A changing world: adapting to a new reality

With the construction industry facing an uncertain economic backdrop, the challenge for us all, from clients to suppliers, is to work together to turn promise into performance.
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Our magazine sharing insights, innovation and best practice drawn from our experience working on the world’s most complex programmes.

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Unique challenges need unique solutions in Africa

2016 saw unprecedented political upheavals across the world and volatility in global commodity prices – and 2017 is set to present new and unexpected challenges to the construction industry.

However, the challenges are matched by opportunities. To seize them, the industry must adapt rapidly – embracing change and disruption, and exploring new forms of funding, programme set-up and delivery.

This issue of 360°view will examine how the industry can identify these opportunities and translate them into intelligent capital programmes that deliver outcomes and greater value for clients.

With the industry facing an uncertain economic backdrop and constrained capacity, the challenge for us all – from clients to suppliers – is to work together to turn promise into performance.

Starting on page two, we explore how the developed and developing world needs new and upgraded transport, energy, communications and water infrastructure to drive economies and underpin living standards in an increasingly urbanised world.

We then outline how private sector capital investment funds are increasingly targeting infrastructure as a stable asset class able to deliver the long-term, reliable returns their investors are demanding on page six.

On page ten, Stefan Kögl, Head of Building Solutions at Siemens Real Estate, discusses how in times of global economic and political uncertainty standardisation, digitalisation and new management approaches are bringing extra resilience to the company’s portfolio.

With the oil price starting to change, 2017 is the first year of a new cycle in which investment is needed in large projects to take advantage of low prices. We look at how the oil and gas industry can get prepared for the long term on page 14.

Governments are investing in infrastructure to generate jobs and drive broader economic growth. But with a number of major programmes in the UK having been given the green light does the industry have the skills, people and funding to deliver such huge projects? Find out more on page 18.

Phil Wilbraham, Heathrow Expansion Programme Director, discusses the major logistical, infrastructure and skills challenges affecting the programme to build a third runway at Heathrow Airport on page 22.

Finally, on page 26 we explore the challenges in the African construction industry and share advice on how to set your project up for success.

If you’d like to know more, please get in touch through our website, LinkedIn page or Twitter feed: @turnertownsend.

We’d be delighted to hear from you.

Vincent Clancy,
Chairman and Chief Executive Officer
Turner & Townsend
Global population is rising. The United Nations estimates that by 2050 the planet will be home to nearly 10 billion people with two thirds living in cities. Pressure is growing on the vital transport, energy, housing, communications and water infrastructure that supports our modern lives. A new model for investible infrastructure is required to successfully support this.

Investment is vital to underpin living standards but also to provide the connectivity that drives economies and generates growth and wealth. Yet while there is certainly a political will and a clear logic to this investment, the challenge faced by global leaders is how to pay for it. For all the speeches and policy commitment, driving forward with long-term investment remains difficult.

Inconsistent delivery record, high-risk profile and funding difficulties plus long return on investment, continue to act as major barriers to both public and private investment.

A new model is needed for the funding, planning and delivery of major infrastructure projects. This should be a new way to focus 21st century global infrastructure projects on investment need, transforming delivery and understanding long-term value.

Tackling the funding challenge
Infrastructure is an expensive business and across both the developed and developing world governments simply do not have the cash to fund all programmes from the public purse without resorting to undesirable levels of borrowing.

We see this in the USA, with programmes such as the $137bn Emergency & National Security Projects programme proposed by President Trump shortly before taking office and public and private funded schemes, which require vast amounts of private funding to underpin the public commitment. To find out about public private partnerships (PPP or P3) read the 360°view article on page six.

Similarly in the UK, the government’s long-term £500bn national infrastructure and construction pipeline of 728 projects assumes that more than 50 percent will be delivered and funded by the private sector. In Australia, Malaysia and Singapore, Sydney Metro and the Kuala Lumpur to Singapore high-speed rail link respectively are anticipated to feature heavy private sector involvement.

There is a great appetite in the global investment community to support this infrastructure ambition and a multitude of ways to finance projects, from issuing long-term bonds to institutional investors, to the long-term involvement of pension funds. Typically there are two routes to provide funding; taxation, or through some form of fare box.

The creation of the UK’s independent National Needs Assessment programme, is potentially making that linked charges with service improvement. Policies to be set and investment decisions to be regulatory frameworks allowing long-term success in these cases has relied on strong political focus and connect revenue collection directly with the public used to obtaining services ‘for free’. That said, it can be equally unpopular with politically undesirable, not least for administrations to direct funding towards infrastructure and is also from government, as such it can be an inefficient way to investible infrastructure is critical to securing this investment. Infrastructure is now an increasingly attractive asset class for the global investment community seeking long-term secure returns on investment. Making the link between investment and long-term value and are being effectively delivered as part of a longer-term vision. However, these successes are not yet the norm. For too many nations investment in infrastructure is still witnessed across the global construction industry, they are understandably wary of investing in major infrastructure projects. Read about investment in Africa on page 26. In many cases, large-scale infrastructure projects still: ■ take too long from inception to implementation ■ cost too much to deliver ■ cost too much to operate and maintain ■ focus on short-term rather than long-term solutions ■ carry higher levels of risk when compared to real estate investment. The current market set-up, with its lump sum and target cost pricing structures, is simply not delivering the performance required by long-term investors. Not least while the supply chain continues to stand back and wait for others to invest in innovation, skills and new products. The market must move towards larger turnkey contracts with more emphasis on outcomes rather than transactional products. Only then will we start to see improvement in productivity across the sector as demanded by asset owners and governments around the world.

In reality the former generally involves a direct grant from government, as such it can be an inefficient way to direct funding towards infrastructure and is also politically undesirable, not least for administrations elected on the basis of reducing the state borrowing. Tolling or charging at the point of use, can effectively make the link between investment and long-term economic value, and create an example of a well-thought-out plan. Not only does this identify the critical needs for the nation today, but it is also capable of identifying those for the longer-term, highlighting the whole-life and whole-community value that can be extracted from that investment.

Transforming delivery
Institutional investors like a clear understanding of risk. Given the inconsistency of project delivery witnessed across the global construction industry, they are understandably wary of investing in major infrastructure projects. Read about investment in Africa on page 26. In many cases, large-scale infrastructure projects still:

■ take too long from inception to implementation
■ cost too much to deliver
■ cost too much to operate and maintain
■ focus on short-term rather than long-term solutions
■ carry higher levels of risk when compared to real estate investment.

The current market set-up, with its lump sum and target cost pricing structures, is simply not delivering the performance required by long-term investors. Not least while the supply chain continues to stand back and wait for others to invest in innovation, skills and new products. The market must move towards larger turnkey contracts with more emphasis on outcomes rather than transactional products. Only then will we start to see improvement in productivity across the sector as demanded by asset owners and governments around the world.

“Project performance must be turned around if investors are to be encouraged into the infrastructure sector at the right price.”

The World Economic Forum’s Shaping the Future of Construction report highlights the scale of the challenge and the size of the opportunity. Given the engineering and construction industry is six percent of global GDP and growing, and is the largest consumer of raw materials and other resources, it cites that even a one percent increase in productivity worldwide could save $100bn a year. Combine this with improving asset management capability then a whole lot more schemes would move from marginal to investible*. The UK’s Construction Leadership Council understands this and, by following the transformation already seen in the aerospace and automotive sectors, is attempting to reform the construction through:

■ digital technology
■ off-site manufacturing (read how Heathrow Airport is managing this on page 22)
■ smart asset management techniques.

A new data-enabled, technology-driven production method is a critical step for asset owners and operators looking to reduce their capital programme delivery, asset management and whole-life cost base.

From an investment perspective, moves to embrace the entire asset lifecycle also herald a transformation for investors. In Australia and Canada, for example, measures are being investigated and instigated in which shares of existing brownfield assets are sold to the private sector so as to fund new schemes. Understanding and managing the whole-life risks and performance significantly impact the value that can be extracted.

Embracing whole-life value
There are numerous global flagship projects which demonstrate that, approached correctly, infrastructure can be very attractive to investors. Think Crossrail and Thames Tideway in the UK; think Sydney Rail in Australia, think Metrolinx in Canada. These projects all make the link between investment and long-term value and are being effectively delivered as part of a longer-term vision.

However, these successes are not yet the norm. For too many nations investment in infrastructure is still rooted in short-term gain, and poorly delivered political pet projects. Neither provide an attractive proposition for private investors. This must change.

Infrastructure is now an increasingly attractive asset class for the global investment community seeking long-term secure returns on investment. Making projects investible is critical to securing this investment. A transformation is needed of current delivery models (see the key criteria in the box on page four) to enable global infrastructure schemes to be delivered and funded consistently, and so benefit governments and the lives of communities worldwide.

For more information contact murray.rowden@turntown.com
Can P3s be top trump in quest to fund infrastructure?

Dominic Leadsom
Head of Infrastructure, Canada
Turner & Townsend

Three steps to P3 success

1. Market sounding
   1. Ask the industry you will be inviting to bid if the project makes sense as a P3.
   2. Give an overview of the project, its characteristics, schedule and an indication of the risk and reward structure.
   3. Engage the community that will be directly affected early to avoid opposition later that will add to the scheme’s risk profile.

2. Value for Money (VfM) assessment
   1. Agree risk transfer approach with key stakeholders.
   2. Evaluate the cost difference between using a traditional design, bid, build procurement versus a design, build, finance and maintain.
   3. Establish a positive VfM percentage for the project. This is critical in securing stakeholder buy-in.

3. Decision to proceed
   Ensure the following elements are in place for P3 procurement to have a good chance of succeeding:
   1. Robust P3 legislation
   2. A fair and transparent process
   3. Local community outreach
   4. Political and public support
   5. In-depth project due diligence
   6. An active project champion
   7. Demonstrable VfM

1. www.infrastructurereportcard.org

US President Donald Trump promised a $1tn infrastructure programme in his first speech to a joint session of Congress at the beginning of March. Public Private Partnership (PPP or P3) could be a prime option for leveraging the investment – but it is crucial to get the risk balance right.

All eyes were on the Oroville Dam in California in February. At close to 800 feet tall it is the USA’s biggest dam and was struggling with a damaged spillway and monsoon level rainfall that meant the reservoir behind it was 98 percent full.

Fortunately fears of the dam overtopping and mass flooding downstream on the Feather River were avoided by some clever emergency repairs. But the incident brought home to everyone that if big infrastructure were to fail, it would fail big with potentially very severe consequences.

Money needs to be spent quickly on upgrading the USA’s existing infrastructure and building new to underpin economic growth. According to the American Society of Civil Engineers, the total figure required by 2020 is a staggering $3.6tn.

It is something not lost on President Trump, who has promised to meet almost a third of this demand with an investment of $1tn of infrastructure during his term in office.

How to fund this ambition and produce results in a short period of time is the challenge, when historically delivering can be a notoriously long drawn-out process.

President Trump is not alone with the conundrum. According to the World Economic Forum, in order to support a future world population of nine billion people, an estimated $5tn needs to be invested in global infrastructure every year.

While governments do not have the spending power to meet the demand for infrastructure, need is driving a more realistic view on risk. This means private sector capital investment funds are increasingly targeting infrastructure as a stable asset class able to deliver the long-term, reliable returns their investors are demanding.

Time for P3s

Public Private Partnership procurement arrangements, or P3s as they are known in North America, are one of a suite of potential solutions which can be accessed to meet this need. It successfully combines the relative strengths of both public and private sectors in a delivery model which increases likelihood of delivering to time and cost. President Trump has himself signalled that P3s will be part of his strategy.
P3 procurement not only accesses private capital for public works but brings in private sector expertise on a service basis. This incentivises delivery of infrastructure to time, on budget, with potentially innovative solutions that drive value for the public purse in the long term.

A best value blend of risk sharing between public and private sector is developed ensuring effective performance of the infrastructure, from design and planning, to ongoing maintenance. Getting the risk allocation wrong at the outset will mean P3 contracts will fail.

Long-term value is driven by adopting the whole-life approach to service delivery including passing maintenance and in some cases operations to the private sector for up to 30 years. Service levels are driven by an incentivised payment mechanism that raises performance standards throughout the lifecycle. The public sector pays for this serviced asset via combined availability and performance payments, which can be off-set where third party revenue is available directly via tolls or user fees.

In the past, the public have been suspicious of a procurement method that has seemed to deliver super-profits to the private sector from government assets. With succeeding enhancements however, a significant proportion of these perceived super-profits are now captured by the public sector to invest in subsequent schemes.

**Getting the risk balance right**

For P3 clients in North America, Europe, Africa and Australia, understanding which risks to transfer and how best to transfer them to the private sector is the key to unlocking private sector investment, and demonstrating value to taxpayers and government officials.

Get the risk transfer balance right and the public sector will get an asset they need, delivered quickly and on budget, to bring benefit to the local economy. It will also mean the private sector is carrying enough responsibility at the right price for the public to see that it is getting value for money.

It’s a fine line to tread. There can be a temptation for the public sector to transfer or retain too many of the risks, for example during the establishment of the design parameters. By delivering a reference design that is too prescriptive, private sector innovation is limited. Conversely, a demonstrably deliverable scheme at a reasonable level of risk attracts bidders and will result in better value bids.

**Driving real value**

The more complex the asset being delivered, the more sensitive the risk transfer becomes. The key to effective risk allocation is to fully recognise the risk, establish which party is best placed to manage and use the project documentation to effectively retain, share or transfer the risk. It should not be forgotten that not only are bidders competing for the investment opportunity but promoters are also competing, through the attractiveness of the deal, for private sector investment.

There is no standard template for risk transfer. The maturity of the local market, evidenced through successful closing and delivery of P3 projects, as well as the capacity of the public and private sector in the market, will determine the approach to effective risk allocation. Government agencies and end users need experienced advice, based on an understanding not only of how to structure P3 procurement documents but also what the private sector consortia and lending groups will accept.

**Is P3 the right approach?**

When used for the right type of asset with well-structured documentation, P3s can deliver needed infrastructure in a more cost and time-efficient manner than traditional procurement models. In a changing world, where the need for urgent infrastructure renewal is outpacing governments’ ability to pay for it, P3s can unlock private sector capital innovation, allowing alternative procurement structures to be developed. P3s could therefore form a key part of the Trump administration armoury for delivering on its infrastructure promise.

For more information contact dominic.leadsom@turntown.com

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**Balancing risk**

- **Public sector**
  - Land acquisition
  - Design requirements
  - Maintenance standards
  - Construction changes

- **Private sector**
  - Design performance
  - Cost overruns
  - Construction delays
  - Contractor default
  - Maintenance performance
  - Lifecycle replacement

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**Leading the way**

In recent years, Canada and Australia have been leading the way in P3 projects. In Canada almost $65bn worth of infrastructure has been built with healthcare and transportation accounting for close to 50% of that investment.

P3 procurement enables the rigorous of financial due diligence when applied to public projects, which can test whether the scheme is viable, the solution is optimum and the price is right.

The state-of-the-art Forensic Services and Coroner’s complex in Toronto is an example of a successful P3 project.
In times of global economic and political uncertainty, having an agile and fast real estate strategy is particularly important for multinational businesses. Real Estate Head of Building Solutions Stefan Kögl explains how standardisation, digitalisation and new management approaches are bringing extra resilience to the company’s global portfolio.

“I love change. I’m happy if things are changing,” says Stefan Kögl.

At Siemens Real Estate (SRE), Kögl is steering the department that is responsible for all new building projects in a multinational giant property portfolio through some very uncertain times. Shifting regional markets and geopolitical uncertainties are changing customer expectations and forcing a rethink of everything from office layout to factory design. The multinational has also been refining its build strategy, helping to get projects underway as quickly as possible.

“Certainly quality is very important to us,” Kögl outlines, “but our priority is speed.”

It’s a challenging aspiration for a company the size of Siemens. With a portfolio spanning globally and approximately 15 million square metres of space, Siemens spends roughly €300m on new construction projects annually. Currently, there are around 50 construction projects underway, with ten to 20 in the planning pipeline.

Streamlining the building process

As SRE is responsible for all the real estate assets within Siemens it is able to mine efficiencies and synergies globally. So Kögl standardised and streamlined the building processes through its Construction Excellence initiative. Introduced in 2015, the initiative is rolled out globally and 20 projects have been tracked in detail. Even though many of these projects are yet to be completed, impressive results are already being realised.

“We have achieved an accelerated three months per project only in the early phases, with a cost reduction of 12 percent to 15 percent,” Kögl says. The first actions were to streamline the requirements for factory projects. The designs for manufacturing facilities, covering production lines for around 100 products, were optimised into five types.

Siemens has also standardised its approach to office design and its process is being speeded up by a software tool that provides rapid costing calculations.

“If we know how many workplaces we need, and we know the city, we can quickly calculate our space requirements and the probability of costs.”

He adds that the tool also automatically adjusts for regional variations, taking into account the design adaptations that will be required for different climates and local building regulations. In Germany, for example, level C offices have a width of 13 metres. In China, the width is 25 metres.

Further streamlining its processes, Building Solutions has refined its supply chain, and now works with selected partners for design and project management in each region.

“We exclusively work only with four or five design teams in each region and six project management companies globally. This saves us a lot of time as previously we often had to work with new partners from scratch,” states Kögl.

Siemens’ own building technology products for elements such as building automation, power, fire protection, and security systems are extensively used across its property portfolio. However, Kögl says that standardisation has yet to be extended to other building components. This is not for lack of trying: so far the construction market is a little bit resistant to such suggestions.

“We had a lot of meetings with construction companies and most of them speak about lean construction, but they do not work in this way. They want to decide case by case on how to construct and how to work, so it’s difficult to develop a leaner construction approach,” he comments.

The size and nature of Siemens build projects is also changing, in response to the different requirements.

Although SRE is part of Siemens, some of its products, such as offices, are ultimately sold on or partially leased by external clients. As a result, the offering must keep pace with shifting commercial trends.

“Workspaces are changing. Previously they would be rented by the square metre on long leases. In the future, we expect that customers are looking for shorter leases – and want to rent workplaces, and no longer square metres.”

One strong trend is the adoption of flexible office space, as illustrated by the company’s major programme ‘Siemens Office’. Up to now SRE has rolled out approximately 1 million square metres of its open space office with all the advantages of modern technology, including enhanced IT connectivity. 

In times of global economic and political uncertainty, having an agile and fast real estate strategy is particularly important for multinational businesses. Real Estate Head of Building Solutions Stefan Kögl explains how standardisation, digitalisation and new management approaches are bringing extra resilience to the company’s global portfolio.

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"It’s a paradigm shift for staff, so it is an HR programme as well as a build programme,” Kögl adds.

**Transforming through digitalisation**
Disruptive technology, digitalisation and automation are also transforming the markets and the product portfolio of Siemens.

Kögl is convinced that the implementation of digital technologies will bring high benefits and new business opportunities and will be the only way for design and construction teams to become more agile in adapting to these trends.

In 2015 SRE had been starting to develop its digitalisation strategy.

"One major initiative was consolidating our IT tools. Previously we were using a lot of different IT products to manage our assets globally."

This complex IT structure is now being replaced with a new software platform, Planon, which serves the company’s entire asset management programme.

"Planon is being implemented over the next two years, and will also interface with our building information modelling (BIM) activities,” Kögl says. "This will lead us to a holistic data exchange and will reduce our IT costs tremendously, and we also anticipate it helping us substantially lower operational costs."

At the same time Kögl’s team started to develop its BIM strategy to cover the whole process from design and construction to operations and it is in the test phase on early adopter projects. Ultimately Kögl’s aim is that construction and design teams will be creating ‘digital twins’ of all new buildings using BIM software.

If the vision is to be realised, Kögl acknowledges, it is essential that the different disciplines of design, construction and facility management collaborate more closely on integrating their BIM and digitalisation activities.

"We really want to bring everything together," he adds. But he admits that it can be difficult finding people who think in this way. In facility management, we are looking at the opportunities offered by big data and BIM, but we see it as a major means of optimising the services.”

"Siemens goes through a lot of mergers, inheriting a lot of older buildings along the way. Our property portfolio can change substantially year on year."

Kögl anticipates that Siemens will be running all new construction projects through BIM models within two years. But he admits that retrofitting digital BIM models for the existing 1 million square metres property portfolio is a challenging prospect.

"We also have to look at the size of the properties and the costs and the benefits of retrofitting them with BIM."

**New management approaches**

Acknowledging that some employees will be feeling culture shock with the rapid introduction of new technologies, Kögl is taking an active method.

"We are training all project managers – around 60 to 70 people – in BIM management, even though we haven’t yet rolled out the strategy globally," he says. "As BIM is really innovative technology that will change the whole process of design and construction, our people have to understand what it is all about. They then will become curious and interested and will support the new approach. If we develop an approach, but don’t explain it to our colleagues, we’re going to meet a lot of resistance."

Over the coming months, Kögl sees his personal challenge as understanding the opportunities presented by digitalisation. He also expects the digital revolution to change leadership styles.

"Leadership is changing fast. We’re no longer in the situation where the boss knows best. Leadership these days is more about empowerment: bringing the right people together, gathering the knowledge and developing the targets together with the team.

It’s a key focus for the global business.

"Our ongoing challenge is helping our teams and managers define priorities and make the right decisions. We’re having many discussions around this topic across the whole of Siemens at the moment."

**Turner & Townsend is providing advisory and project management services on Siemens’ global real estate portfolio.**
Competitive barrels need a commercial mindset:

a shift in behaviour in oil and gas

Oil and gas projects are coming off the drawing board and into the field, but they will only be viable if costs are dramatically reduced.

In December last year BP announced that it was to add a second platform to its Mad Dog field in the Gulf of Mexico with the capacity to produce up to 140,000 gross barrels of crude oil a day. The really show-stopping part of the announcement was the expected cost of the development: $9bn, 60 percent less than the cost of almost $22bn announced in 2013.

Projects that were viable when oil prices were up at $100 per barrel do not look attractive now, even with the rising price trend we have seen since OPEC announced it was limiting production in November 2016. The industry has to drive costs lower.

Speaking about the second Mad Dog phase in December 2016, Bob Dudley, BP Group Chief Executive, said: “This announcement shows that big deepwater projects can still be economic in a low-price environment in the USA if they are designed in a smart and cost-effective way.”

Though the 60 percent cost reduction achieved on Mad Dog will not be achievable in every case, most oil and gas companies should be looking for reductions of between 30 and 40 percent. But to achieve this step change in costs requires a change in mindset too.
Goodbye gold standard

The traditional approach to designing oil and gas facilities for large operators was to always seek the ‘gold standard’. Each development had to be a flagship project, bigger and better than the previous one, fully future-proofed so that additional phases could be brought online with relative ease some years down the line.

In 2017 those ideas are being turned on their heads. Companies are seeking a simpler, bare bones proposition with standardisation taking over from bespoke design. ‘Design one, build many’, which has been the mantra for some small operators, is now becoming the guiding principal for the big players too.

Investments are very much limited to what is absolutely necessary now. We are seeing smaller, faster, incremental projects being lined up for delivery, with no provision made for later phases. Each element of the project is interrogated to assess the risk, cost and value attached to it and only advanced if the value exceeds the cost.

Technology is advancing apace; driving down costs as operations become quicker and more efficient, particularly in drilling where some operators are seeing wells completed in half the time when compared to two years ago. The new mindset looks to delay design of future phases and reassess what technology can do at that point.

After a barren two years, market conditions are also playing a significant role in lowering the cost of projects coming out of the starter blocks now. The costs of steel and labour have both come down, with contractors offering keen prices as they look to fill up their order books again.

This is a double-edged sword however. With many contractors having downsized or even disappeared altogether, resource is more limited and as demand rises, costs of labour will be on the up too.

Increasing collaboration in the supply chain

To mitigate rising costs, project managers should look for ways to increase collaboration with their supply chains. Costs can be reduced by adopting a more open and shared approach to risk allocation between parties to give the best outcome for the project.

As well as the challenge of moving to a new development model, oil and gas companies are also facing a potential shortage in internal resource and capability. Like their supply chain, they too were forced to slim down dramatically, leaving leaner and arguably keener teams.

Although we expect these teams to be more efficient, as individuals strive to demonstrate their worth, there is a fear that the industry has lost some important knowledge. Many experienced heads have been lost to retirement. Until these new projects get underway, we won’t know whether the balance is right or whether more capacity will be needed.

Data now

In the last two years we have seen an upsweep in the use of the Performance Forum, a resource run by Turner & Townsend for the oil and gas industry, which collates and benchmarks data from between 60 and 100 upstream projects a year. Companies such as BP are interrogating the cost of every element in order to deliver projects in the low oil price environment.

We are also starting to see some smarter use of the vast amounts of data captured on projects. This is a trend which needs to go much further.

Lessons learned meetings at the end of projects, which pull out possible improvements for future programmes and phases, are commonplace now. But in this new world, learning lessons when delivery is complete is just too late: data must be mined and analysed as it is collected so that changes and improvements can be made mid-project in order to keep projects on track and if possible deliver even more value. Digitalisation is the new buzzword.

“Companies are seeking a simpler, bare bones proposition with standardisation taking over from bespoke design.”

Life and times of Mad Dog in the Gulf of Mexico

Located 190 miles (346km) offshore from New Orleans, the Mad Dog oil and gas field is one of the largest to be discovered in the Gulf of Mexico, containing an estimated 4 billion barrels of oil. It is jointly owned by BP (60.5 percent), BHP Billiton (23.5 percent) and Chevron (15.6 percent).

Its current platform has capacity to produce up to 80,000 gross barrels of oil and 60 million gross cubic feet of natural gas per day. The planned second platform will have capacity for up to 140,000 gross barrels of crude oil per day.

The resource estimate for the field was doubled to 4 billion barrels of oil equivalent after further investigation of its reserves.

1998
Mad Dog field discovered in the Gulf of Mexico

2002
Development of field approved

2005
Production begins from first platform

2009 - 2011
Further appraisal drilling reveals reserves are double initial estimate

2011
Second platform planned

2013
Design of second platform reassessed due to cost of approximately $22bn

2017
Simplified design announced, to cost $9bn

2021
Production expected on second platform

Source: BP press release, 1 December 2016

“With oil prices expected to remain around the $50 to $60 a barrel mark, the only way for oil and gas companies to reach a financial investment decision is to adopt this stripped-back approach to design and specification.”

A shift in behaviour

They must challenge their supply chains to think differently, to look for standardisation in both design and construction, and to ask the question: ‘Why do we do things this way?’.

As with any significant change the biggest unknown is the human factor. The successful delivery of projects at this cost level requires people with the experience and knowledge to make informed decisions. But perhaps most challenging of all, it requires people who can change their behaviours and who won’t revert to type as projects get underway.

For more information contact aileen.jamieson@turntown.com

Five areas to cut costs and drive efficiencies on oil and gas projects

1. Design and specification
   Simple and standardised are key

2. Market conditions
   Make the most of lower labour and material costs

3. Efficiency in execution
   Teams are leaner; they must be keener too

4. Phasing of development
   Invest only in what is needed now

5. Real time data
   Immediate interrogation of data to inform changes now: digitalise
How to avert a capacity crisis
Putting infrastructure at the centre of the UK’s new industrial strategy

Never waste a good crisis, so the saying goes. Make the most of the opportunity to bring about positive change. The UK’s infrastructure sector is at just such a critical juncture: the industry must take decisive action to ensure it can deliver all that is asked of it.

While successive UK governments have increasingly appeared convinced of the merits of investing in infrastructure for stimulating economic growth, uncertainty has lingered over a number of major projects. However, now phase one of the High Speed 2 (HS2) railway is nearing, a positive decision has been made in favour of Heathrow Airport getting a third runway, and construction has started on the Hinkley Point C nuclear power station, the UK’s first new nuclear site in a generation. Not to mention Highways England’s ambitious plans to upgrade the strategic road network.

These mega-projects will give a very healthy boost to the construction industry as a whole. Prospects for order books have never looked so good.

To compound this, just as these mega-projects begin to come on stream, the importance of long-term investment in infrastructure has been restated by policy changes in light of Brexit. Many of the government’s recent announcements – its proposals for Heathrow, a green paper on a Modern Industrial Strategy, plus a white paper on tackling housing shortages – have been key government initiatives to show the world that the UK is ‘open for business’.

The opportunity is to combine the government’s key proposals within the industrial strategy to look at how the industry embraces technology and innovation. If we get this right we could not only help to solve the capacity issue by reducing the resource demand side of the equation, but also transform the industry’s image at the same time.

Construction’s image problem
The skills shortage in construction and engineering disciplines is well documented. According to Engineering UK’s 2016 State of Engineering Report, the construction industry is currently one of the most severely hit by a lack of new recruits coming through with suitable STEM (science, technology, engineering and mathematics) qualifications.

Engineering UK’s analysis shows a current annual shortfall of 69,000 qualified to Level 3 (advanced apprenticeship) and above. In transportation alone, the shortfall of newly qualified recruits is expected to reach 55,000 by 2020, according to the government’s 2016 Transportation Infrastructure Skills Strategy.

1 www.engineeringuk.com/media/1309/engineeringuk-report-2016-synopsis.pdf
Clearly, too few young people are entering into infrastructure and construction careers. The industry has an image problem; too often regarded by families and careers advisors as a dirty, dangerous and demanding career option. In contrast, it actually offers a fantastic and wide range of high-tech opportunities – for a diverse range of people.

“The UK government has a pledge to create 30,000 new rail and road apprenticeships by 2020, and organisations like Crossrail have publicly supported the skills agenda, setting their own apprentice target.”

Terry Morgan, Chairman at Crossrail, said: “At Crossrail we committed ourselves to having 400 apprentices by 2018, and right now we have 602. We count every single one. What’s even more impressive is that 40 by 2018, and right now we have 602. We count every single one. What’s even more impressive is that 40

Select and rally round strong leadership
What is needed here is not an Einstein moment of brilliant new ideas but strong, effective leadership and greater collaboration to ensure the industry speaks – and leads – with one voice.

The construction industry does not lack respected professional organisations. Many good initiatives are being well coordinated by the industry’s various groups and organisations; tackling important subject areas such as improving project delivery models, contract procurement, collaborative behaviours and carbon reduction.

For the crucial issues of skills and improving the industry’s image, however, currently there is too much fragmentation. Too many different organisations are trying to do similar things, without the critical mass of a whole sector working as one.

Take for example the Apprenticeship Levy due to come into force in April this year. This initiative is welcome as it will encourage all sectors of industry to increase funding for apprenticeship opportunities, bringing greater diversity to the industry and allowing us to really define our compelling offer in that space. The Levy will raise substantial sums of money for retraining people through part-time, day-release courses, but have universities, colleges and other local learning institutions increased their vocational training capacity accordingly? There is still a lot of work to do on the Apprenticeship Levy. Strong leadership is needed to ensure a single drive for change is coordinated on behalf of the whole industry.

A single submission to the UK government’s Modern Industrial Strategy
The Modern Industrial Strategy green paper reads clearly that government wants to support individual sectors that can put forward proposals through strong leadership.

The strategy lists ten ‘key pillars’ for improving living standards and economic growth. Upgrading infrastructure is given as one of the ten in its own right. However other pillars – skills, investing in research and innovation, improving procurement, driving growth across the whole country and creating the right institutions – are all directly addressable through the construction industry and its ability to deliver.

So if government is already convinced of the importance of infrastructure (and housebuilding), the industry now has to pull all of these strands together.

It must build a comprehensive submission in response to the Industrial Strategy and appeal for coordinated government support to help improve the construction sector’s image – to promote the many varied and exciting careers on offer.

This leads us to the ongoing role of the Infrastructure Projects Authority (IPA) and the National Infrastructure Commission (NIC). There are few organisations with a truly pan-industry remit. This is their time to embrace the government’s motivations and connect them wholeheartedly to our industry, solving many challenges in the process.

Improving living standards and economic growth: the ten key pillars of the UK Modern Industrial Strategy

1. Investing in science, research and innovation
2. Developing skills
3. Upgrading infrastructure
4. Supporting businesses to start and grow
5. Improving procurement
6. Encouraging trade and inward investment
7. Delivering affordable energy and clean growth
8. Cultivating world-leading sectors
9. Driving growth across the whole country
10. Creating the right institutions to bring together sectors and places

Truly collaborative opportunity
To adapt to this new reality, government support is vital to show the public that infrastructure and construction employers offer exciting and rewarding careers to everyone. Over the coming months, the industry must show strong leadership and work in a truly collaborative fashion. In a changing world, it will succeed by rationalising initiatives and executing a clear plan everyone is signed up to.

For more information contact patricia.moore@turntown.com
Planning for success:
Heathrow Airport tackles its expansion challenge

Client interview

Phil Wilbraham
Expansion Programme Director
Heathrow Airport

The construction of a new third runway at Heathrow Airport in the UK is comparable to Crossrail in scope, complexity and cost - albeit in a much tighter space. Phil Wilbraham discusses the major logistical, infrastructure and skills challenges ahead.

There has been a buzz at Heathrow Airport, ever since the UK Government gave the airport its backing for a third runway in October 2016.

After decades of debate and political wrangling, the airport operator is now shifting its energies from campaigning to planning.

"It’s very exciting, because it’s still very new," says expansion programme director Phil Wilbraham. "Before the Government’s decision last October, we had done very little design or architecture. But in the last three months, the team has grown substantially."

The Department of Transport’s draft National Policy Statement on Heathrow is currently out for consultation1. It will be debated and voted on by Parliament later this year. A second consultation on the preferred masterplan should take place in 2018. All being well, Heathrow will be applying for planning permission in mid-2019 and construction could begin in 2020, with the first flights taking off from the new runway in 2025.

“In 2016, 75.6 million passengers passed through Heathrow Airport. The operator anticipates that the new runway could ultimately help capacity to grow to 135 million passengers a year.”

Considering infrastructure requirements

There are going to be some major infrastructure building and logistical challenges on the biggest project that Heathrow has seen in decades. The £4.5bn Terminal 5 project, which opened in 2008, was considered to be one of the UK’s mega-projects at the time and included the diversion of two rivers and the construction of underground rail infrastructure – the Piccadilly Line and Heathrow Express extension.

Before work can start on the runway, hectares of critical infrastructure need to be shifted out of its path, including a large energy from waste plant, a Home Office detention centre, the head office of British Airways as well as 700 homes. Four rivers may have to be diverted. Local artery roads, including the A4 and the A3044 must be rerouted.

1 www.gov.uk/dft/heathrow-airport-expansion.
Tackling the logistics challenge

Then there are the logistical challenges of running a programme of this magnitude within the world’s busiest two-runway airport. Wilbraham understands this better than most. A chartered civil engineer, he has worked at Heathrow for 20 years, 14 of them with the client. Former roles have included construction director on the Terminal 5 project as well as programme director on Terminal 2. Before heading up the expansion team, he was development director, responsible for the airport’s capital spend decisions.

Heathrow has long been a pioneer of offsite and modular construction, but Wilbraham believes that the third runway project could develop the concept even further. The operator is planning to create four manufacturing and logistics hubs around the country.

He adds that part of the expansion team’s work this year is determining the most suitable locations for the hubs. It is currently scoping out parts of the country with strong Small and Medium-sized Enterprise (SME) manufacturing ecosystems.

“We want to create something that is sustainable for the future,” he adds. “It would be great if these hubs were still there in 20 years’ time, serving not only the needs of Heathrow but also of other clients.”

In its quest to build faster, safer and more efficient than ever before, the Heathrow expansion team is casting its net wide for best practice and innovation.

“We’re gathering information from airports around the world. There are many opportunities. We need to select the right ones and develop them,” Wilbraham says. He adds that one area under consideration is the increased use of precast concrete.

“There is a view that in-situ poured concrete is easier to do. But in America airports are beginning to use precast concrete for taxiways. We currently have a team visiting Atlanta and Chicago O'Hare airports where this type of work is being developed.”

The right innovation and skills

He also anticipates that new technology could radically transform work on site.

“Autonomous vehicles and robots may be a little too soon for our project, but I’m not ruling them out,” he says. “Our Terminal 3 already uses two robots in its baggage handling systems.”

Heathrow is a member of I3P – the Infrastructure Industry Innovation Platform. This initiative was started by Crossrail, and is now being led by the Thames Tideway Tunnel.

“Our approach to innovation is likely to become more structured around initiatives such as I3P, we also hope to be incorporating lots of learning from programmes such as HS2 or Hinkley Point C.”

Heathrow has set up a skills task force, chaired by Lord Blunkett, and has announced up to 10,000 apprenticeship places, for both the operation and construction of the airport, over the next 15 years.

“Wilbraham acknowledges that the amount of sharing and collaboration currently going on between major clients is unprecedented.

“While we’re coming together not only to get consistency on things like innovation, but also to be consistent in how we are approaching the supply chain, so that we are not asking for different things. We want to learn from each other,” he adds.

The UK’s chronic skills shortage is another challenge that requires industry-wide collaboration. The crisis is not only affecting the trades, but increasingly being felt in disciplines such as design, engineering and surveying.

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“There is no doubt that the skills shortage is a national issue, which we are trying to address with other clients. But he is relishing the personal challenge that the expansion project is bringing.

“This is a once in a generation project that has huge national significance. My job is to hold this programme together, remain optimistic and leave a legacy that is really exciting.”

Turner & Townsend is one of four client partners on Heathrow’s expansion programme.

“Expanding Heathrow is much more than building new infrastructure. It is about connecting the whole of the UK to growth and delivering benefits estimated at £211bn and up to 180,000 jobs across the UK.”

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Infrastructure Industry Innovation Platform (I3P)

This pioneering initiative was launched in October 2016 to energise innovation within the UK’s infrastructure industry.

It aims to provide a platform to drive collaboration and increased value across the infrastructure industry, bringing together 21 major infrastructure clients and their supply chains.

Heathrow has long been a pioneer of offsite and modular construction. The operator is planning to create four manufacturing and logistics hubs around the country.”
Successful investment in any market requires strong local expertise and on-the-ground planning, and nowhere more so than in Africa. Those planning a capital programme here must understand and adapt to Africa’s exceptional and unique challenges to access its opportunities.

With a population treble that of the USA, a fifth of the world’s oil reserves and nearly a third of global mineral reserves, Africa’s extraordinary economic potential – and the challenges it poses to those keen to unlock it – attracts and intimidates foreign investors in equal measure.

Even seasoned global players who have successfully invested in other developing markets have been caught out by unforeseen difficulties with their projects in Africa that resulted in schedule overruns and spiralling costs.

Being a frontier in a changing world, Africa can be a demanding and unpredictable region in which to invest, but there is nothing inevitable about such issues. With the right market intelligence, planning and cultural awareness, challenges can be anticipated and mitigated, but it’s essential that this process begins right at the outset.

The myth of the single African approach

Capital projects across Africa are likely to encounter similar problems, but the solutions are seldom the same. Huge cultural, linguistic, financial and political divisions separate Africa’s 54 sovereign nations, so those setting up a project should never assume that what worked elsewhere will work again.

This has also been true for neighbouring markets with a common language and similar legal systems – such as Kenya, Uganda and Tanzania – and even across different regions within the same country.

For example, an investor working in Nigeria planned to move a group of skilled welders from a project that was nearing completion to a new project in a different state within the country. The idea was to take lessons learned from the first project to boost productivity on the second project.

But differing regulatory systems between the two Nigerian states meant that when the welders got to the new site they were not permitted to work. Instead local welders had to be trained and upskilled urgently, which brought about major delays.

The investor’s understandable but mistaken assumption that regulations would be standard within Nigeria led them to a decision that would ultimately reduce the project’s efficiency by half, instead of doubling it, from the previous project.

“With the right market intelligence, planning and cultural sensitivity, challenges can be anticipated and mitigated – but it’s essential that this process begins right at the outset.”

Looking beyond logistics

Many of the challenges posed by construction projects in remote areas are obvious; the lack of power, water and road or rail networks able to bring people and materials to the site, must be identified and addressed early on.

But allowances must also be made upfront for ongoing difficulties in getting materials through ports and to the site. The average time for a consignment to clear customs at an African port is between 42 and 60 days. This compares to an average of two days in some East Asian ports. Poor road links will slow the progress of heavy loads, as can border posts – which frequently delay trucks for more than two days.

Transnational projects can be particularly challenging, as they require the project team to align the timing on approvals across countries and maintain good relationships with multiple governments that may have divergent goals and drivers.

It’s essential that investors take expert advice at the feasibility stage, on how such complex and interlocking issues might impact their project’s delivery. Without it, informed decision-making will not be possible.

Navigating shifting sands through early stakeholder engagement

Global investors may commit to a project in an African country with the backing of the national leadership, only to realise once on the ground that there are multiple layers of stakeholders with decision-making power, from provincial governors to local communities, to consider.
African trade barriers are falling
Intra-African trade holds enormous potential. If duties are lowered and incentives introduced, manufacturers could see benefit from setting up production and assembly operations in multiple African countries.

Customers are changing
With the growth of Africa’s middle class, there is a development of new expectations. Educated, urban professionals are young, brand-aware and sophisticated in terms of their consumption.

Digital transformation
Africa leads the world in mobile adoption, which continues to offer the biggest cross-sectoral economic opportunities. Mobile payment networks, pioneered in East Africa, opened the wired, global economy to city and rural dwellers.

In-country experts should be engaged at the very earliest stages to communicate with those communities, through someone who understands the local language and culture. Communities need to know what the project involves, how they will be involved and what legacy will be left behind.

For this reason, investors should make time at the very earliest stages to communicate with those communities, through someone who understands the local language and culture. Communities need to know what the project involves, how they will be involved and what legacy will be left behind.

Distribution of risk is another sensitive contractual issue. While it is understandable that a client moving into a new market may want to transfer all risk onto the contractor, it is not always achievable in Africa.

Investors should instead work with consultants who have regional expertise to create an equitable contractual relationship with the supply chain, where the risks are shared appropriately and allocated to those most able to manage and mitigate them.

Risk mitigation and setting up for success – starting early is key
In this changing world, Africa’s huge, untapped potential offers an attractive proposition to foreign investors but the key is understanding how to deliver successful projects there. There are many success stories among those who have already taken the plunge. While no two projects will ever be the same in such a huge and diverse region, some themes are universal:

Investors should ensure their project team has the right commercial, project management and soft skills alongside the technical ones
In-country experts should be engaged at the earliest possible stage of the project, and certainly by the time technical design work begins
More upfront effort with logistics planning, stakeholder engagement and contracting strategy is required during project set-up than in other markets, but this need not mean an uplift in overall project costs

Given that failure to set up properly and early enough may add exponential risk to the project, such upfront investment is vital not just for risk mitigation, but also to deliver a successful outcome and maximum reward.

The continent is exceptional in many ways – and certainly in both the scale of its opportunities and the complexity of its challenges. The best way to secure the former and overcome the latter is with the help of world-class local expertise and pragmatic, on-the-ground planning right from the feasibility or even concept phase of a capital programme.

For more information contact
mark.haselau@turntown.com

Predicted GDP hotspots in Africa in 2018

Source: International Monetary Fund
www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD

2018 - prediction from IMF
1. Ghana - 8.4 percent
2. Ethiopia - 7.5 percent
3. Rwanda - 7 percent
4. Senegal - 7 percent
5. Tanzania - 6.8 percent
6. Mozambique - 6.7 percent
7. Kenya - 6.5 percent
8. Uganda - 6.9 percent
9. Zambia - 5 percent
10. Botswana - 4.3 percent

www.weforum.org/agenda/2016/05/6-reasons-to-invest-in-africa/
Turner & Townsend is an independent professional services company specialising in programme management, project management, cost and commercial management and advisory across the real estate, infrastructure and natural resources sectors.

With 97 offices in 41 countries, we draw on our extensive global and industry experience to manage risk while maximising value and performance during the construction and operation of our clients' assets.

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