Cycling and other forms of active travel are on the increase nationally, but there are growing concerns over the safety of vulnerable road users and the over-representation of large construction vehicles in collisions that have serious and sometimes fatal outcomes.

To address this issue, a variety of stakeholders have collaborated in a construction industry-led initiative – Standard for construction logistics: Managing work-related road risk – designed to reduce the risk of a collision between large goods vehicles in the construction sector and vulnerable road users, such as cyclists and pedestrians.

**Issue:** Cyclists, pedestrians and the large vehicles required for construction projects are sharing the roads more than ever. Where the numbers of people walking and cycling are growing in parallel to higher levels of development and associated construction activity, there is increasing pressure on already constrained road space leading to the potential for conflict.

**Growth in active travel:** Cycling is on the increase nationally, but the increase has been particularly notable in London where cycling has almost doubled since 2000. There are now nearly 600,000 cycle trips made each day with numbers rising each year. However, this growth has been coupled with concerns about cycle safety and there have been particular concerns about the over-representation of large goods vehicles in collisions with cyclists and pedestrians that have fatal and serious outcomes. Nationally, large goods vehicles over 3.5 tonnes are involved in approximately 15% of cyclist and 10% of pedestrian fatalities.

**Addressing the challenge:** To address this challenge, a review was undertaken of the construction logistics sector’s transport activities with the aim of understanding the causes of collisions with vulnerable road users and how they may be prevented. The outcome highlighted issues with the way Work Related Road Risk (WRRR) was managed across the industry and raised concern over the limitations of current construction vehicle cab design with regard to minimizing blind-spots.

The Institution of Civil Engineers (ICE) was among a variety of industry stakeholders who contributed to create a common set of Standards for Construction Logistics, including heavy goods vehicles (HGVs), which are intended to improve safety for all road users. Published by Transport for London, the WRRR requirements represent a key step in demonstrating the commitment of construction logistics industry organisations to improving road safety.

Embedding work-related road safety in our culture is critical if we are to develop the skills and capability to manage and embrace population growth and travel demand throughout the UK.

**Recommendation:** The work to improve standards of construction vehicle design and practice must persist, and continued engagement among Transport for London and construction industry stakeholders will be ongoing to further improve the safety provision for all road users. The Institution of Civil Engineers urge all involved with construction logistics to consider the WRRR requirements, and evaluate their own practice and how the standard promoted could improve their organisation’s performance in this area.

For further information please contact Adam Kirkup, Innovation Executive, Engineering Policy & Innovation, Institution of Civil Engineers, One Great George Street, London (020 7665 2262; E-mail: adam.kirkup@ice.org.uk).

Our sponsors:

- Loughborough University
- The Royal Academy of Engineering
- HR Wallingford
- The Institution of Structural Engineers
- ICE

Segregated traffic junction at Tottenham Court Road

Segregated cycle lane provision at Victoria, London
Low carbon and sustainable construction

Industrial strategy is about the whole of Government working in partnership with industry to set out and deliver long-term plans to secure jobs and growth. During the first year of industrial strategy, the Government and industry set out these long-term ambitions across five themes: skills, technologies, access to finance, procurement and sector partnerships. Eleven sector strategies have been published, setting out long-term ambitions to ensure that the UK is in the best possible position to compete in the global race.

A s part of this whole economy initiative, the UK construction industry and Government launched Construction 2025 - the industrial strategy for construction, in July 2013. It is a partnership between the UK construction industry and the Government, and sets out a vision and four long-term ambitions of significant reductions in construction costs, time taken to complete projects, greenhouse gas emissions; and major improvements in exports. The UK has a world-class science and research base which supports the development of innovative solutions in a number of priority areas for construction. Research and innovation will therefore play a key part in helping deliver the strategy’s ambitions - including low carbon and sustainable construction.

Delivering low carbon growth: The Green Construction Board

One of the key elements of Construction 2025 is low carbon sustainable construction. The Green Construction Board, made up of industry professionals and Government, will be the key delivery body working to achieve the ambition of a 50% reduction in greenhouse gas emissions in the built environment by 2050 (against a 1990 baseline).

In addition to the well-documented environmental gains, the transition to a low carbon economy also presents the UK construction industry with terrific opportunities for growth. The global green and sustainable building industry is forecast to grow at an annual rate of nearly 23% between now and 2017.

The Green Construction Board is well placed to take this important growth agenda forward. The publication in March last year of the Low Carbon Construction Routemap creates a real focus, and provides a better understanding of the opportunities, risks and key interventions.

The Green Construction Board: Work So Far

As part of the Green Construction Board, there are six working groups to consider key issues and deliver a comprehensive programme of activity. Much of this work is supported by research and innovation projects. These include:

- Mapping of the Real Estate Life-cycle
- Incentives
-”. for effective policy interventions – this involved a comprehensive overview of the real estate life-cycle, its key participants and intervention points, with the objective of establishing the most effective points for carbon reduction policies to target.

Infrastructure Carbon Review – a joint publication by HM Treasury and the Department for Business, Innovation and Skills, aimed at making carbon a key part of infrastructure investment decision-making in the UK – whether construction, operation or maintenance. The report and supporting documents make the business case that reducing carbon reduces cost. The low carbon agenda not only brings resource and energy efficiency, but can also stimulate innovation and better solutions.

Energy Performance Gap in Non-Domestic Buildings – a situation and solutions report and promotional material for a non-expert audience on the energy performance gap. Evidence has shown that operational energy use in buildings can often be more than double the amount predicted. The project looked at how the energy gap arises and how it can be reduced.

In parallel, there is work with key cross-cutting themes that apply generically across the construction industry, recognising however that each market sector will have its own particular challenges and solutions. These cross-cutting themes are ‘Knowledge and Skills’, ‘Greening the Industry’ and ‘Promotion’.

Where has Level 2 BIM got to with infrastructure?

31st March 2014 marked the day the BIM Task Group and BSI (British Standards Institution) published the fifth in their series of seven documents to describe the process of delivering Level 2 BIM to the UK market. The programme, launched in 2011 as part of the Construction Strategy, marked its half way point with the issue of “PAS1192:3:2014 – Specification for information management for the operational phase of assets using building information modelling”. This, along with the recent completion of “COBie for All”, is clear evidence that the focus of the BIM Task Group team’s activities are on infrastructure and operations.

The process of ensuring the handover of useful data to an operator, rather than the pile of Operation and Maintenance (O&M) manuals traditionally handed over from the contractor (now joined with a BIM) has long challenged operations and maintenance businesses. The lack of up-front engagement and involvement often means that an operational strategy (see PAS55 and ISO 55000) is missing until it’s too late. The result is a complete mis-match between what is received and what is required. Through the use of the clear guidance offered by the latest documents and the use of Government Soft Landings this must become a thing of the past.

BS1192:4:2014 is due for delivery in mid-2014 and this document marks the formal standardisation of the “COBie” data format as a standard. This work builds on COBie-UK-2012 which was the first UK iteration and incorporates the work completed by the “COBie for All” team, who have extensively explored the use of COBie across the infrastructure market. Their findings and the experience from the worked examples are documented on the labs area of the BIM Task Group website (address below).

The ICE have also joined the activity and have created a BIM Action Group, which has already done much good work to ensure the needs of the infrastructure sector are addressed. Last autumn’s third ICE BIM Conference was an indicator of the progress made over the past few years, with three detailed client presentations indicating real leadership
Highway filter drains maintenance management

The presence of water on the surface or in the foundations of a highway pavement can lead to safety and structural problems with the road’s operation (for example: reduced visibility, loss of wheel adhesion, accelerated structural deterioration). The pavement and sub-surface of many UK highways are drained by highway filter drains (HFDs). These are gravel filled trenches fitted with a porous carrier pipe at the base to remove surface and sub-surface water from the pavement system. Research at Loughborough University is determining how to manage the maintenance of such systems effectively.

HFDs are typically characterised as free draining upon construction; however, over time the voids of the granular medium become partially or wholly filled due to the intrusion of fines washed from the adjacent earthworks or pavement surface. Current UK design guidance expects HFDs to have an operational life of 10 years, while within some long-term maintenance contracts (20-30 years), the hand-back requirement may include a 5-year HFD residual life at contract end.

However, there are currently no standard methods or techniques to assess the asset’s in-service performance or residual life. With no appreciation of how fouling progresses within an HFD, and with a lack of understanding of the deterioration mechanisms or a structured fouling characterisation, the assessment of operational and residual HFDs’ life is limited to subjective or generic estimations of the in-service performance. This extends to maintenance procedures that are often reactive rather than proactive. Maintenance treatment strategies normally range from scarifying the top 100mm of the drain, to full replacement of the “contaminated” filter drain material with new media.

Planned maintenance activity on the HFD network is often based on engineering judgement rather than the adoption of systematic and formalised maintenance management practices (e.g. condition performance monitoring, life-cycle cost analysis, optimisation and financial planning). The current practice, and in general the design and maintenance guidance documents, fall short of addressing the integration of performance standards, minimum acceptable levels of service effectiveness and operational / residual life. This imposes the practical query of whether the current maintenance and technical regimes enable asset managers to export the full extent of the asset’s life value or fail to address its gradual deterioration and the impact of this on the in-service performance of the drain.

To address these issues, a study is being undertaken at the Centre for Innovative and Collaborative Construction Engineering by Theodoros Stylianides under the supervision of Dr. Matthew Frost and Dr. Paul Fleming. The research is being conducted as part of the Engineering Doctorate programme at Loughborough University and co-sponsored by Balfour Beatty, Transport Scotland, the Engineering and Physical Sciences Research Council (EPSRC) and Pavement Testing Services (PTS).

The study aims to develop a maintenance evaluation and monitoring system to allow the establishment of predictive maintenance techniques for highway filter drains and of a system that allows the performance of HFDs to be routinely evaluated and monitored with the aim of improving performance and introducing sustainable maintenance thinking in the current business model. This should ensure that effective maintenance regimes are implemented and foster more-sustainable use and reuse of materials. The study aims to build on field evaluations and investigation of the performance of the asset. It will do this through a combination of destructive and non-destructive assessment of the condition of the drains, permeability and hydraulic experimentation of the fill, and evaluation of the fouling characteristics that have an impact on the in-service performance of HFDs.

For further information please contact:

Theodoros Stylianides (E-mail: Theodoros.stylianides@connectroads.com or T.stylianides@lboro.ac.uk).

Future projects such as the spectacular Twin Sails Bridge in Poole are anticipated to achieve significant efficiency gains over past traditional methods of design & construction management.

With Thames Tideway, High Speed 2, Network Rail, Water AMP programmes and a renewed focus on carbon emissions and their impact on the environment, there has never been a more important time to ensure you remain in the vanguard of the UK Engineering environment and that you are “the best digital civil engineer you can be”.

For further information please contact:

Mark Bew, Chairman HMG BIM Task Group, Chairman Building SMART UK and Director, Engineering Construction Strategies Ltd (E-mail: mark.bew@ecstrategies.co.uk) or visit: www.ice.org.uk and www.bimtaskgroup.org.

www.innovationandresearchfocus.org.uk
Enabling rapid response to flood defence breach

The ARC-Boat is an innovative remote controlled boat that is used to collect river, reservoir and estuarine data such as flow rates, depth and suspended sediment concentrations. Produced by HR Wallingford, the ARC-Boat has delivered real operational benefits for the Environment Agency in England, and helped them to quickly respond to breaches in flood defences during the storms of winter 2013/14.

HR Wallingford developed the ARC-Boat in response to a request from the Environment Agency. The two organisations worked in partnership to develop the boat, ensuring that it met the needs of end users. The ARC-Boat’s V-shaped hull was designed by naval architects to give optimal manoeuvrability and minimal air entrainment, ensuring that the data collected is of the highest quality. It can be equipped with GPS, and features a ‘moon-pool’, a sealed instrument holder with an open base, that can be adapted to carry a variety of instrumentation including Acoustic Doppler Current Proﬁlers (ADCPs), sub-bottom proﬁlers and echo sounders. The boat also has the potential to carry multi-parameter probe systems, further broadening its potential application.

The operational boat is just less than 2 metres in length, but the bow can be quickly detached from the main hull to reduce the length to 1.2 m; and as a result it will fit into an average sized car, eliminating the need for trailers or specialist vehicles. Grab handles allow it to be safely deployed from the most difficult locations and the independently controlled propellers and twin rudders deliver excellent manoeuvrability, even in the roughest conditions. The boat employs an industry standard remote control with a range of up to 200m and Bluetooth communications for data transmission to an onshore laptop.

Launched in 2012, the boat is now in use internationally, and users include the regulatory bodies such as the Water Survey of Canada, and the National Institute of Water and Atmospheric Research (NIWA) in New Zealand. In the UK, as the ARC-Boats prove their value in operation, the Environment Agency’s ﬂeet continues to grow, and they now have at least one boat in use by every area ofﬁce in England (and in Wales by Natural Resources Wales).

Environment Agency staff deployed ARC-Boats in December 2013 when storms caused signiﬁcant damage to a number of coastal structures. Among these were ﬂood defence embankments in Teesside and Lincolnshire. The Environment Agency used the boats to assess the extent of the damage to these structures, and to rapidly provide data that could inform their plans for remedial action.

In Teesside, severe weather and a storm surge resulted in the highest tide recorded in 150 years. This caused signiﬁcant damage to a ﬂood embankment at Seal Sands near Billingham, scouring a hole in the structure that was some 70-80 metres across. The breach allowed large volumes of sea water into a nature reserve listed as a biological Site of Special Scientiﬁc Interest (SSSI) and threatened local industry and residents. As the full extent of the damage to the embankment was not visible, even at low tide, an ARC-Boat fitted with an ADCP was used overnight to survey the area in around an hour at high tide. The data collected was used by staff on site to produce a 3D map of the hole. This enabled the Environment Agency to act swiftly and effectively to repair the damage. Initially, Chincuk helicopters were enlisted to bring in construction materials. Later a temporary road was built to provide access by land.

“In the past, this type of survey would have been conducted by a team from a boat using instrumentation mounted on poles,” explains Nick Everard, Technical Adviser in the Environment Agency’s Hydrometry & Telemetry team. “In both Teesside and Lincolnshire the deployment of the ARC-Boat was a great success. It allowed us to carry out surveys very quickly and to collect high quality data that let us take swift action to protect these areas. Importantly, our staff could stay safely on land throughout.”

For more information please contact Dr Keith Powell, Director, HR Wallingford (01491 835381; E-mail k.powell@hrwallingford.com).
Young Researchers’ Conference – showcase of structural engineering research

The Young Researchers’ Conference is hosted every year by The Institution of Structural Engineers to develop awareness of the importance and potential of research in advancing structural engineering.

 Held on the 5 March 2014 at the King’s Fund, London, this year once again saw students join industry professionals and academics in a showcase of the very best work young researchers have to offer.

The event focuses on the next generation of structural engineers who are enthusiastic about structural engineering and ready to make their mark in the industry.

We were especially pleased to have Molly Stevens, Professor of Biomedical Materials and Regenerative Medicine at Imperial College London, as our keynote speaker to open the day. Molly is a leading light in biomedical engineering and gave a fascinating talk on materials that she and her multi-disciplinary team are designing to help heal the human body.

The Chairman, Professor Tim Ibell, Institution Vice-President and Associate Dean at the University of Bath, then invited nine previously selected young researchers to give 15-minute oral presentations throughout the day. Sixteen other young researchers presented their posters informally over an extended lunch.

For the first time the event was opened up to other researchers, academics and practitioners who are interested in structural engineering research. Ed Clark, Director of Arup’s Building Engineering Group, agreed that it was a highly motivating conference. He said: “It’s great to attend this event. It’s truly unique, as one of very few opportunities we have as industry professionals to connect with researchers and see how their work reflects our own thoughts about the direction of structural engineering. It’s interesting to see how industry trends are reflected in the presentations. This event is a really stimulating day out and makes you ask the old question again: does the industry drive research or research drive the industry?”

Prizes from a fund of £2,000 were awarded to the best oral and poster presentations of the day. All the winning presentations, plus conference proceedings showcasing all delegate projects, are available on the Institution website at www.istructe.org/yrc. The prize-winning presentations were on the following topics:

**Oral category**

- **1st prize**: ‘Behaviour of cold formed steel portal frames in fire’, by Ross Johnston of Queen’s University Belfast.
- **2nd prize**: ‘Lifetime extension of reinforced concrete slab-on-beam structures’, by Monika Grusova of University of Bath.
- **3rd prize**: ‘Combined predictive structural finite element and musculoskeletal modelling of bone structure for study of fracture under solid blast conditions’, by Claire Villette of Imperial College London.

**Poster category**

- **1st prize**: ‘The synergistic response of structures to thermal and blast loading’, by Laurence Clough of University of Southampton.
- **2nd prize**: ‘Shear strengthening of reinforced concrete slab-on-beam structures using externally bonded FRP fabrics’, by Robert Foster of University of Cambridge.

Leroy Gardner, Chairman of the Institution’s Research Panel, presented the prizes and commented that: “The conference is a marvellous opportunity for these students to get their work into the public eye, and perhaps be exposed to questions that their PhD supervisor might not ask. There is always a terrific, lively atmosphere based on the exchange of ideas, which is tremendously motivating.”

The event was supported and sponsored by Arup, Atkins, Flint & Neill, Laing O’Rourke, IABSE British Group, Institution of Civil Engineers, Oasys Software, Ramboll, S-FRAME Software, TRADA, and the Institution’s own Research Fund.

If your firm would be interested to be associated with next year’s event, please contact Peter Welland (Peter.Welland@istructe.org).

For further information about the event please contact Laura Kirk (020 7235 4535; E-mail: laura.kirk@istructe.org).
Big scanning on a small scale

Understanding the way waves, currents and sediments interact with coastal structures, and the potential impact they can have, is far from simple. 3D laser scanners are helping coastal engineering specialists at HR Wallingford improve the design of such structures.

HR Wallingford works with organisations around the world to solve problems involving water and its interaction with structures and the environment. In many cases, their engineers and scientists apply advanced computational models to investigate these issues. When it comes to structures in the coastal environment, however, the complexity of the processes involved means that scaled physical models still have a critical role to play.

At the organisation’s world-leading physical laboratories in Oxfordshire, UK, physical modelling facilities extend to over 15,000 m². Seven years ago their engineers and scientists began to explore the use of terrestrial laser scanners; today they have been adopted as standard practice.

Breakwaters are structures built to protect coastal infrastructure from the forces of waves. These structures vary in size and composition – at some of the world’s largest ports they can be over 4 km in length. Building a breakwater of any size involves a significant capital investment, and mistakes are costly to fix when problems occur post-construction. Physical models are used to optimise the design of a breakwater in a low-risk environment and help to ensure that it does not fail during its design life.

“A breakwater physical model is typically built at a scale of 1:40,” explains Tom Rigden, HR Wallingford’s Coastal Structures Scientist. “This allows a structure up to one kilometre in length at full size to be built in a wave basin of 25m by 35m. The basin floor is accurately moulded to represent the sea bed so that the waves we create propagate and behave in the same way as they would at site. The model is tested under a variety of storm conditions, ranging from frequent monthly events to more extreme 1:10,000 year events to ensure the structure is able to survive.”

The action of the waves and currents can cause armour units to move around, sometimes a little and sometimes a lot. The challenge for HR Wallingford’s modellers is to quantify the extent of the movement and determine the impact this will have on the performance of the structure. Terrestrial laser scanners have had a big impact on the way that this is done and the quantity and quality of information available.

The use of terrestrial laser scanners has had a positive impact on HR Wallingford’s physical modelling methods. The improvements in the quantity and quality of the data that they obtain is facilitating new advances in coastal physical modelling.

“Analysis used to involve an intensive comparison of overhead photographs and detailed visual inspection and measurement. Several years ago we introduced terrestrial laser scanners to monitor and measure damage to the model structures,” explains Tom. “We scan a model from several locations before testing to provide baseline data. We then repeat the scans after each test. This allows a very high level of detail to be recorded about the model. Each scan point cloud contains several million points, and the point spacing of 2-3 mm allows us to identify where individual rocks (typically as small as 10-50 mm in size) have moved from and to.”

The data is used to produce a series of profiles along the breakwater. Pre- and post-test results are compared to determine where the structure has been damaged or rocks have moved and by how much. The quantity and detail of the data captured allows an accurate assessment of damage to be made, and allows reanalysis of damage to different areas of the breakwater.

“The data is interrogated to extract the information we need to draw conclusions on the model tests,” says Tom. “This can be done even after testing has finished if new areas of interest are identified. We can produce difference plots and surfaces to highlight the most vulnerable areas of the breakwater and show our client where design improvements, such as the use of larger armour, are needed to ensure the breakwater design will be successful.”

For more information please contact Tom Rigden, Coastal Structures Scientist, HR Wallingford (01491 835381; E-mail: t.rigden@hrwallingford.com).
SABRE: Scenario modelling for asset management in the water industry

Water resources, and the assets that treat and transport water and sewage, are coming under increased strain from factors such as increasing population, urbanisation and climate change. In common with all asset-intensive industries, the water industry is facing challenges of reliability and affordability, along with performance and regulatory requirements. Controlling costs and ensuring resilience and business continuity is necessary to meet customer expectations.

The in-service costs, from when an asset enters service through to its retirement or disposal, can be up to 75% of the life-cycle cost of a medium to long life asset in the water industry. Research is currently being undertaken at the University of Bath in collaboration with Wessex Water to define and test a methodology for the effective estimation of in-service costs and performance parameters for high value water industry assets. The research aims to provide tools and methods that can be used to select and direct the operation and maintenance schedule to manage assets at a strategic and tactical level. The model is being developed to allow evaluation of alternative maintenance scenarios, and trade-off analysis between cost and performance.

Modelling

The SABRE scenario modelling tool is being used to evaluate typical water industry asset scenarios, and this has been demonstrated through the development of a case study.

A group of bio-gas generators were chosen for the case study, being typical of the high-value medium-life assets employed at sludge treatment centres: they are an essential site utility, providing hot water for heating and electricity; they operate continuously; they are supported by a rigorous preventive maintenance regime; and the asset management planning objective for the generators is to maximise availability and efficiency.

Scenario modelling process:

- **SCENARIO**: Describe the scenario of interest
- **ACTION**: Describe the operation and maintenance strategy
- **BENEFIT**: Describe performance and cost benefits expected
- **RISK**: Identify risks to cost and performance
- **EVALUATION**: Evaluate risks and benefits

The SABRE scenario modeller provides a structured process to define and assess asset management scenarios. For a typical asset management activity, such as providing the optimum number of assets in order to balance required process throughput against cost, the first stage is to describe the scenario of interest, which is to ascertain the effect of increasing the number of assets within a process on cost and performance. The second stage is to identify the necessary action to affect the scenario – in this case to purchase, install and maintain additional assets. The next stage is to estimate the benefits and risks of the action, as identified through the cost and performance model. The model developed extends existing quantitative parametric life-cycle cost estimating techniques to include performance in addition to cost. The model calculates the overall cost and cost per unit of output using parameters input by the user (such as the number of assets, asset utilisation rate, time-scale for modelling, asset run hours to date).

Example output from the model illustrates the variation in estimated cumulative cost for two simple scenarios providing equivalent process throughput. The components of cost considered in this scenario are depreciation (%age of purchase and installation cost), consumable cost, major service cost (scheduled according to hours run), preventive maintenance cost (according to manufacturer’s recommendations) and corrective maintenance cost (following failures).

The final stage of the SABRE process is to compare the output for all possible combinations within the specified scenario, and evaluate the overall cost and performance to arrive at strategic or tactical decisions.

Conclusions

The use of modelling approaches has been shown to offer benefits for the management of assets, providing decision making support at tactical and strategic levels, thus enabling informed decision-making for the management of assets. Wessex Water have identified potential applications for modelling, such as setting budgets, benchmarking, activity planning, planning for new investment, and comparison of alternative technologies.

Further model development is continuing to provide a robust and comprehensive means of addressing these aims.

For further information please contact Dr Helen Cornwell, who holds a Daphne Jackson Trust Fellowship funded by the Royal Academy of Engineering. For more information please contact Angus Baker (E-mail: Angus.Baker@raeng.org).
Standards for ‘Smart Cities’

‘Smart Cities’ are increasingly promoted as a potential solution to all kinds of problems associated with urbanisation. The concept relies on making innovative use of data sources across the city to achieve specific outcomes: better services that can improve a citizen’s quality of life, for example, or more efficient transportation that could reduce the city’s environmental impact. How can we help city leaders unlock this data to deliver their aspirations and demonstrate value for money to citizens and investors alike?

One urgent task is to help cities determine the outcomes they want to achieve so that people know what is on offer. Innovators can explain the benefits of their solutions and city authorities can spend public funds with confidence. Voluntary consensus standards provide a powerful tool to share good practice, providing agreed ways of doing things are published openly.

British Standards Institution (BSI), as the UK’s national standards body, was commissioned by the Department for Business, Innovation and Skills to identify where good practice can help cities plan, procure and implement smart technologies. One of the first standards (PAS 181), published in February this year, provides a framework to guide decisions on how to create smart cities. Other standards will cover an overview of the concept, a common vocabulary (PAS 180), and guidelines on planning. These good practice standards will help cities develop smart projects designed around citizen’s needs.

To deliver these projects, cities will need a holistic view of the information that is available across the city, much of which will come from buildings and infrastructure assets. From 2016, all public sector construction projects in the UK will use Level 2 Building Information Modelling (BIM) to manage information in the delivery phase. As cities become smarter, the information and data gathered will go beyond the delivery to the operational and maintenance phase. Standards such as the BIM standard PAS 1192-3, which covers data transfer processes between these phases, as well as throughout the life-cycle of an asset will be critical in specifying how this data is captured and should lead to significant cost savings in the way the assets are managed.

Cities will want to integrate this data with other sources of information, such as GSM data and local authority databases. This will require new data protocols and interoperability standards. As a first step, BSI is developing a smart city data concept model (PAS 182) that will allow data from different sources to be compared and analysed. This is a rapidly growing global market, estimated to be worth around $400 billion per year within a few years. The strategic approach taken by the UK towards smart city standards has led directly to an invitation to chair a new international advisory group on the overall standards landscape that cities and industry urgently need. Bundling the UK’s world-leading smart city standards with other UK initiatives, such as the Technology Strategy Board demonstrator projects in Bristol, Glasgow, London and Peterborough, is a vital step towards creating a ‘UK brand’ for future cities.