, the chairman at Tidal Lagoon Swansea Bay, who is convinced that his team have proved the environmental case for the project.

He is frustrated that the government uses a framework in which the guarantee has to take place over around three decades, when this would be considerably lower if the guarantee lasted for around 90 years.

Clarke says: “This is a first-of-its-kind project, it has planning consent, we’ve got funding, we’ve taken the risk. We need an indication from government that they’ve got a framework for us.

“The 35-year framework is for something like a wind farm, so they’re trying to fit the framework onto the wrong asset class, because this is a 90-year life cycle. With this project, energy is predictable. There are 14 hours a day when it would make power, and we can tell you when those 14 hours are



Top, Tidal Lagoon Swansea has already received planning permission and if built will power 155,000 homes. Below, illustrative picture of deep-sea wave technology as being considered by DP Marine Energy

> “The government has been agonising for a while about the first tidal project in Britain. They’re clearly interested in the technology, but they’ve been put off by the price tag of £168/MWh – that’s understandable”
>
> **Dale Vince, Ecotricity**

forever. We would like an indication that we would go into formal [strike price] negotiations or not by the summer.”

That indication would also mean Tidal Lagoon could get under way with plans for a £7bn sister scheme in Cardiff that would produce enough electricity to heat all the homes in Wales. Further, Tidal Lagoon has claimed that technology could become a great export, with other countries keeping a close eye on the project to see if it works, though it is again thought that some civil servants question this.

Stephen Kinnock, MP for Aberavon and parliamentary private secretary to shadow business secretary Angela Eagle, insists the lagoon could boost Wales’ ailing steel industry. Tata recently announced more than 1,000 job losses at Port Talbot Steelworks, and Kinnock says: “The casings for the turbines are in line with what Port Talbot can produce. There is significant value for the steel industry in this project.”

Liberal Democrat leader Tim Farron goes further, arguing that “the tidal lagoon in Swansea Bay is a litmus test of this government’s position on green energy”. He adds: “I am concerned that this recently announced review could just be used as a smokescreen to try and justify even more cuts to the green energy sector. Britain could be the world leader in green technology if government would back the industry.”

A senior engineering source says nearly all major water barriers take “20-plus years” to move from conception to completion, and Swansea Bay was first thought up only six years ago. He adds:

"We've got a really good democracy in the UK, but that democracy presents certain challenges – everything seems to be delayed. For this type of big-ticket infrastructure item, the UK's got to start making its mind up how important they are as a top-down policy issue."

A spokesman for Fairhead Tidal, the special-purpose vehicle behind the Northern Irish scheme that is jointly owned by DP and Bluepower, says it is preparing to submit a planning application for "an array of turbines about a kilometre off the coast of County Antrim" this summer. This will provide enough electricity for 70,000 Northern Irish homes by 2020.

"I am concerned that this could be used to justify cuts to green energy"

Tim Farron, Liberal Democrats

Says the spokesman: "The fundamental difference [between the schemes] is that Swansea is looking at a shallow tidal movement in a broader area. Ours is in deeper water, but the tidal movement is much faster. The Crown Estate, which owns the seabed, has identified absolutely prime areas for this."

The turbines for this scheme have also been rigorously tested for about five years. This means that Fairhead is now choosing between three or four second-generation turbines.

Hopes for Swansea Bay, then, are not forlorn, but it has to compete against rival technology. Rudd does not speak like someone who will be rushed into a decision, but the energy secretary has least suggested that she is considering the case for lagoon and broader tidal energy.

Mark Leftly is deputy political editor at The Independent on Sunday and associate business editor at The Independent

Time for government to ride the wave of innovation and free the country from fossil fuel dependence

The technology is now ready; policy must catch up. *Craig McMaster*, MWH Director Infrastructure UK, makes the case for tidal power

We are an industrious nation; we have entrepreneurs, technical innovators and one of the most successful economies in the modern world. Why does such an industrious nation struggle to produce a definitive plan to ensure our future energy needs are secure? A single national plan defining the required energy generation mix would provide those entrepreneurs and technical innovators with a framework within which to invest and create the infrastructure we need.

Last year I wrote an article for *Infrastructure Intelligence* that suggested a long-term energy vision for a UK free of fossil fuels, which included a nuclear and renewables mix enabled by grid-scale storage (namely, pumped storage hydro). I stated that the abundant tidal resource available around the UK should be harnessed and included within the renewables component of this future mix.

Government plan lagging behind

The entrepreneurs and the technical innovators are now ready to deliver a small fleet of both tidal lagoons and tidal arrays, but it seems our UK plan for energy infrastructure isn't quite as ready to respond. The government's recent announcement of a review of the feasibility and practicality of tidal lagoons is sure to cast doubt on the future of the technology and its investment attractiveness.

"The concept of energy from tidal arrays has been considered for many years. We are after all a group of islands"

Certainly, the nation expects rigorous analysis and due diligence on innovative technologies like tidal lagoons to ensure tax (and bill) payer value for money, but surely within a forward-looking and cohesive plan; not retrospective or reactive, resulting in reduced energy security margins and reduced investor confidence.

Our energy industry has progressed tentatively in recent years, despite policy changes such as incentive removal for onshore wind, hydro, solar PV and removal of funding for carbon capture and storage.

The UK's onshore unconventional gas potential remains untapped, and the slow progress of nuclear new-build places ever greater risk on future energy security as ageing power stations are decommissioned.

The concept of electricity generation from tidal lagoons, tidal arrays and tidal barrages has been considered for many years. We are, after all, a group of islands on the edge of a continent surrounded by constantly moving water. It is disappointing that the intent to invest in and construct tidal lagoons should be delayed, owing to a lag in national policy and technological awareness.

Clean, reliable energy

The predictability of tidal schemes presents an irreplaceable form of clean, renewable energy that reduces variability and strengthens grid stability, thus enhancing base load generation.

The UK is fortunate to have such an abundant energy resource surrounding our nation. For example, the River Severn has the second-highest tidal range in the world, an uncommon attribute that if harnessed could potentially provide more than 5% of the nation's electricity supply.

Value for money is an entirely valid consideration in any project that attracts an element of public funding or financial incentive mechanism. However, this consideration should be proactive and either precede individual projects or be developed in parallel.

Suburban railway shake-up:

Plans are afoot for improving connections into the capital by transferring services

Travelling into central London by train from any of the southern counties can be an extreme test of patience. It's worse if the journey starts within south London, where services can be as infrequent as two trains per hour and the chances of finding a seat at peak times practically non-existent. Mainline railways serving south London boroughs have been bad for so long that members of the London Assembly are calling for change.

The wishes of the Assembly and many others appeared to have been answered in January, with the announcement of a new partnership between the Department for Transport and Transport for London; at its core, the transfer of services from DfT franchises into TfL hands.

The news brought a triumphant response. While some national and local media welcomed the changes as full re-nationalisation of railways in south London, even those who favoured a softer line could see the benefits of devolving services to TfL.

London's transport authority has already shown what it can do in the form of the 'turn up and go' Overground system, created on upgraded lines to the north and east and now forming an orbital network, albeit a discontinuous one, terminating at Clapham Junction from both directions and going no further to the south.

Handing more services to TfL will allow extension of the Overground, and there are compelling reasons for doing so, but more on that later. First, a reality check: the plans do not involve devolving any of the Southeastern, Southern, Thameslink or South West franchises to TfL in full. As and when these come up for renewal, they will be re-specified to run alongside some suburban services transferred to TfL.

Timelines

The first to undergo this change will be the Southeastern franchise in 2018. South West Trains is due for renewal earlier, in 2017, but DfT has announced that First Group and Stagecoach will also bid to operate services on routes between Exeter, Southampton and Waterloo.

"It's no simple matter to make the necessary changes for devolution of rail services," says TfL's head of transport planning Geoff Hobbs. "We need a secondary statutory instrument through Parliament for each franchise. We also have to procure new operating contracts through competitive tender and carry out TUPE [transfer of undertakings compliance] for TfL and DfT operators.

"There was no way all this could be done for 2017, so for South West Trains we're looking at dates after 2020 (for taking over services), and the outcome of proposals for Crossrail 2 will dictate what we do with the Overground in the south west of London. But for the Southeastern franchise, the second half of 2018 is realistic for getting the necessary powers and contracts in place."

From late 2018, or early 2019, TfL may be running its own orange-liveried trains on routes from Kent into London Bridge, Charing Cross and Cannon Street. Rail commuters in southern London boroughs including Croydon, Kingston, Lambeth, Merton, Richmond, Sutton and Wandsworth will have to wait longer for better train services. The Govia Thameslink and Southern franchise is not due for renewal until 2022.

Delving into the detail of Network Rail's long-term planning shows that some stations will get fewer trains into central London. TfL has provided

> "It's no simple matter to make the changes. For South West we're looking at dates after 2020, but for Southeastern, late 2018"
>
> **Geoff Hobbs, TfL head of transport planning**

2024: Start of Network Rail Control Period 7; infrastructure upgrades on south-London rail network.

2023: New South West Trains franchise starts and TfL gets access to operate services across all south London boroughs.

2018: Award of new TfL operator contract and Southeastern franchise

2017: Issue of specification for Southeastern franchise with services devolved to TfL.

2016: Department for Transport and Transport for London publish prospectus on south London rail services; Planning under way for infrastructure changes to allow more capacity from a simplified south London network.

delays expected

to TfL. But when and to what extent? *Jon Masters* reports

2021: Award of new franchises for Southern and Thameslink. TfL gains access to operate services across south London boroughs into Sussex and Surrey.

input to NR's Sussex Area route study, published in September 2015, which says the aim is for greater frequency and quality of services on a simplified suburban network.

Answering questions from the London Assembly Transport Committee last week, Network Rail chair Peter Hendy said a joint NR/TfL plan for south London's railways was due to be published next month, but would be largely aspirational.

Infrastructure changes are planned in NR route studies. "These are works in progress," Geoff Hobbs says. "Planners from NR, TfL and others will get together to decide on the best affordable ideas for the Wessex area (radial routes out of Waterloo) in late 2016."

The Sussex Area study covers major upgrades, including creation of hub interchanges where lines converge at Streatham and Peckham Rye, with changes to stations and track layouts. This would deliver substantial benefits and good value for money, the study says, but is considered to be an option for funding beyond the end of NR's 2019-2024 Control Period 6.

Quick wins

This largely underwhelming assessment is a far cry from the hopes of a report by the social and economic think tank Centre for London. The report – called *Turning South London Orange*, in reference to the Overground livery – came a week before the DfT/TfL announcement and called for the wholesale upgrade of services across south London.

Upgrades and alterations to track layouts and junctions for a south London Overground could create Britain's fourth-largest rail project after HS2, Crossrail and Crossrail 2, valued at between £7bn and £14bn, the report says.

But TfL's Hobbs warns: "The Centre for London plans are very ambitious and probably unrealistic, given what's affordable." So what can be done?

"There are lots of things that can be done in the meantime," says Hobbs. "First of all we can improve reliability, with operator contracts that incentivise performance over everything else."

Frequency of services can be raised in off-peak periods, Hobbs says. "Thirdly, we can add more staffing of stations. We can also improve real-time information for passengers, introduce better security, more straightforward ticketing and better stations. On top of all that we can use longer trains."

The long horizon

Centre for London and TfL cite several reasons for doing all this, not least the need to cope with population growth. "Based on a modest 2 per cent annual economic growth and 0.6 per cent population increase, transport demand in south London will double by 2050," says one of the principal authors of the Centre for London report, Jonathan Roberts.

London is expected to need another 500,000 homes over the next decade as its population grows towards 10 million. TfL estimates that demand for rail travel will grow 80 per cent between now and 2050. Five Underground lines extend into south London boroughs, but only as far as Brixton, and at far lower density than north London. These five lines are overcrowded and despite planned upgrades, they are expected to reach maximum capacity by 2031.

The suburban mainline rail network is largely underused, however, according to TfL and Centre for London. "Our analysis shows that extension of the Overground further into south London boroughs could deliver all the capacity expansion needed," says Roberts.

"The present system of lines is exceptionally complex and features inadequate junctions and service arrangements that simply don't permit improvements. Radical change is needed. The system must be made simpler and more technically effective; we need planning for the big-ticket items for construction in the 2020s, not later; and we should recognise that the planning horizon of 2030 is wrong. We should be planning for longer."

Graham Dalton, former Highways Agency CEO and member of the National Needs Assessment Executive Group

It's time to work together on using infrastructure to make the world a better place

"I've worked on many exciting projects in 30 years. But none as exciting as this"

I have spent much of my career designing, building and operating transport infrastructure. I have worked on some great projects, and will work on many more. But all too often we just think of infrastructure as a series of construction projects without thinking about why we are building it.

We take it for granted that we can travel at will, and that we can have the goods and services we want delivered to our doors virtually immediately. We expect utilities to flow at the flick of a switch, or the turn of a tap. And we expect to pay relatively little to enjoy this high standard of living.

But much of our infrastructure is working beyond its design capacity. And the forecast growth in population means that there will be more reliance on infrastructure.

Let's then add the challenge of making the world a better place. Improving air quality and reducing carbon emissions will mean radical changes to our transport network, creating far more demand for electricity generated from clean or renewable sources and compounding the challenge of renewing a fleet of ageing power stations.

These are big challenges and demand a big response. I am pleased to be working with colleagues from across the infrastructure, business and academic community to prepare an independent National Needs Assessment for infrastructure.

The assessment, led by the Institution of Civil Engineers and chaired by its president, Sir John Armitt, will look into the demands our infrastructure will need to meet by 2050 – whether to replace existing capacity, provide more capacity to meet growing demand, or support our environmental obligations. The assessment will culminate in a report which will be published in the autumn and provided to the National Infrastructure Commission.

As I said, I have worked on many exciting projects over the last 30 years. But none as exciting as this; this the first time I have felt a real sense that we as professionals are working together to make the world a better place.

Most importantly, however, we are not just creating a list of projects. This is to be an evidence-based assessment exercise, and will draw from a wide pool of views, data, research and economic and social forecasts.

The infrastructure debate must be based on need. I look forward to seeing this project develop, and encourage involvement in the evidence-gathering process over the coming months.

Paul Jackson, CEO, EngineeringUK

To close the critical skills gap, we must inspire young people

Engineering UK 2016: The State of Engineering analyses the engineering industry's capacity for growth and details engineering in education, training and employment and is available at www.engineeringuk.com/Research/Engineering-UK-Report-2016

The recently published report *Engineering UK 2016: The State of Engineering* highlights the fact that the sector is driving employment and productivity. In fact, engineering is a considerable 68 per cent more productive than retail and wholesale.

Over 27 per cent of UK GDP is now generated by engineering, amounting to £445.6bn, and sector turnover has grown 3.4 per cent to £1.21tn. Employment in engineering has grown to over 5.5 million and the industry now supports 14.5 million jobs. A strong engineering industry has a powerful ripple effect – for every new job in engineering, two more are created outside the sector, and every £1 GVA generated in engineering generates £1.45 elsewhere.

Yet we are concerned for the long-term future of the industry. There is a considerable gap between the supply of and demand for people with engineering skills. We can't sit back and hope that the education system will spit out the requisite new recruits – it simply doesn't have the capacity.

While there have been huge advances in engineering in the past 30 years, very little has changed in terms of the make-up of the sector. We need to join in concerted action with the education sector to inspire young people to make the choices that will close that skills gap.

Skills strategies such as that announced by the Department for Transport are right to focus on the programmes and interventions that are showing real results rather than launching new initiatives. That strategy includes boosting apprenticeships and attracting more women into the industry.

Our strong, consistent and positive message about working in engineering needs to reach young people whatever their background and whatever their gender. Unless it does, talent will be missed, opportunities will wasted and the UK will be left behind.

We need to build on the strong foundations laid by the Tomorrow's Engineers programme to boost the volume, reach and quality of employer engagements with young people. We need joined-up education policies that deliver easy-to-follow pathways for those in education today and commitment across government, education and business to work together to inspire those young people to become the industry's talent of the future.

Keith Mitchell, Chairman, Peter Brett Associates

Listening to the great British public will help secure infrastructure improvements

In December last year, Sir John Armitt launched the results of *an Independent Survey of Attitudes to Infrastructure in Great Britain*, published by Copper Consulting in partnership with Peter Brett Associates. In welcoming the report, Armitt identified the critical need "to explain – in plain language – what we are trying to achieve and why" in order to secure political and public support for national infrastructure projects.

Explaining the why, what and how of infrastructure was also high on the agenda when two groups of infrastructure professionals met recently to discuss the implications of the report's findings. Delegates quickly identified some interesting differences between public perceptions and our current national policy position.

For example, renewable energy and housing are identified by the public as the highest priorities for investment – and yet housing is not included in proposals for planning our national infrastructure, and renewable energy investment is stalling as political and financial support is withdrawn.

The public also wants to see strong improvements to the nation's infrastructure, and feels that there is too much red tape in the way.

These apparent differences of view show that we have not yet established a clear narrative of infrastructure delivery, the key priorities for investment, and what needs to be done to maximise economic and social return on investment. This creates confusion, inconsistent policy making, and unnecessary conflict in the system.

So what can be done to create a more positive and constructive environment for infrastructure delivery? At the project level, many delegates had examples of how lack of engagement had led to delays in the planning process, and poor project outcomes. There seemed to be a strong desire to create a better evidence base to support a clear narrative, strong leadership and early and open engagement, leading to better project outcomes. Could the NIC (or the Infrastructure Projects Authority) promote this work? And could it provide a repository for good practice and support better knowledge sharing?

Overall, there was a strong sense that the public should be trusted to reflect common-sense views about infrastructure needs in a way that might address political anxiety about tackling the critical infrastructure issues. This level of engagement is vital if we are to deliver greater benefit from investment in infrastructure.

Dr Viorica Patraucean, CSIC Research Associate in 3D Model Generation

Is deep machine learning the key to the future of BIM for existing infrastructure?

The digital era has fundamentally changed the way infrastructure management operates.

Maintaining high-quality, resilient and sustainable infrastructure is key to economic growth. Digital BIM models* enhance the efficiency and effectiveness of asset management, providing a single source for asset data and information that everyone involved can access during design and construction, and throughout the lifecycle of a built asset.

However, while creating BIM models for future assets is relatively straightforward, documenting existing assets is far more complex and there are no efficient tools to perform this specific task. As a result, the costs outweigh the benefits of using BIM for existing infrastructure. Can it be made to work effectively for existing assets?

At the Centre for Smart Infrastructure & Construction, at the University of Cambridge, we are taking a new approach to creating BIM models for existing assets. Our initial focus is on bridges, because they generally have fewer occluded parts, making the process easier.

In a bid to bypass the costly laser scanning and man hours required to create the BIM model of an existing structure, we are designing and applying advanced machine learning techniques to create the model from videos. The potential of this method is vast, but the transition from prototype to deployment is strictly limited by the availability of training data – videos of bridges and laser-scanning point clouds to facilitate the data labelling.

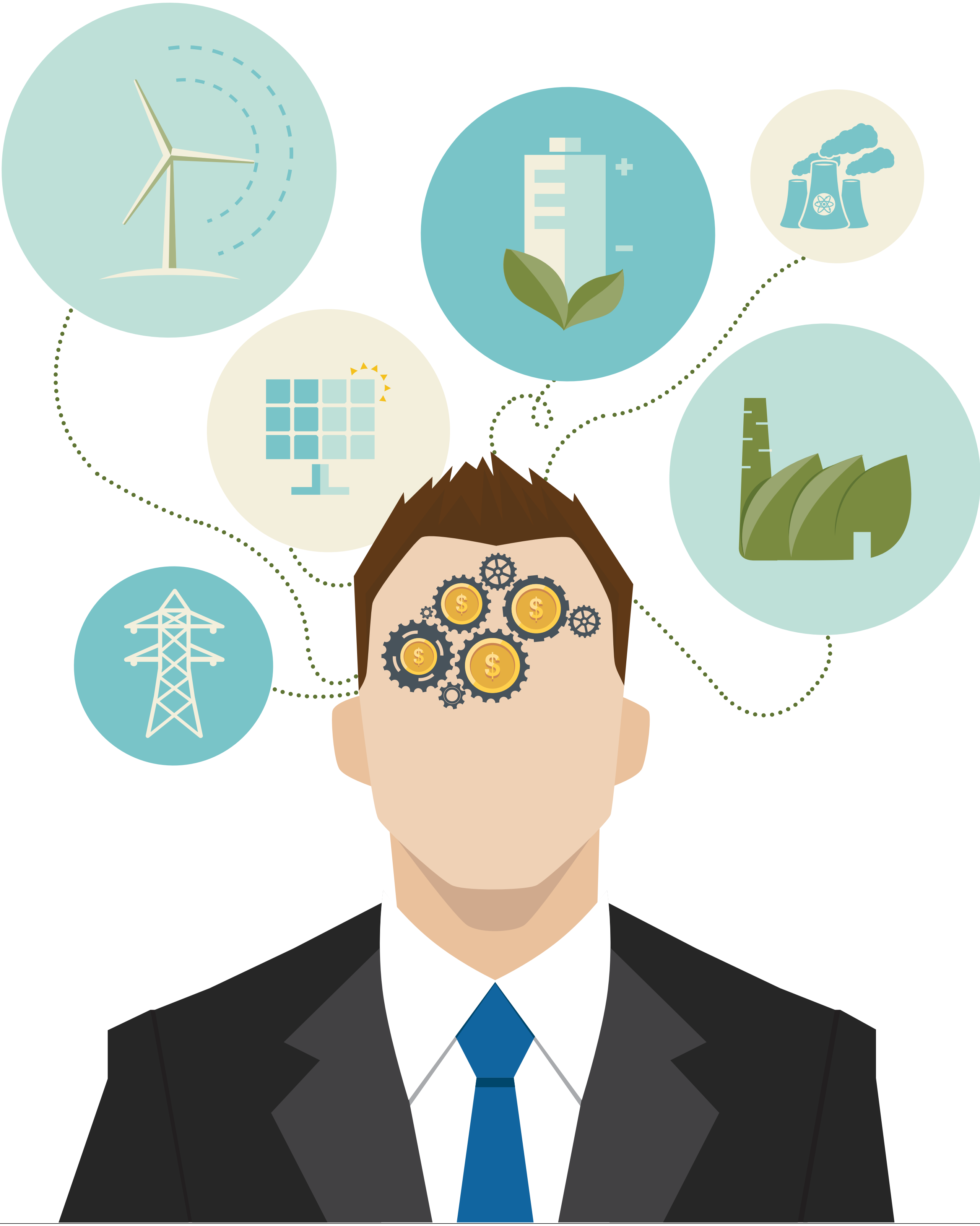
To further develop this method to the wide benefit of infrastructure and asset managers, we need help to collect sufficient training data. This requires collaborating with national agencies involved in the infrastructure sector and professional surveying companies.

Working together will benefit all parties. We are witnessing significant progress in machine learning and computer vision – self-driving cars are surely only a matter of time. Deep machine learning could also provide the key to making BIM work for existing infrastructure and, in turn, enhance the future of asset management.

**We are using the term here to refer to a digital model that includes information about the (visible) geometry, part labels and materials.*

To find out more about developing BIM for existing infrastructure contact Viorica Patraucean at vp344@cam.ac.uk.

Inside the mind of a fund manager



The hunt for yield has led to an influx of capital in the European infrastructure sector, but will the increased appetite drive new projects? *Jennifer Bollen* reports

Why the flood of capital?

Infrastructure managers are not typically thrill seekers. Peter Hofbauer, head of infrastructure at Hermes Investment Management, talks of "sleep-adjusted returns" – those that give managers peace of mind beyond absolute or risk-adjusted returns.

The sector's lack of excitement has led to a surge in appetite among risk-averse investors for European infrastructure funds. Data provider Preqin said 15 Europe-focused infrastructure vehicles completed fundraising in 2015, raising an aggregate €200m, compared with €9.6bn raised by 21 funds in 2014 and a record €10.5bn raised by 25 funds in 2013.

Colonial First State Global Asset Management and Copenhagen Infrastructure Partners raised the biggest infrastructure vehicles aimed at Europe last year, each garnering €2bn.

Significantly, when Preqin published an infrastructure report in November, all of the Europe-focused infrastructure funds raised last year had exceeded their initial targets, compared with half of such funds in 2014 and 32% in 2013.

It is not just European infrastructure attracting investment – fund managers are opportunistic and will consider most regions. However, SL Capital Partners says it has decided to target north-west Europe for a conservative geographic focus.

Figures from Preqin show a large concentration of completed infrastructure deals in the UK between 2010 and the fourth quarter of 2015 – 1,076, compared with 267 in France, which had the second-highest level of deal activity. In third place, Germany had 189 deals in that period. The figures include brownfield and greenfield deals.

Hofbauer said the rise in fundraising activity followed growing allocations to infrastructure among institutional investors, as they increasingly viewed infrastructure as a separate asset class from the broader alternative investments category.

"It is to do with in part some of the investment characteristics and attributes you can achieve investing in infrastructure, which attracts long-term investors," he said.

These characteristics include a lack of correlation with equity markets, the ability to generate steady compounding returns in a low-interest-rate environment and a hedge against inflation, should it emerge.

> "I have yet to meet an investor who is reducing their allocation to infrastructure. They are holding it or increasing it. The majority are increasing it"
>
> **Dominic Helmsley, SL Capital Partners**

Dominic Helmsley, managing director of infrastructure at investment manager SL Capital Partners, said that pre-crisis, traditional managers had typically split the investment universe into equities, fixed income and cash. Post-crisis, incumbent infrastructure funds had performed strongly, driven partly by low interest rates and operational value-add.

Increasing allocations

"Core infrastructure should be uncorrelated to listed markets, so clearly, investors are increasing their allocations to the broader alternatives, real assets bucket and specifically to infrastructure," Helmsley said. "I have yet to meet an investor who is reducing their allocation to infrastructure. They are holding it or increasing it. The majority are increasing it."

Karen Dolenec, global head of real assets at advisory firm Willis Towers Watson, added: "Infrastructure is still quite an immature asset class when you compare it with the other ones. It is structurally growing as investors become more familiar."

Figures from Preqin suggest even greater sums will head for infrastructure in the coming years – it said 58% of Europe-based investors were below their target allocation to the asset class.

Pension funds and sovereign wealth funds dominate the infrastructure institutional investor base.

Abu Dhabi Investment Authority is the biggest infrastructure investor targeting Europe by current allocation levels – it has €14.2bn allocated to the asset class, according to Preqin. South Korea's National Pension Service comes second, with €10.9bn, while Canada Pension Plan Investment Board comes third with €9.6bn.

Historically, Canada, Australia and the Netherlands have been the biggest infrastructure investors in Europe, but Asian investors are stepping up their presence. South Korea's National Pension Service is one of the biggest investors in the region by allocation, while in October, energy company China General Nuclear Power Group agreed to invest in the UK's Hinkley Point C Nuclear Power Station alongside EDF Group in an £18bn deal – the biggest in Europe since 2010, according to Preqin.

Meanwhile, in June, the £1bn Swansea Bay Tidal Lagoon named contractor China Harbour Engineering Company the preferred bidder for a £300m contract to supply marine works.

"CHEC has taken the strategic decision to enter the UK infrastructure investment and construction market, and we see the Swansea Bay Tidal Lagoon – a pioneering scheme that could bring the world a new energy option – as the cornerstone project in our business development strategy in the UK and wider Europe," said Lin Yi Chong, president and chief executive of

Top 10 infrastructure investors in Europe by current allocation

1. Abu Dhabi Investment Authority – €14.2bn – United Arab Emriates
2. National Pension Service – €10.9bn – South Korea
3. CPP Investment Board – €9.6bn – Canada
4. All Pensions Group – €8.3bn – Netherlands
5. Ontario Teachers' Pension Plan – €8.1bn – Canada
6. AustralianSuper – €6bn – Australia
7. Future Fund – €5.9bn – Australia
8. PGGM – €5.4bn – Netherlands
9. Public Sector Pension Investment Board – €4.6bn – Canada
10. Hermes GPE – €4.2bn – UK

Source: Preqin

China Harbour Engineering Company in a statement at the time.

Manish Gupta, head of infrastructure corporate finance at advisory firm EY, noted: “China is still a marginal player in Europe, despite a number of state-owned entities looking at foreign markets, such as Africa, in line with government trade policy. However, as the domestic market slows down, we should be seeing more investment driven by exporting products and construction capability.”

Another growing theme in recent years has been co-investments with large institutional investors, particularly pension funds, as more investors seek to reduce the fees they pay by executing deals directly.

Helmsley said SL was keen to team up with investors for co-investment deals, although smaller investors might find such transactions challenging.

“It is about risk sharing on the pursuit of the asset and closing simultaneously when we find the asset, as opposed to us underwriting the deal, closing the deal and selling down the asset,” he said. “Co-investment is something we look at positively, but not all investors are equipped to do it. A lot of investors express a desire for it; not as many can tool up to execute it.”

What will be the impact on deal activity?

What impact will the buoyant fundraising market have on UK infrastructure deals? Managers are clear that deal opportunities continue to outpace fundraising and as a result, the market is far from overcrowded.

Hofbauer highlights that the capital flowing into European infrastructure funds covered a wide range of strategies and jurisdictions within the region, and that the equity held by closed-ended funds was earmarked for deployment over the next three to five years.

“The number is not actually that big,” he said. “What you are seeing more of is valuations related to the overall fall in returns in all asset classes rather than an imbalance between demand and supply of available capital.”

However, market participants have warned that deal activity and valuations for the most sought-after assets will inevitably rise. “Prices will go up, no doubt about that,” said EY’s Gupta, adding that the pipeline for transactions this year was limited.

> “For the very large trophy assets we see huge competition and pressure on pricing. That is less the case at the smaller end of the market”
>
> **Dominic Helmsley, SL Capital Partners**

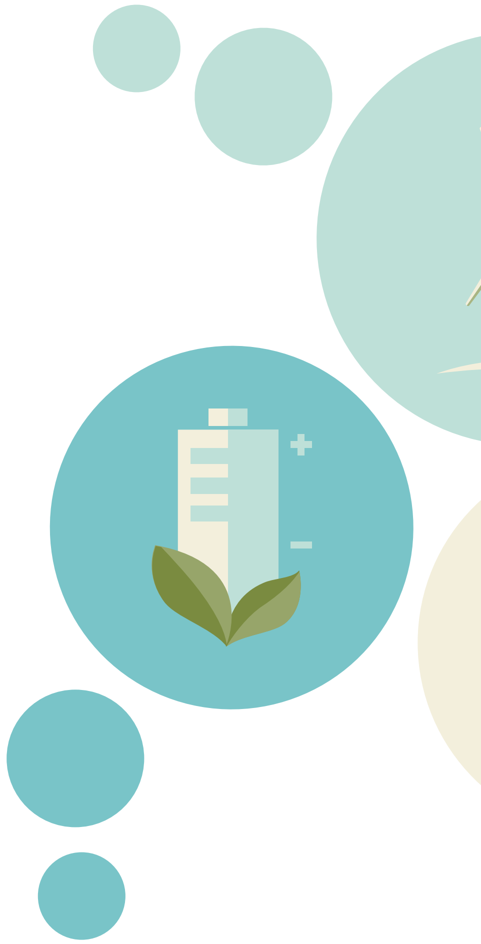
Helmsley of SL Capital Partners agreed, but said: “There is so much money seeking assets, we see a difference depending on where you sit in the spectrum. For the very large trophy assets we see huge amounts of competition and pressure on pricing – prices being pushed up and returns being pushed down. Increasingly those assets are being acquired by the direct pension funds, as opposed to the fund managers. That is less the case at the smaller end of the market.”

UK benefits from transparency

The UK, which relies heavily on private capital, remains a favourite market for infrastructure investors thanks in part to its transparency and regulatory regime, according to Hofbauer at Hermes.

Large UK deals last year included the Thames Tideway Tunnel, London’s £4.2bn sewer, backed by a consortium of Allianz, Amber Infrastructure Group, Dalmore Capital Limited and DIF.

Meanwhile, CPP Investment Board and Hermes Infrastructure agreed in March last year to buy a third of ports operator Associated British Ports



from GS Infrastructure Partners, an infrastructure unit of bank Goldman Sachs, and infrastructure firm Infracapital for £1.6bn.

Helmsley said investors continued to demonstrate strong appetite for low-risk investments, citing regulated assets such as those in the utilities sector and deals in the transportation sector among those attracting interest from SL.

Gupta said that while relatively few UK infrastructure assets were expected to come to market in the coming months, managers expected spin-off opportunities as a result of a restructuring of Network Rail.

The sales of London City Airport by infrastructure firm Global Infrastructure Partners and the M6 Toll road are also expected to be some of the highest-profile deals of the year.

Hans Holmen, a principal at consultancy Aon Hewitt, added that disposals of non-core assets by oil companies would also provide attractive deal flow. Brownfield assets continue to attract the strongest level of interest from funds and institutional investors, according to Holmen, thanks to

Top 10 infrastructure managers in Europe by infrastructure funds raised in the last 10 years

1. Macquarie Infrastructure and Real Assets – $29.7bn – UK
2. Ardian – $4.8bn – France
3. Antin Infrastructure Partners – $4.2bn – France
4. EQT Funds Management – $4.2bn – UK
5. F2i SGR – $3.7bn – Italy
6. Infracapital – $3.7bn – UK
7. DIF – $3.7bn – Netherlands
8. 3i Infrastructure – $3.6bn – UK
9. Deutsche Asset & Wealth Management – $3.5bn – UK
10. Meridiam – $3.2bn – France

Source: Preqin

established operating records and the promise of immediate yield. Such deals are particularly popular among pension funds, which must match their liabilities with low-risk, low-return investments.

"For greenfield assets you are taking on more risk on development and construction of those assets and will not generally get returns back until later," said Holmen, who added that greenfield projects exacerbated the J-curve – the effect caused by negative cash flows in the early years of an investment.

Furthermore, many investors are reluctant to engage in the highly competitive public tendering process, which comes with potentially high abortion costs.

New developments are riskier

"Most of our clients are pension funds that have liabilities of some description and are looking to match those liabilities," said Hofbauer.

"Therefore they are looking for safe, steady, predictable returns… so new developments do not naturally fit within that because there are higher risks – execution risk, construction risk, a lack of yield and there is probably a lack of opportunities, other than in the very large economic infrastructure projects."

Recent research from Aurium Capital Markets has revealed a 36% increase in the number of pension schemes investing in infrastructure during a 12-month period over 2014/15.

Online analysis by the investment house found 136 pension schemes with direct investment in infrastructure projects in 2014, rising to 185 last year.

Pensions identified as investing in infrastructure last year included Australian Government Future Fund, Canadian Forces Pension Plan, John Lewis Partnership, Pensionskasse Post, Ontario Municipal Employees Retirement System and The Pension Protection Fund, the company says.

> "Green energy projects are very attractive for pension schemes. They improve the green impact of pensions' portfolios and pay attractive returns"
>
> **Steven Blaze, Aurium**

Aurium has also announced that it has raised £270m to help fund UK renewable energy projects, including over £100m from institutional pension funds. The attraction of renewables to investors is growing significantly, the company says, as falling costs in the sector coincide with government looking to phase out coal-fired power stations. Green energy is increasingly seen as a good bet, despite the phasing out of government subsidies for onshore wind and solar power.

Aurium partner Steven Blase said: "We are seeing more and more pension schemes investing in infrastructure, and we believe green energy projects here are very attractive for pensions. They improve the green impact of pensions' investment portfolios, they can pay an attractive return and there is very little correlation with mainstream asset classes.

"We have already raised £200m to build and acquire a portfolio of major biomass and EfW (energy from waste) plants in the UK and we are looking to raise funds for more projects in this area."

However in February, the chief executive of Suez UK's recycling and recovery division, David Palmer-Jones, expressed concern that if we were to leave the EU this sector might become less attractive to investors, because EU recycling targets might no longer apply.

New projects and risk

Activity in the greenfield market rose last year – there were 25 UK infrastructure project finance deals worth a combined $8.9bn, according to data provider Dealogic, up from 14 totalling $7.4bn in 2014.

However, project finance levels remain low compared with the top of the market – in 2007, there were 71 UK infrastructure project finance deals worth an aggregate $22bn, the highest number and total value of such deals of the past decade.

By 2009, as the credit crisis took hold, the figures had fallen to 55 and $11.5bn. The following year they had slumped to 48 and $5.7bn.

The need for private capital for greenfield projects and the high risk profile of such investments has led to growing discussion around how to solve the risk problem for investors.

"There is a desire to invest in greenfield; the gap you see between that desire and implementation is due to the risk profile and whether projects can be structured in a way that is beneficial to investors," said Willis Towers Watson's Dolenec. "This is an area where we see governments focusing more attention."

Fund managers cite the Thames Tideway Tunnel as an example of how the government can significantly lower the risk profile of a greenfield project. According to a spokeswoman for Thames Tideway, a government support package provides cover for insurable events above the amount the market is prepared to provide and means the government would act as insurer of last resort should the market not be able to provide pre-agreed cover.

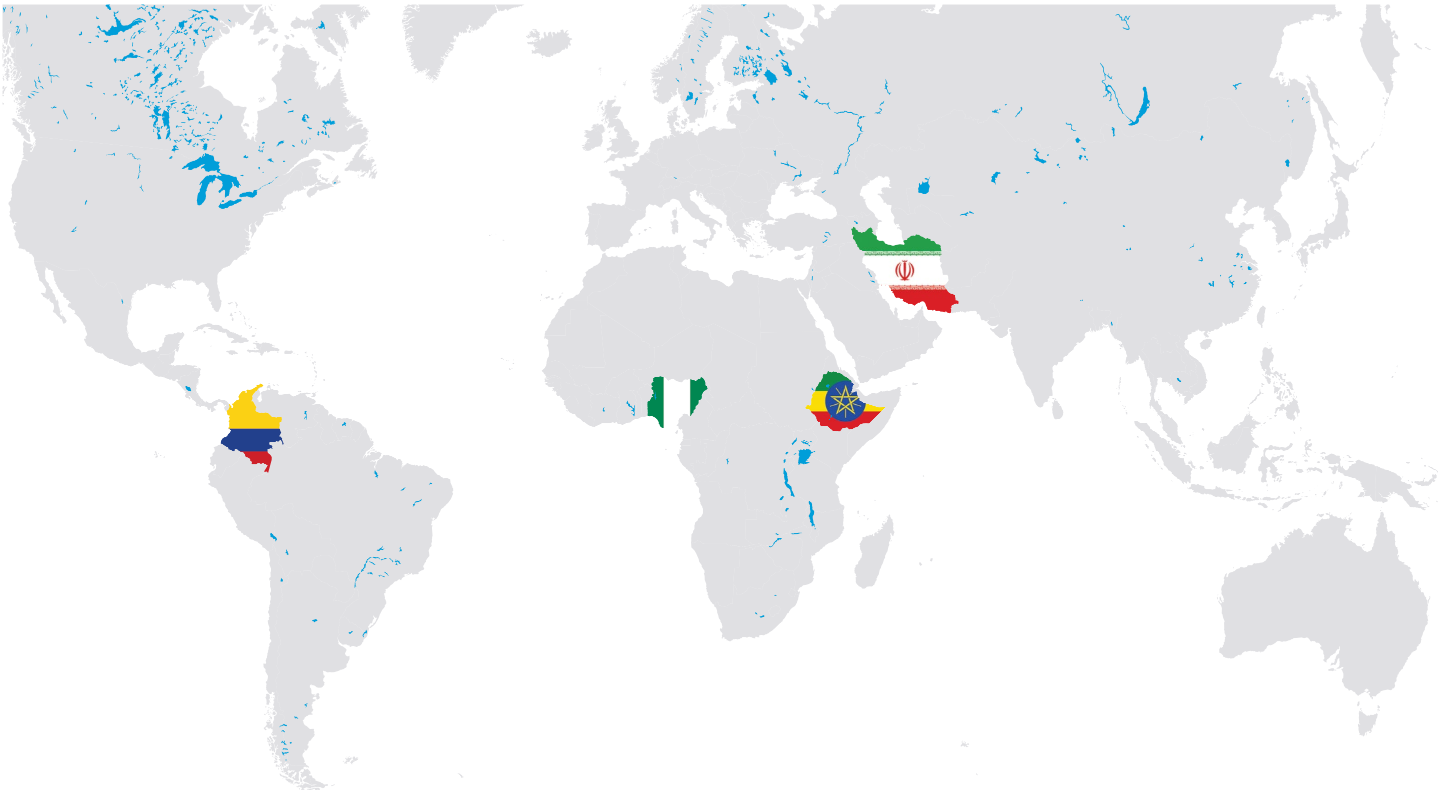
The government would also act as lender of last resort should the capital markets close for a significant period and may provide equity to fund the shortfall should the project's costs exceed a 30% overspend.

"When the project started three or four years back… the government was keen to show pension fund money coming into infrastructure," said EY's Gupta. "It will need to be done on a case-by-case basis… It can only be done for large projects."

And Dolenec warned: "All governments are talking about it, but for every project that has gone well I could give you an example of a project that has not had investment go into it."

Emerging markets

Many developing countries are planning to invest billions in infrastructure upgrades and potentially lucrative projects on offer, a cool assessment of the geopolitical risk



Exponential growth in urban areas and the associated rise in urban middle-class populations present major opportunities for investors, developers and engineers involved in infrastructure around the world. Indeed, the United Nations recently estimated that 60% of the urban area projected for 2030 is yet to be built.

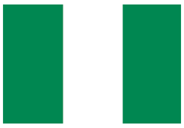
Yet in order to capitalise on these opportunities, particularly in emerging markets, organisations need a firm understanding of the risks. Opportunity and risk are in a constant state of flux, leaving many with an understandable mismatch between their perception of risk in a country and the reality. Taking two countries that have made headlines in recent months – Nigeria and Iran – and two countries that can still be perceived as hidden gems – Ethiopia and Colombia – we will give examples of the interconnection of infrastructure opportunities and risks, and how strategic risk mitigation can ensure the maximisation of opportunities.

Country	Opportunities	Risks
Nigeria	● Infrastructure investment a policy priority ● Proposed budget of more than 6 trillion naira ($30bn)	● Effect of oil price slump ● Anti-corruption drive – investor uncertainty owing to potential contract reviews or new regulation
Iran	● Sanctions – lifting or easing of most, thanks to JCPOA ● Investment – Ministry of energy introduced projects worth $28bn	● Opaque business environment ● Remaining sanctions
Ethiopia	● Per-capita income tripled in last eight years ● Investment in road, rail and power planned as part of five-year plan GTP II	● EPRDF party unlikely to reform complex business environment ● Land ownership issues
Colombia	● Long-term prospects for security situation – peace process with FARC ● Government conducting ambitious overhaul of road, rail and river infrastructure	● Short-term deterioration in security environment if peace process succeeds ● Acquiring environmental and operating licences

in the spotlight

to support their changing economies. Before rushing to participate in the exciting factors at play in each country is essential, warns consultancy Control Risks

Nigeria – how significant is the Buhari effect?



In Nigeria, President Muhammadu Buhari's administration has identified infrastructure as a policy priority. Major projects under way include the Eko Atlantic Economic City, being built on reclaimed land near Lagos. Lawmakers are discussing a proposed budget of more than 6 trillion naira ($30bn), up 20 per cent from the 2015 spending plan, of which the president aims to earmark around a third for capital expenditure.

Basic infrastructure will be a key element of the government's plan: Buhari appointed Babatunde Fashola as the minister responsible for roads, power and housing. He is known as a technocrat with a record of improving public services in Lagos, Nigeria's commercial megacity, during his tenure as governor there.

His new role will be a huge challenge, as electricity failures and transport difficulties are still among the biggest drags on productivity and economic growth. The budget has yet to be approved. While it is already coming under intense scrutiny, and there is no guarantee that the building projects Nigeria needs will be commissioned this year, his appointment is a sign that the new administration recognises the severity of the country's infrastructure deficit and intends to address it.

Unlike under the previous president, Goodluck Jonathan, oil-dependent Nigeria does not have the luxury of selling crude at upwards of $100 a barrel, and the reduced level of government revenue is one of the key risks to the Nigerian outlook. But as long as pressure builds for a currency devaluation – which has so far been resisted by the president and the central bank – appetite among commercial lenders for lending the amounts Nigeria needs may be limited. The president's anti-corruption drive is also likely to add uncertainty to the investment outlook, with the possibility of contract reviews and new regulation. In the longer term though, Nigeria's clearly identified need for a large infrastructure-building programme will open opportunities.

"Electricity failures and transport difficulties are still among the biggest drags on growth"

Eko Atlantic – Nigeria's 'Manhattan' – is under construction on land reclaimed from the ocean. Credit: Eko Atlantic

Colombia – will stability bring prosperity?

Colombia's transformation from a country on the brink of collapse in the late 1990s to one of the region's most vibrant economies has gone hand-in-hand with considerable shifts in the risk exposure for infrastructure companies. Aggressive government policies concerning the Revolutionary Armed Forces of Colombia (FARC) and the 2003-06 demobilisation of right-wing paramilitary groups have reduced politically motivated attacks and driven considerable improvement in many indicators of security, including rates of kidnap and homicide.

With peace negotiations between the government and the FARC, further improvements are likely, but considerable security challenges persist. A new generation of armed criminal groups known locally as bacrim continue to present a threat to companies, especially where infrastructure projects stand to upset the local status quo or reduce the remoteness of certain areas, which benefits the criminals. Likewise, some guerrillas will return to their lucrative illegal businesses.

Potentially far more critical will be other aspects of a peace deal. Questions over land ownership, issuing of environmental and operating licences and prior consultations with local communities will all be central to the government's political agenda. This means that companies will continue to be attracted to infrastructure projects in Colombia – in fact the government is embarking on the most ambitious effort ever to overhaul the country's crumbling road, rail and river networks – but project implementation will take place in a more volatile political environment.

Ethiopia – will shift to manufacturing create Africa's next economic powerhouse?

Despite experiencing some of the world's highest economic growth since 2000, Ethiopia remains a lesser-known opportunity. Initial growth can be attributed to the expansion of services and agriculture. However, growth in these sectors has slowed, and Ethiopia needs to shift towards manufacturing-led growth – supported by rapid infrastructure expansion – to sustain momentum.

The government's economic policy is anchored in five-year Growth & Transformation Plans (GTP). The first GTP (2010-15) failed to drive a sufficient shift from agricultural- to manufacturing-led growth, but succeeded in laying foundations for future manufacturing growth, a key element of GTP II (2015/16-20).

Transportation and energy infrastructure has expanded rapidly, including a new railway to Djibouti, and the $4.7bn Grand Renaissance Dam on the Nile. The government has also made progress in revising investment laws, establishing a one-stop shop for investors, and is setting up industrial zones. There are a host of opportunities for foreign investors as the new GTP II aims to progress the strategic transformation of the economy, with plans to double the GDP share of manufacturing to 8 per cent by 2020.

Grand Ethiopian Renaissance Dam, situated in Ethiopia's Benishangul-Gumuz Region on the Blue Nile. Credit: William Davison/IPS

Under GTP II, Ethiopia also plans to almost double the network of all-weather roads, construct 1,545km of rail network and increase power generation capacity more than seven-fold. As a result, investment opportunities will likely remain strongest in the infrastructure sector, while slowly increasing in manufacturing.

Foreign investment will however be obstructed by a variety of factors. The absence of multinational banks capable of providing the sort of credit and financial expertise required by large investors will likely remain a particularly significant obstacle. Despite pledges of economic liberalisation, privatisation has slowed – and in some sectors been restricted to domestic investors – and land ownership remains vested in "the state and the people" under the constitution. Despite donor pressure, the government appears reluctant to yield control and ownership of its biggest state-owned enterprises. It has also been criticised for overpricing assets or withdrawing them from sale when bids were lower than expected.

Progress in addressing some of these issues will be slowed by a lack of leadership within the ruling EPRDF party. Policy making will likely remain slow and confused, resulting in a complex business environment with many unofficial and official barriers.

Iran – easing of sanctions means brighter prospects but problems remain

Prospects for Iran's infrastructure have significantly improved, with the majority of economic sanctions against the country being lifted or suspended following the nuclear deal (JCPOA) reached in 2015.

Iran's improving economy and the opportunity of increased foreign investment, coupled with a new climate of co-operation with the West, are expected to drive infrastructure growth. The country's most acute infrastructure needs are in the power, aviation and rail sectors. In 2015, the Ministry of Energy introduced projects worth $28bn to attract foreign investment into Iran's power, road and railway construction and renewable energy sectors.

> "Investment will remain constrained by low oil prices and uncertain GDP growth expectations"

However, infrastructure projects will continue to present significant challenges to investors, stemming from political and regulatory risks, some remaining international restrictions and Iran's macroeconomic weaknesses.

Despite Iran's efforts to attract foreign direct investment, contractual terms for projects typically remain vague, reflecting the volatile regulatory environment. Plans for project financing also frequently lack clarity. Domestic investment in infrastructure is likely to remain limited, constrained by budget limitations stemming from low oil prices, Iran's limited ability to monetize its gas resources, and uncertain GDP growth expectations.

Moreover, despite the easing of nuclear-related sanctions, sanctions relating to terrorism, human rights and Iran's ballistic missile programme remain in place.

However, understanding and monitoring these risks will allow businesses to comprehend how such changes could influence the trajectory and success of their business, and allow them to review their posture and adapt their market entry strategy and compliance procedures accordingly.

Learn more at www.controlrisks.com

No to Europe doesn't just mean no

Antony Smith, senior partner at Beale & Co, looks at the legal implications of the UK leaving the EU and what the impact would be on construction

Assume a No result. What happens?
The process of withdrawal is set out in Article 50 of the Treaty of the European Union. The UK must give two years' notice of its intention to exit. During that period the UK and the EU will negotiate the terms of their future relationship. It is fascinating that none of the politicians are looking so far ahead, but just talk in terms of sovereignty and the borders. Perhaps the reason for that is that when you look at the choices available to the UK, they won't satisfy many of the No voters. So what are the choices?

The first option is the European Economic Area. This is the arrangement that Norway, Lichtenstein and Iceland have chosen. The UK would remain bound by much of the EU law on employment and competition, so the free movement laws would still apply. We would probably pay less to the EU budget, but we would still make a significant contribution in order to be able to continue trading.

On the downside, we would no longer have any direct influence on European legislation, as we would no longer send representatives to the European Parliament and the government could not send representatives to the European Commission.

The second option is to join a European free trade association but be outside the European Economic Area. This is the model that Switzerland has adopted. This would enable the UK to enter a bilateral trade agreement with the EU. The UK would not be bound by EU legislation but would have to allow freedom of movement.

The other options are a customs union, such as Turkey has adopted, or a World Trade Organisation relationship only. A customs union would allow us to trade goods on favourable terms, but not services. We could enter a free trade agreement with the EU, but commentators believe the EU would not agree such a deal without freedom of movement for workers.

Under the final option, the WTO relationship, we would leave the EU but trade with them on the same basis as the US and China do now. This is the opposite end of the spectrum to the EEA and we would not be subject to EU laws; we would have complete control of our borders but we would have to negotiate a trade agreement.

Clearly countries like Germany and France like to trade with the UK and we are an important market for them, so we probably could negotiate that. We should not forget that 50% of our total exports go to Europe.

So you can see that although the referendum will be an "in or out" vote, an out vote would mean a number of options arising, right through from an EEA to cutting ourselves off completely.

The impact of a No on construction?
Against that background it is impossible to predict the impact of a No vote. What we can do is look at the benefits of the current system that could be lost or reduced if the country voted no. The main points I can foresee becoming important are as follows:

Procurement
At the moment we apply the EU procurement directives, meaning that we are part of the club and can bid for OGA EU work. If we joined an EEA that would probably remain the same, but if not, we would not have the same benefits as our competitors when bidding. It would mean, however, that the government could subsidise domestic projects without being sued for unfair competition by others in Europe.

Environmental law
We have implemented a series of EU directives on environmental issues. Large parts of the UK law on waste are derived from the EU, particularly on landfill waste and recycling. If we leave the EU what will happen to our environmental laws? Can you imagine the political battles if all of a sudden those EU directives were no longer in force and we had to write our own legislation? All of these battles will come to the fore in the two years of renegotiation during the notice period.

Freedom of movement
We are all very well aware of the skills shortage in this country. This means that many consultancies depend on engineers and architects from other EU countries. I am sure if we did leave, we would end up with some form of quota arrangement, similar to Australia. We would want to welcome with open arms engineers, doctors, dentists etc, but would they want to come to such a closed country, if we stopped or greatly restricted the free movement of labour?

Euro codes
These are now part of our heritage. Will we go back to the old British Standards? Will we be as welcome on the Euro code drafting committees? We could lose influence on future standards of design.

Health and safety legislation
We will be free of European influence – no more red tape, but will our standards be acceptable when doing business in Europe? All these questions and many others will not be answered until the end of the two years of negotiation that follow a No vote, so we will be entering a very long period of uncertainty.

It is well known that the markets react badly to uncertainty. We not only have the four-month period leading up to 23 June to cope with, we could also have two years of political wrangling over the terms of renewed membership or some form of trading agreement outside the EU.

We could also have a lot of domestic wrangling about our legislation. During this period one could anticipate poor economic conditions. The CBI predicts a 4-5% drop in GBP if we vote No. Others are more pessimistic as to the impact on GBP. Not good news for our businesses.

My personal view is that any business which trades outside the UK must want to stay in the European Union so that it can continue to trade in a settled and regulated market that it knows well.

For those businesses who are smaller and only operate in the UK, the benefits are the freedom of movement of labour, which helps with the skills shortage. And if everybody begins to look inward, as trading is less favourable in Europe, there will be much greater competition for domestic business!

So there you have it – my campaign for the "in" vote is for the benefit of the whole construction industry.

Has the tide turned for flood

In the wake of this winter's flooding, an incoming Environment Agency chairman experts – *Jon Robinson*, director for water at AECOM, and consultant *Jim Barrack* – for

As incoming chairman of the Environment Agency, you will surely be taking on one of the toughest jobs in England. With many communities still recovering from the severe flooding this winter, you will need to balance short-term repairs with long-term resilience.

Your immediate challenge will be to deliver on the recovery and repair programme set out by acting chairman Emma Howard Boyd earlier this month. Following 16,000 inspections, the Environment Agency has already identified more than 650 flood defences in need of repair work in the wake of the storms in December and January. But in addition to essential repairs, the threat of increasingly frequent and extreme weather events will necessitate a different approach to flood risk management if the UK is to tackle the challenges that lie ahead.

Integrated approach

You may quickly come to share my strong belief that a more integrated approach to flood risk management, which incorporates flood defence infrastructure within wider catchment management, would surely provide a more sustainable long-term solution. This will require different stakeholders, including the Environment Agency, local authorities, industry, communities and private landowners, to work together more closely. A balanced approach that combines hard and soft engineered methods with resilient building will likely be needed.

But every catchment is different and there is no 'one size fits all' solution. To achieve improved resilience, individual stakeholders must recognise their own responsibilities.

The National Flood Resilience Review, announced by government in December, should inform a longer-term strategy to better protect the country from future flooding. The review, set to be published this summer, will focus on future investment strategy, as well as stress testing the UK's resilience to flood risk and assessing the resilience of important infrastructure and temporary defences. Importantly, the review will include close consultation with the National Infrastructure Commission.

Austerity challenge

Collaboration with the NIC should provide increased certainty around the delivery of vital new flood defences. But delivering flood risk management at a time of austerity will be another key challenge. After all, Defra has committed to steep departmental revenue cuts in this Parliament. Budget constraints will likely necessitate new ways of engaging with the private sector to raise funds.

New development zones

The Environment Agency could also face policy shifts in relation to flood risk management in the coming year. In an appearance in front of the Commons Liaison Committee in December, the prime minister called on the Environment Agency to put homes before nature. Alluding to the pressure to build homes, he suggested an attitudinal change was needed in the way the agency and others managed flooding. This could result in steps to future-proof new development through planning, opening up development zones through catchment management across multiple planning authorities. The government is likely to push the delivery of some of this flood defence work out to unitary authorities through the Flood & Water Management Act.

You will clearly be required to lead the Environment Agency through much change. The key to your success in better managing flood risk will be greater integration with its stakeholders, as well as further budget increases to unlock delivery.

Jon Robinson, director for water, AECOM

"How do we get government to put party politics to one side?"

Jim W Barrack, MICE consultant

Severe flooding in York highlighted

risk management?

is sure to find a full and pressing in-tray. II has asked two water
open letters setting out the challenges in store and offering their advice

the need to improve resilience

"A more integrated approach would provide a long-term solution"

Jon Robinson, director for water, AECOM

As you may already know, flooding is second only to pandemic flu in terms of both economic, business and personal risk to the UK. Our changing climate is sending ever stronger messages to this effect, but so far we are failing to respond adequately in recognising and preparing to meet the challenge. This is now your task, and the key to your eventual success will be making government take the issue far more seriously than it has done to date.

Maybe the lack of perceived urgency arises from the 1:X years prediction of flooding risk, where X can be quite a large number, combined with the ongoing immediate demand for so many more obvious calls for investment, plus the rapidly increasing funding of the national debt. But as has been demonstrated recently, X can be quite a small number (floods having happened in the same place three times in as many years), with significant repeated damage, if not catastrophe.

EA handicapped

We have an excellent UK flood policy but it desperately needs implementation. The Pitt Review and the Environment Agency strategy have identified what is required, but the EA is severely handicapped by a shortage of funding, coupled with limitations on its role. How do we get government to put short-term party politics to one side, accept the challenge and deliver the requirement? The love affair with HS2 (return on investment 1.2:1) compared with flood defence (return on investment 8:1) is scarcely in the best national infrastructure interest.

Following the 2008 Climate Change Act, the first CCRA (Climate Change Risk Assessment) report in 2012 identified the threat from flooding. In order to deal with this a significant increase in investment is required, starting now. So, what does the government do? It makes significant budget cuts. We can deduce that putting on wellingtons and appearing on television is no more than a brief token gesture.

HM Treasury's *National Infrastructure Plan 2014* allocates circa 1% of the total recommended investment to floods.

ICE recommendations

The Institution of Civil Engineers' 2014 *State of the Nation – Infrastructure* report presented three key recommendations:

1. The EA and local authorities should fully implement a holistic approach to flood management, including land use planning, upstream catchment measures, flood defences, and increased infrastructure and buildings flood resilience.
2. The EA should work with infrastructure owners to agree the standards of resilience required to maintain and operate infrastructure networks. This should include agreed levels of service during severe weather events.
3. The government should provide the longer-term certainty needed to improve flood resilience by committing to a long-term capital and maintenance programme for flood management which protects funding beyond current plans.

Disaster looms

From someone who has spent the last 10 years tackling the challenges of flood defence and resilience, this is a call for you to make strong representation to our political leaders urging them to take the threat of flooding seriously and place it very near the top of the national investment list before it is too late. Failure to do so is quite likely to mean disaster on a huge scale. The dramatic increase in the frequency of mobilisation of the Thames Barrier is but one pertinent warning.

Jim W Barrack, MICE consultant

PS By the way, the EU does not allow us to dredge our rivers or build embankments.

Fresh thinking needed

With a third of all major projects possibly 'unachievable', the model needs revision, says *Peter Madden*, chief delivery officer at Arcadis

Major projects and programmes are now the chosen delivery platform for large-scale infrastructure as well as other significant public- and private-sector investments. However, sponsors and practitioners fail to recognise them as temporary production systems (or temporary organisations) that first need to be designed and established. Weak operating model design results in opaque leadership, misalignment of strategy, lack of expertise and a failure to deal with scale or address risk, which in turn results in weak accountability.

Although the NAO partly recognised this in its January report (*Delivering Major Projects in Government: A Briefing for the Committee of Public Accounts*), it is not clear whether it recognises that major projects and programmes are also deeply political environments. Even if good governance exists (and it usually doesn't), programmes are a contested space where the numerous stakeholder groups both inside and outside the programme boundary compete for the 'right projects', so widening the debate that usually only focuses on 'doing the projects right'.

Major projects and programmes therefore exhibit large asymmetries of power and objectives, which make their alignment hugely challenging. Big projects and programmes are also very dynamic through time, with emergent and unexpected properties further exacerbating these asymmetries, leading to entropy and antagonistic sub-goal pursuits if not actively managed.

Stakeholder management

To assure delivery of the planned outcomes, this process of emergence needs managing, and the need for collaboration (and co-operation) among the actors is high. During the front-end phase it is important the interests of participants and stakeholders are managed to achieve and maintain organisational stability for the longer term; the actor networks in large projects and programmes are usually dynamic and unstable and can only be stabilised, to a certain degree, when people, technologies, roles, routines, training, incentives and so on are actively managed.

"Current approaches may not be fit for purpose. Conventional project management methods are simply overwhelmed by such complexity"

While conventional (or rational) project-based approaches may focus on efficiency and risk transfer, the management approach and subsequent contracting strategy for major projects and programmes must focus on the transformational opportunity and in turn, must be capable of maintaining the value created at the front end throughout the period of execution (with no erosion). It is often the asymmetries in power within such environments that lead to failure.

Greater risk and complexity

Major projects and programmes, then, need to be distinguished from smaller, more conventional projects. New methods are required that can accommodate high levels of complexity, ambiguity and risk, while recognising a high degree of emergence.

Major projects and programmes deliver strategic business transformation and are often massive, indivisible and (very) long-term undertakings. Their investment is usually well in excess of £1bn, often in waves or tranches. They exhibit greater risk than smaller undertakings, largely because of their exceedingly long and underinvested planning phases, great complexity and extraordinarily large number of stakeholder groups and interfaces, which require interdependencies to be understood and managed. The desire to lock down scope early also inhibits the proper consideration of alternatives, further reducing flexibility.

Systems engineering and systems thinking offer one alternative approach. Viewed through this lens, major projects and programmes can be considered as open systems, to an extent undefinable. Open systems interact with their context, environment and social setting, with many constant interactions across the programme (or system) boundary (Figure 1), presenting a significant challenge which can overwhelm closed-system approaches.

In big programmes where innovations proliferate, group boundaries are uncertain and the range of entities to be managed fluctuates, project-based approaches break down as the new parties' associations cannot be traced. Technical project-based approaches, then, cannot limit in advance the shape, size, heterogeneity and combination of associations in large projects and programmes; it has to be tackled over time, which presents huge challenges for control and forecasting.

This is one of the many reasons why current approaches may not be fit for purpose. Conventional project management methods are simply overwhelmed by such complexity, leading to ambiguity and weak accountability.

Major projects and programmes are not simply scaled-up projects, so we need to look elsewhere for inspiration to design temporary organisations and management regimes adequately able to deliver indivisible investments of £1bn and more. Such approaches need to be clear on how risk can be managed when the planning horizons stretch into years, when the large number of stakeholders impact ever-growing and changing dependencies and inter-dependencies, and where early lock-in stifles alternative approaches.

New techniques required

New techniques for decision-making under conditions of high uncertainty are necessary, such as real options methodologies, which apply the modelling techniques of options pricing in financial services to the planning of real physical infrastructure. The industry is also beginning to experiment with the development of approaches for overcoming optimism bias in the

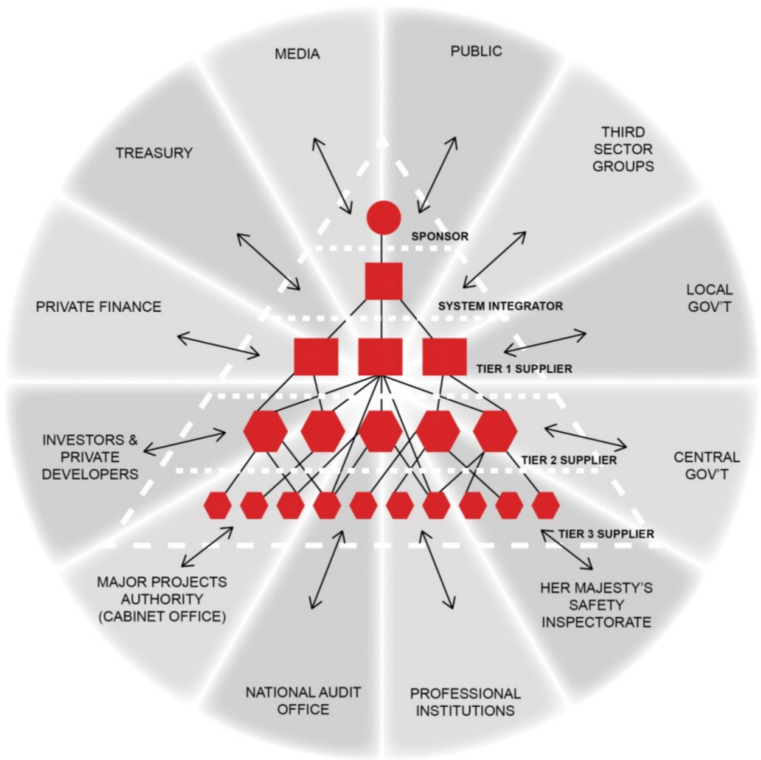


Figure 1: The number of stakeholders in major projects generates immense complexity.

planning and delivery of large projects and programmes by applying reference class forecasting.

The parametric analysis of past projects and programmes on a common statistical basis are also driving a more sophisticated approach, and can support techniques for programme shaping, organisationally configuring the programme into a reasonably stable platform for delivery – usually by breaking down scale and setting up the programme in a series of shorter delivery phases, or sprints.

Front-end phase is critical

As touched on, the delivery of beneficial outcomes by major projects and programmes in the UK is often related to how risk is managed and transacted during the front-end phase. This phase of any major programme is critical to successful delivery and yet this is often overlooked (as the NAO conclude), as the majority of major programmes still fail to realise expected benefits for the initial forecast of time and cost. The industry does not yet fully understand that the determinants of success or failure often have their roots here. Even though this is broadly understood by the NAO, it still cannot account for why we perpetuate the problem by continuing to underinvest in terms of time, money, capability and capacity, which in turn leads to weak and flawed plans for execution.

Very few large projects and programmes actually fail owing to problems that originate in execution: the seeds for failure are often sown in the very early stages. For major projects and programmes where group boundaries are uncertain, and the range of public- and private-sector entities to be taken into account regularly fluctuates, conventional approaches will continue to fail. This is because the industry is slow to innovate and new approaches take time to diffuse.

The relative advantage of the innovation (the benefit of investing in the front-end phase), the type of innovation decision (optional or directional), the communication channels used, the industry cultural environment into which the innovation is launched (its degree of fragmentation) and the extent of the change agent's attempts to lead the change all impact the rate of change.

We therefore urgently need a new paradigm which incorporates some of these thoughts and ideas and which starts with an appreciation that major projects and programmes are simply different, and will always resist scaled-up project management methodologies.

COGNITIVE TOOLS TO TACKLE MAJOR PROJECT PLANNING

Real options methodologies

Advocates of 'real options' suggest that the thinking behind financial options (in financial markets) may be extended to opportunities in real markets (major programmes) that offer, for a fixed cost (the value of a feasibility), the right to realise programme benefits in return for further fixed investments (the forecast cost of the execution phase) but without imposing any obligation to proceed.

Optimism bias

Two academics, Daniel Kahneman and Amos Tversky, have argued that errors of judgment are often systematic rather than random, manifesting bias rather than confusion. Major programmes are highly uncertain environments during the front-end phase, where errors in forecasting as a result of optimism bias can lead to catastrophic consequences for the implementation phase. Such bias therefore needs correcting.

Reference class forecasting

Reference class forecasting is a method which ensures greater accuracy by basing the forecast upon the past performance of projects and programmes with similar characteristics (the reference class). In this way the 'inside view' (bias of promoters or optimism of practitioners) is bypassed and the estimate 'de-biased' or corrected.

Parametric analysis

Parametric analysis is a methodology for the statistical analysis and forecasting of project outcomes from the analysis of the total out-turn of past projects.

Programme shaping

A unique determinant of success for major programmes and projects is the need to assess and shape the opportunity into a reasonably stable platform. If the project environment is made stable it is much more likely to withstand unplanned or unforeseen events and therefore achieve success.

Collaboration means you

Client attitudes to procurement were the main topic of conversation at the final *Infrastructure Intelligence*/Griffiths & Armour risk management round table

Two points met universal agreement when guests at the latest risk management round table discussed the issue of collaboration – the current focus of industry attempts to improve performance.

One was that "clients are key; they have to require the team to co-operate". The other was to wonder why "clients do a lot of talking about collaboration but don't feel they should be part of the collaboration themselves".

Participants shared the experience of facing more stringent contractual terms and potentially onerous demands on risk transferred to professional indemnity insurance, with regular requirements for consultants to accept unlimited liability – arrangements that companies had felt they had to sign up to in order to win any work in a constrained market, but that have the potential to undermine a robust, vibrant and profitable consultancy sector.

Having agreed to those onerous terms in difficult times, consultants were now finding it difficult to refuse even in a busy market.

"It's frustrating. We all agree it is terrible but someone – perhaps the less informed or less selective – will accept these terms, which weakens our resistance. We have to be stronger and say no," was one expression of a common view.

If more motivation were needed, it was reported that those further down the supply chain were pushing back and saying no when lead consultants want to pass risk agreements they have signed up to down the supply chain. As Griffiths & Armour's Paul Berg says: "You have to continue to fight against risk dumping because if you go along with it, the consequences, both financial and reputational, can be severe."

Nevertheless, public- and private-sector clients are increasingly focused on pushing risk of schemes down the line without understanding that, as these are ultimately their projects, the risk will always come back to them.

Requiring collaboration from the supply chain as a way of reducing risk is ultimately meaningless if the client does

Left to right: Antony Oliver, Steven Trewhella, Patricia Moore, Sheena Sood, Tom Locking, Scot Parkhurst, Gareth Arber, Graham Nicholson, Carl Evans, Jennifer Hamilton and Paul Berg

not include itself in that collaboration by sharing the risk, the group asserted.

"One thing that people don't understand is risk. And that is anathema to collaboration," said Griffiths & Armour director Paul Berg. "Failure to equitably allocate risk to those who can manage and fund it is just risk dumping."

The issues and views debated in the six round tables, which have involved around 50 key players from the industry, will inform the content of a new guide to better risk management to be published by Griffiths & Armour in late spring. *The Avoidance of Professional Liability Claims through Better Business Practice* is an update of a guide first published in 2005 which had a significant impact, and Griffiths & Armour see the new publication as an opportunity to inform on trends and support positive influence on the risk management landscape in the industry.

As a trusted adviser and partner to those in the industry, Griffiths & Armour has always advocated the collective benefit of appropriate risk allocation, and has consistently highlighted a tendency towards an inequitable approach to risk by clients and indeed contractors. That's why their integrated risk management service includes reviewing contracts with their

Will clients pay for work on whole life value?

Consideration of whole life cost and consideration of the price of asset performance as well as its construction are common sense, but are clients prepared to pay for the upfront work this requires?

It is a tough sell, the round table group agreed.

When you advise clients that they could spend £5m now and £5m later but get better benefits over the life of the project, against spending £2m now and £8m later, you will be lucky if they say yes. Most clients want to spend as little today as they possibly can, the group reported. Often clients don't have the money "now" and cannot take advantage of the opportunity, or do not understand the long-term benefit.

If consultants get involved early, when they can influence client thinking and understanding, then convincing clients of the benefits is easier. But to quote one of the panel: "When you propose early engagement to many clients, they just think you want more fees."

What are your biggest business challenges?

We heard the same problems on all sides: people and prices.

"Recruitment. The concern is delivery, not getting the work. And time spent bidding but with no guarantee of projects." **– Jennifer Hamilton**

"Clients want new ideas. But the challenge is getting the staff in so we can get the earnings." **– Steven Trewhella**

"We are recruiting ahead of the workload, but it can take up to 18 months to find the right person and then we have to win the work to keep them busy – that's a real challenge." **– Scot Parkhurst**

"We are standing on the doorstep of unprecedented demand, so finding the volume of staff is an issue. Meanwhile the more mature clients are looking ahead of the market and working to attract the right supply chain; the less mature are lagging. That's a challenge and an opportunity." **– Patricia Moore**

"Consultants are outperforming every single measure according to our records, but they are often not very good at taking the opportunity to increase prices to support margins." **– Carl Evans**

"The risk of delivery costs increasing means we can't just put up prices, and the market shouldn't be so competitive when there is so much to do. But it will get better; fees will go up and salaries too." **– Graham Nicholson**

"Growth is the main challenge, both organic and through acquisition. Fees will go up but it's still a buyers market." **– Gareth Arber**

"The market is still quite competitive; that could be because firms aren't close enough to clients for them to trust the prices, or we all fear that if we raise our prices we lose the opportunity." **– Tom Locking**

Attendees

- Jennifer Hamilton, environment director, Grontmij
- Steven Trewhella, director, Royal HaskoningDHV
- Graham Nicholson, managing director, Tony Gee & Partners
- Patricia Moore, managing director UK infrastructure, Turner & Townsend
- Sheena Sood, partner, Beale & Co
- Tom Locking, director, Sweett Group
- Scot Parkhurst, managing director, Tyrens
- Gareth Arber, head of legal, WYG
- Carl Evans, managing director, Griffiths & Armour
- Paul Berg, director, Griffiths & Armour
- Antony Oliver, former editor, *Infrastructure Intelligence*
- Jackie Whitelaw, former associate editor, *Infrastructure Intelligence*

clients to ensure that risk is correctly apportioned and managed. As a result, risk awareness is increased and better, more informed decisions can be made by those with the power to make them.

Griffiths & Armour notes that the industry is at a risk crossroads. Collaboration was at the heart of this but there also needs to be recognition that collaboration creates a new set of consequences, with benefits but also different risks to be managed.

Risk can never be completely eradicated. And one failure, one party going bust affects everyone in the collaboration chain.

Griffiths & Armour hopes that the trial of its Integrated Project Insurance product at the Centre for Advanced Building Technologies at Dudley College will prove the worth of a system that insures the whole project team, including the client. IPI is one of the alternative procurement mechanisms being trialled as part of the Government's Construction Strategy to improve delivery of public-sector projects.

Griffiths & Armour managing director Carl Evans explained that government now wanted industry to pick up the baton of championing the cause of IPI.

"But if benefits of using IPI at Dudley are as great as expected, a number of other projects will come forward for trial," he said.

IPI is designed for collaboration. But with the insurance right, the legal agreements also need to be spot on, to make sure all the parties are ringfenced into collaboration with no opportunity to claim against one another, the round table group agreed.

Currently, they said, many contracts only paid lip service to collaboration. So despite commitment among leaders of a client and its supply chain to collaborate, those delivering the project were not commercially aligned to embrace it and continued to look at apportionment of individual risk.

It would take more proactive and focused input from informed lawyers at the initial stages to ensure that collaborations are set up on the right basis, but there should then be fewer and less expensive claims as a consequence, it was pointed out.

The best thing you've done to manage risk?

Our host certainly emerged as a sure bet when the assembled guests were asked about the single biggest thing they had done to manage risks.

"Get a good legal team with the fantastic support from Griffiths & Armour," said Jennifer Hamilton.

"Tony Gee & Partners have worked with Griffiths & Armour for many years on hundreds of projects. They provide an excellent and invaluable service," said Graham Nicholson.

Top to bottom: Jennifer Hamilton, Tom Locking and Sheena Sood

Technology is a tool to enhance the human dimension – not replace it

The intelligent use of communications and data tools has enormous benefits, but does not change the nature of our people industry, says *Nelson Ogunshakin*

Business today is increasingly reliant on technology. The widespread impact of advanced computer and communications technology is comparable to the last great transformation – that of the Industrial Revolution. Yet we cannot forget the vital role of human interactions in creating a sustainable and growing business.

Among the benefits of technology seen every day are increased efficiency in data processing, and increased access, both in direct communications and in reaching new markets previously limited by distance. As the implementation of Building Information Modelling (BIM) continues, it is important to contemplate the impact of technology on the future of our sector.

Industry-wide benefits

ACE, as the voice of the industry for over 100 years, has adapted to technology as a tool to connect with members in addition to being able to provide quality support to all firms, no matter their size or location.

ACE has increased access to its specialist services and expertise by embracing online communication channels, while maintaining access to expertise by email, phone or in person. Tools such as webinars, video insights, and social media discussions provide ACE members with fresh, relevant information. In a world requiring immediate action, timely access to expertise is a fundamental service.

Better mutual understanding

This has also allowed members and stakeholders to become more involved – virtually joining in expertly guided sessions or group meetings, regardless of location; fostering better mutual understanding and communication across the industry as a whole; and developing a way forward that benefits all, not restricted to a set location.

Our industry historically has a strong focus on people. While embracing technology is critical, it does not replace the fundamental need for face-to-face interaction. While Moore's law of computing predicts exponential increases in capacity and speed, this access to a large quantity of information does not replace the need for intellectual analysis based on human values.

"While Moore's law of computing predicts exponential increases in capacity and speed, this access to a large quantity of information does not replace the need for intellectual analysis based on human values."

Chief Executive Dr Nelson Ogunshakin, OBE

Technology enhances the speed of delivery, but cannot yet replace human input in decision-making; a process in which the raw data is only one component, with factors such as trust, cognitive understanding, ethics, or predicting human behaviour weighing heavily on decisions.

ACE values maintaining, developing and fostering these personal connections. Through collaborating with their peers in seminars, sector interest groups, regional groups and conferences, members develop well-rounded perspectives and make personal connections that last throughout a career.

Progress Network, ACE's network for under 35s, exemplifies the importance of ACE's technology-enabled offerings as well as the continued need for face-to-face interactions.

This age group comprises 40-45% of those using our website. Yet in addition to requests for ACE expertise online, ACE continues to receive requests for further expansion of Progress Network groups that meet throughout the UK as well as in the Middle East.

From informative seminars on topics including legal updates or smart cities, to ideas for collaborations for the future of infrastructure or social events such as pub quizzes, ACE Progress Network groups have active participation on all platforms amid a continual drive to get to know industry peers face-to-face.

No substitute for face-to-face interactions

While technology provides many benefits, the human side of relations in this people-orientated industry can never be replaced.

Technology is an enabler: of better ACE service provision, of greater member interaction with industry peers, and of increased access to knowledge or markets.

But tools such as BIM, video conferences and webinars do not provide the level of analysis, understanding or trust that is essential for a business to succeed and expand.

ACE is a community our members can trust. The consultancy and engineering sector is one of the UK's success stories, and its importance to economic growth and prosperity cannot be overestimated.

With a listening ear and watchful eye on industry developments, ACE will keep communications and relations at the forefront of our future activities.

Three new appointments for ACE boards

Lady Barbara Judge, Sara Lipscombe and Clare Bristow join the leadership

ACE has strengthened its governance with the appointment of three senior women to its boards. Lady Barbara Judge has been appointed as chair of the advisory board, while Sara Lipscombe, group communications director at Atkins, and Clare Bristow, group legal director at Arup, have joined the main ACE board of directors.

Judge has followed an illustrious career, starting as a corporate lawyer with a top New York law firm and most recently as adviser to the UK and Japanese nuclear industries, including chairing the UK Atomic Energy Authority. She is currently chairwoman of the International Advisory Board of the Energy Institute at UCL.

In May 2015, Judge was appointed the first chairwoman of the IoD in its 112-year history, and has been a strong supporter of encouraging women into professions. Speaking on her appointment, she said: "ACE's advisory board has an important role to play in guiding the main board on strategic matters and ensuring it is contributing to the national debate on infrastructure.

"This is a crucial time for the industry, with much-needed investment a key priority for ACE to influence at national, devolved, regional and local levels. ACE has also recognised the business imperative to embed a diverse and inclusive culture for positive, sustainable change within its member firms, and I am committed to moving this important agenda forward."

"ACE has recognised the imperative to embed a diverse culture, and I am committed to this agenda"

Lady Barbara Judge

"I hope to support the ACE's agenda in shaping UK infrastructure policy"

Claire Bristow

"We will guarantee that what matters is raised at the highest level"

Sara Lipscombe

Sara Lipscombe said: "I look forward to participating fully with my fellow board members to guarantee that what matters to the industry is being raised at the highest level."

Clare Bristow added: "ACE is synonymous with the highest standards of professionalism and is committed to shaping the development of the UK's social and economic infrastructure policy. I hope to be able to support this agenda, particularly in areas such as risk management, where ACE and its members are playing a leading part in developing frameworks for the future."

Dr Nelson Ogunshakin OBE, chief executive of ACE, said: "Barbara, Sara and Clare bring a wealth of experience to ACE and their achievements speak for themselves. It is exciting to welcome new members to both ACE boards who will bring with them a fresh perspective. The benefit from their combined expertise will help us continue with ACE's ongoing growth and support important campaigns. Companies can no longer have any excuse not to implement a diverse and inclusive culture. We ignore the issues at our peril and risk our industry faltering under the magnitude of challenges ahead."

Details on both the advisory and main boards can be found at www.acenet.co.uk/Board.

Brexit on the agenda at June conference

ACE International Conference will feature EU, global risks and climate change

The most pressing political topic of the day – whether the UK will vote to stay or leave the European Union and the implications of the decision – will be the subject of one of the keynote sessions at the ACE International Conference in June.

James Stewart, KPMG's chairman, global infrastructure, will lead the discussion, which will address fundamental questions including: How will the global economic slowdown impact the European referendum? In the face of this potential and highly significant change, how does our industry prepare for the consequences?

The conference will also address global issues including what influence will volatile financial markets have on the growth of emerging economies. It will review in particular the economic issues of the Far and Middle East, and investigate how we can benefit from the changing geopolitical landscape.

Richard Fenning, chief executive officer of Control Risks, will lead another international session. During this slot he will take a look at some of the major issues impacting global security today and those expected to be key considerations in the future.

Climate change and the Paris Agreement is another urgent and pressing topic that affects the sector and this will be addressed in another keynote.

This expert session takes an in-depth look at the real impact on our businesses today and the planning work required for tomorrow.

The conference takes place on 15 June in London. For more details contact Sarah Bassett, event delegate manager, on 01689 853 867 or email sarah@ace-events.org.uk.

www.ace-international-conference.com

A conscious stand against unconscious bias

Staff involved in recruiting or evaluating work situations need training to fight the risks of instinctive stereotyping. A new guide from the ACE shows how

Unconscious bias training, commonly used to improve diversity and inclusion, is the natural first topic in a new series, *Preparing Staff to Foster Diversity and Inclusivity*, based on ACE research.

We are naturally drawn to personal traits that are familiar to us. The brain quickly sorts individuals using obvious characteristics such as weight, age, attractiveness, colouring and gender, as well as invisible characteristics such as accent, socio-economic background, nationality, religion, or sexual orientation. This happens without our awareness, creating an implicit or unconscious bias for no logical reason.

In business, recruiters or interview panels are most likely to gravitate to candidates who seem familiar, which can perpetuate a lack of diversity. If not acknowledged and addressed, this undermines business strategies to improve diversity and inclusion.

Implicit association assessments

– speed-based questions that reveal tendencies – can uncover unconscious bias. Research shows that biases can be overcome through regular use of discovery and reduction techniques.

Training should start with senior leaders, people managers and those involved in employee selection, moving on later to other staff. Make implicit association assessments available, and encourage regular completion with reflection. Accountability is also fostered through setting clear criteria for the decision process.

Bias is not only directed towards others: individuals can unconsciously limit themselves based on what they believe to be biases or stereotypes within a specific workplace. Therefore, when creating self-evaluations, ensure all objectives are based on facts or logic.

At a meeting or interview, reduce the effect of biases by ensuring that the first information presented is most relevant as well as objective. Do not refer to age, gender, appearance or other personal characteristics that do not influence performance, as the first information received has a significant impact on performance and decisions.

When selecting a training programme, it is important to ensure the effectiveness has been tested and measured. Poor programming can actually solidify or increase bias, rather than reducing it.

Read about Unconscious Bias and more at acenet.co.uk/d&i.

Regional elections – hopes and expectations

With Parliamentary and local elections in Northern Ireland, Scotland and Wales this year, our regional leaders examine key issues for engineering

Northern Ireland
Alan Barr – ACE Chair of Northern Ireland Regional Group

Investing in Northern Ireland's infrastructure is essential if we are to increase our quality of life, both now and for future generations. This is the key message our profession has put forward to government ahead of this year's local elections. In Northern Ireland, we have a good sense of what our key infrastructure projects are; the challenge now lies in their delivery. We must also look after our infrastructure so that it continues to look after us, sustaining our quality of life for years to come. It is not just about building new projects, but maintaining what we already have.

Scotland
Simon Innes – ACE Chair of Scotland Regional Group

The Scottish Parliamentary elections, although important to the future of the construction industry, will probably provide little surprise in the outcome. The construction industry will be looking further to the council election in 2017 to see real change in the direction of expenditure. The current Scottish government is very supportive of major infrastructure investment and the delivery of the expected stable government will enhance this. As an industry we need to focus the government on investing in the backlog maintenance of this vital infrastructure.

Wales
Philip Lumley – ACE Cymru Wales Regional Manager

ACE Cymru Wales is pleased that infrastructure continues to take a prominent position in the Welsh political debate, but there is still much to do to support Wales' sustainable growth. Our recent work around an infrastructure vision shows significant opportunities for transport, energy, tourism and water resources to contribute to Wales' wellbeing – all of which will benefit from targeted infrastructure investment. Meaningful dialogue on investment and delivery priorities is essential, so we are keen that an infrastructure forum or commission is an ongoing commitment for all parties.

Don't lose money by falling into unnecessary disputes

For those within the field of consultancy and engineering, success is developed through fostering project efficiency, ensuring dependable cash flow and creating sustainable relationships. All of this is done through contracts.

While contracts inherently carry a risk of disputes that could devastate one's business, whether financially or through reputation loss, these situations are avoidable.

Proper contract administration saves businesses from the costs of unnecessary disputes. Avoiding dispute costs is achievable for all firms or consultants that refine their skills, fostering an understanding of the potential pitfalls and best practice for achieving goals.

Derived from the work of practising adjudicators, successful contract administration follows five principles, which reduce the risk of court, arbitration or adjudication.

Five principles of successful contract administration

1. Fully understand your contract.
2. Ensure effective communications.
3. Understand the needs of all parties.
4. Maintain thorough records.
5. Identify and manage risks throughout the process.

While each of these is, admittedly, a full skillset, contracts should never be a mystery but something well understood by all parties involved.

With greater clarity more parties will be successful in achieving their objectives through contracts, and willing to continue professional relations for years to come.

In order to find out more about the five principles of successful contract administration, and many more topics integral to contract success, attend the Arcus–ACE Two-Day Workshop.

Arcus–ACE Two-Day Workshop

25 & 26 April, 2016, London

Find out more and register at:
Arcusacademy.com/online-booking-2/

The EU and the environment

Green issues highlight the compromises that Europe struggles with, says *Matthew Farrow*

As David Cameron finally secured his EU deal at the February Brussels summit, the media served up soundbites from the usual political figures. The one that struck me was Jeremy Corbyn's – not his somewhat grudging support for staying in the EU, which was to be expected, but the fact that he was the only one who mentioned the environment. Where Cameron had gone wrong, he intoned, was in not using the negotiation to strengthen EU action in areas such as the environment.

Three years ago, it seemed likely that green issues would play a part in the EU debate. David Cameron's Bloomberg speech announcing the referendum singled out environmental red tape as a problem. But the government didn't follow up, and this was not among the four areas prioritised in the Brussels negotiations.

EU brought big improvements

Green issues do however illustrate some of the tensions at the heart of the EU debate. There can be no doubt that EU law has transformed UK environmental practices. Without EU regulation and the threat of infraction proceedings, I believe Britain would still be a country of landfills, toxic air and filthy beaches. To pick just one example, the government's new-found determination to improve air quality and create a national network of clean air zones would not have happened without the ongoing legal action against ministers for failing EU air quality targets. The vast majority of EIC member firms value the long-term certainty that EU environmental law provides and would not want to see the UK leave.

These benefits are achieved by allowing our environmental laws to be decided at EU level, through processes which bring to mind Bismarck's famous dictum of never wanting to find out how your laws or your sausages are made. EU treaties have given the EU environmental competence on the basis that looking after our shared environment is a common European ideal, which must not be undermined by the single market – something I heartily agree with.

The Commission, and whichever national government holds the EU presidency, might then come up with a reasonable aim, such as increasing recycling or restricting air pollution from manufacturing plants, and produce a logical technocratic proposal for how this might be done across the EU. The fun then starts, as the plan is fought over by 28 national governments, green NGOs and the European Parliament (all of whom will claim they are best placed to ensure the final outcome reflects the real priorities of the EU citizen), along with myriad business and other lobbyists.

What emerges is inevitably a compromise, albeit one that often works well and drives environmental progress. But problems can arise. Sometimes, the final regulation ends up messy or flawed. This can mean that the desired improvements do not materialise – for example, the failure of some of the European vehicle emissions standards to genuinely improve real-world driving emissions. Or the legislation tries to fix issues which are very difficult to micromanage across 28 countries. The Waste Framework Directive Separate Collection Regulations (which covered how many bins households should have) would be an example – significant cost, disruption and legal argument has been caused in trying to implement a badly worded directive that tried to decide something better tackled through pragmatic national decisions.

And even when the regulations do work well, there has been little national democratic input into the process, and hence limited public ownership of the result. Some will argue this doesn't matter – by putting environmental regulations beyond day-to-day national politics, technocrats can deliver progressive environmental laws that become the norm. Who would want to go back to 90% landfill or polluted beaches? But at a time when alienation from politics is already a major concern, expect the democratic deficit debate to loom large in the campaign.

Matthew Farrow is director-general of the Environmental Industries Commission, the leading trade body for environmental firms: ***www.eic-uk.co.uk****.*

Designer dilemmas answered

Uncertainty abounds since the new CDM regulations were introduced in October. Beale & Company associates *James Vernon* and *Andrew Croft* cover some FAQs

The Construction (Design & Management) Regulations 2015 affect almost all construction projects in Great Britain and so all consultants need to ensure they are familiar with them.

The main changes they have brought about are:

- the introduction of the new principal designer role for projects with more than one contractor (including the competency requirements for that role), replacing the CDM co-ordinator;
- the extension of the regulations to cover domestic clients; and
- a change in the basis for determining whether projects require notification to the Health & Safety Executive.

Common queries and our response:

Do the Construction (Design and Management) Regulations 2015 apply to services carried out in Great Britain for a project overseas?

CDM 2015 applies to all construction projects in Great Britain. Accordingly, if the project is not in Great Britain, CDM 2015 will not apply, even if services in relation to the project are carried out in Great Britain.

Appointments on projects overseas may, however, include obligations to comply with CDM 2015. Furthermore, when assessing whether a consultant in Great Britain has breached its duty of care on an overseas project, non-compliance with the principles of CDM 2015 may be taken into account, so consultants based in Great Britain should always consider the spirit of CDM 2015. Consultants with offices overseas which are involved in projects in Great Britain will need to ensure that those overseas offices are fully up to speed with CDM 2015.

Are all the principal designer's duties qualified?

Some of the principal designer's duties, including the general duty, are expressly qualified by wording such as "so far as is reasonably practicable". Other duties are not expressly qualified, such as the duty to "ensure" all designers comply with their duties (Reg 11(4)). Other duties, including the general duty (Reg 11(1)), are expressly qualified by wording such as "so far as is reasonably practicable".

The HSE L153 guidance describes the duty under Reg 11(4) using the "so far as reasonably practicable" qualification and states that by following this guidance you will "normally be doing enough to comply with the law". However, the regulations suggest that some of the principal designer's duties are not qualified and therefore a court may also come to this conclusion. Liability for strict obligations may not be covered by PI insurance.

> "It is very important to clarify who will be principal designer so that you do not assume the role by default"

Can the principal designer be novated to the contractor on a design-and-build (D&B) project?

The principal designer must be appointed by the client and be a designer with control over the pre-construction phase. When a D&B contractor is appointed, it is likely to be difficult for another designer to be principal designer.

If the principal designer role is novated to a D&B contractor, the principal designer will no longer be appointed by the client, so cannot continue the role.

If the principal designer is not novated, it will be difficult for the principal designer to retain control over the pre-construction phase.

It is our view that the D&B contractor should be appointed as principal designer. Consultants continuing to act as principal designer following the appointment of a D&B contractor should consider their role carefully.

Can consultants refuse to be appointed as principal designer?

A consultant can refuse to accept the role of principal designer. Nevertheless, if you do refuse to take on the role of principal designer we recommend that you clarify which member of the project team will be appointed principal designer.

If the client does not appoint a principal designer, other than on domestic projects, the client will assume the role. If the client does take on the role you should consider whether the client has the necessary skills, knowledge and experience to do so. If not, warn the client that they should appoint a principal designer.

On domestic projects where a principal designer is required, if the client does not appoint a principal designer, the designer with control over the pre-construction phase will be the principal designer even if not appointed in writing. It is therefore very important to clarify who will be appointed as principal designer on any domestic project so that you do not assume the role by default.

Who can be a designer/principal designer under CDM 2015?

Under CDM 2015, a designer is any person who prepares or modifies a design (including drawings, specifications and bills of quantities) relating to a structure (including scaffolding or a supporting structure), or a product or system intended for a structure. Any person who instructs a person within his control to do so is also a designer. The term is therefore defined very widely.

The principal designer must (a) be a designer and (b) have control over the pre-construction phase. The client can also take on the role of principal designer in some circumstances. The principal designer needs to have sufficient competence in relation to design and health and safety. A former CDM co-ordinator who is not also a designer is unlikely to have sufficient competence to be a principal designer.

If you would like to discuss the above or have any other queries in relation to CDM 2015 please contact Sheena Sood at Beale & Company on +44 (0) 20 7469 0402 or s.sood@beale-law.com.

Career path: Caitlin Stuart

In National Apprenticeship Week we speak to *Caitlin Stuart*, building services design technician at Troup Bywater + Anders, and WISE Apprentice of the Year 2015

Why did you choose an apprenticeship?
Having studied engineering and product design for A levels I was drawn to building services engineering, as it involves design work, appealing to my creative side as well as my STEM strengths. I wanted to get qualified but also gain experience in the field.

Describe your typical day at Troup Bywaters +Anders?
I work within a design team that focuses predominantly on projects in the commercial/financial sector. I am able to get involved with all aspects of the projects, from initial design, client meetings and calculations to going onto building sites to see the finished design.

What are your two favourite highlights from your apprenticeship?
The biggest highlight was winning Apprentice of the Year at the WISE awards. It's really special to be recognised

for my efforts to encourage more women to take engineering apprenticeships during my 2.5 years at TB+A.

What advice would you give potential apprentices?
Ask as many questions as possible and don't be afraid of getting involved in different activities, both within the business and externally. I was lucky enough to be invited to the Investors in People awards in 2015. It was a great opportunity to represent the business and celebrate, which made me feel really valued and proud.

What are your plans after your apprenticeship?
My apprenticeship with TB+A is a permanent role, comprising seven to nine years of structured training to get my academic development to BEng, MEng/MCIBSE CEng level. I completed the first academic stage of my apprenticeship in 2015 and am now in my first year studying for my BEng in Building Services Engineering at London Southbank University. I see myself developing a long career with TB+A, managing my own projects, mentoring apprentices and sharing experiences.

For more information about outstanding apprentices or the Technician Apprenticeship Consortium, please visit tacnet.org.uk.