



On Monday 3 February 2014, Professor Andy Pike, Deputy Director of iBUILD, gave oral evidence to the House of Commons Communities and Local Government Select Committee Inquiry into Fiscal Devolution to Cities and City Regions. The second oral evidence session examined the process of devolving powers, governance, business rates and borrowing; equalisation and redistribution; and non property taxes.

For further information about the iBUILD programme visit our website: [www.ibuild.ac.uk](http://www.ibuild.ac.uk) or contact :

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## Infrastructure Business models, valuation and innovation for Local Delivery

This is the first in a series of quarterly updates that provide brief summaries of the news, progress and direction from the iBUILD Centre.

The iBUILD Centre brings together a multi-disciplinary team from Newcastle, Birmingham and Leeds Universities that includes leading researchers in systems analysis, civil and infrastructure engineering, business modelling, economic analysis and social science, alongside an extensive stakeholder group.

The iBUILD Centre is developing a suite of alternative infrastructure business models, adapted to a range of circumstances, to improve the delivery of infrastructure systems and the services they provide.

Our research programme is focusing on the scale of neighbourhoods, towns and cities where infrastructure is most dense and interdependencies between infrastructures, economies and society are particularly profound. Furthermore, as cities, local authorities and local enterprise partnerships are given more powers for infrastructure delivery and to raise finances it is crucial to develop robust new business models to develop infrastructure related business and growth locally - to the benefit of the nation.

Our recently updated website gives further details of the scope of the iBUILD work programme: [www.ibuild.ac.uk](http://www.ibuild.ac.uk)

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Recognising that a 'one size fits all' approach is not appropriate, the iBUILD Centre will produce a portfolio of alternative business models that are suited to a range of different circumstances. However, the motivation behind each business model will be to enable a step change in the Value-Cost proposition of infrastructure delivery by:

(i) Reducing costs of infrastructure delivery by understanding and exploiting the technical and market opportunities that emerge from the increased interdependence of modern infrastructure systems.

(ii) Improving the creation, delivery and capture of the value infrastructure provides by identifying and harnessing the social, technical, environmental and economic opportunities.

(iii) Recognising that no infrastructure is disconnected from its surroundings and local scale priorities must be reconciled with regional and national strategic needs by considering local↔local, local↔national and local↔international interactions.

To ensure these business models are not just abstract concepts, we will work closely in partnership with an extensive stakeholder group from academic, private, public and voluntary sector organisations to test and demonstrate the effectiveness of alternative



## The need for new business models to maintain UK infrastructure resilience

David Dawson describes and explains how the recent storms have impacted upon the iconic London-Penzance railway line.

iBUILD Deputy Director Stephanie Glendinning was part of a delegation of 14 leading UK Future Cities experts who participated in a knowledge exchange visit to the USA from 28 January to 7 February 2014. The mission was co-organised by the Science & Innovation Network and the Technology Strategy Board; the delegation visited Chicago, San Francisco and New York. A number of themes emerged from the mission that complement the themes of the iBUILD Programme; Stephanie highlights some of these with examples:

**Governance and Politics:** Different forms of City Governance structure have emerged as critical to enabling innovation to be implemented. There was much debate about the relative benefits of local vs national governance structures between the US and the UK and the role of City Mayors. Furthermore, it was evident that politics strongly influenced the decision making of local and national leaders and the more complicated the governance structure, the greater the mix of politics and the more inhibiting to innovation. *Cont....*

This winter the news headlines have been overrun with stories of transport problems on the rail network due to coastal flooding and rising river levels, and this has prompted national debate over resilience of our infrastructure along with the response of local communities to the impacts of flooding. One of the headline stories has been the collapse of the London-Penzance railway line at Dawlish in Devon, leaving the region without a main railway connection to the rest of the UK. These storms have highlighted the urgent need for new business models.

iBUILD researcher David Dawson, from the University of Leeds, is an expert on this stretch of railway line which he has been studying since 2006. He was contacted by regional and national media on a number of occasions in reaction to the event of 5

February. The following is adapted from an article he originally prepared for 'The Conversation' and considers how iBUILD is working to address some of the challenges.

The assault on British coastlines by storm, flood and sea this winter is a taste of things to come. Rising sea levels and a greater risk of coastal flooding are a significant threat. Britain is an island nation, and a great deal of important and expensive infrastructure, from ports and harbours to power stations and industry, lies along the coast. Roads and railway links are also vital—some entire coastal regions' economies depend on key highways or rail links.

### Exposed infrastructure

The coastal section of the London-Penzance railway line that runs between Dawlish and Teignmouth in Devon is a perfect example and exemplifies many of the challenges that iBUILD is seeking to ad-

dress. As the main railway connection for the southwest of England to the rest of Great Britain, it is a vital transport link for the Devon and Cornwall economy – and thus a particularly acute example of the economic and infrastructure interdependence that iBUILD is researching. Several sections of railway embankment have just been destroyed by storms, leaving tracks hanging suspended in space over the waves and may not reopen until mid-April.

Just a few metres above mean sea level, the line has been susceptible to frequent closure during high seas and storms ever since it opened in 1846. The past 30 years have seen the problem worsen, coinciding with rising sea levels, but the current damage is the most severe in its entire 178 years of service. It is currently estimated that the sea-level will rise 5-7cm between 2010-2020, which by my calculations could double the amount of disruption on the line. By 2050 services could



### Rising tides

With sea levels set to rise over the next century, these extremes could become more severe and frequent. Around 1200km of UK coastline, around a third of the total coastline of England and Wales, is protected by sea defences such as sea walls, rock armour, and breakwaters to protect coastal communities and the services upon which they depend.

It is not a case of if, but when, the railway will be lost completely to the sea. It is vital that the region prepares for this eventuality, and although Dawlish is arguably the most iconic coastal railway, others in North Wales, northwest England and in Scotland already face similar challenges (for example in 1990 the British Rail embankment and sea defences failed inundating Towyn).

### Living with change

Flood defence investment, like many other public infrastructures, has been reduced and further cuts are

expected – although the recent event may reverse this trend. In the South-west, plans to re-route the line have been dismissed as too costly. Taken from a purely transport economics or engineering perspective this may well be correct, but this evaluation does not take into account the wider socio-economic and environmental benefits of transport connectivity, such as access to employment, productivity gains, increased business opportunities and improved quality of life.

Improving how the wider socio-economic values of transport, flood risk management strategies, and other infrastructure can be captured in terms that are meaningful to decision-makers is a major theme of iBUILD. Without investment, the future of Britain’s transport infrastructure services are at risk of failure and collapse, just as surely as the Dawlish-Teignmouth

stretch of railway. The cost of clawing back from that eventuality will far outweigh the high costs of early intervention and adaptation – yet current business models fail to capture these longer term benefits. A key objective of iBUILD is to propose a range of new business models that may help unlock these benefits and identify potential financing and funding mechanisms to deliver infrastructure.

**‘this evaluation does not take into account the wider socio-economic and environmental benefits of transport connec-**

High profile and costly infrastructure such as HS2 and Crossrail often steal the limelight. However, as we are doing in iBUILD we must take a wider systems perspective of our transport infrastructure across a range of scales – recognizing the importance of local and regional infrastructure and the service it provides locally and to the wider UK economy, health and wellbeing.

## iBUILD News Cont.

**Clear identification of assets, including natural assets of a city as the basis for growth:** Examples were given of cities in the mid-west of the US who are struggling to revitalise after the economic crash. One particular example of note was *Milwaukee who are using* natural assets as economic drivers/revitalisers (urban ecology centres) which is a win-win for environment and economy. An example was given of an over 60 acre stormwater park, which creates an environmental asset whilst freeing up flood-protected land for businesses (re)locating to the city who all have to contribute to its upkeep, therefore making it sustainable.

**Open innovation plus open data provide much opportunity for creating new business models and new business start ups around smart infrastructure**

There was much talk in all three cities around open city data and how it is being used by cities, researchers and private business. Integration of multiple data streams enables identification of new business models to fund smart infrastructure (identified as key enabler for Smart Grid company in Chicago).

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iBUILD co-investigator Chris Baker is on the move...to the Technology Strategy Board-sponsored 'Transport Systems Catapult'. Chris is taking up a one-year, part-time post as Senior Research Fellow at the Milton Keynes-based Catapult, bringing academic input to a number of projects, including the development of the proposed National Transport Model. Chris, whose current research interests include vehicle aerodynamics, wind engineering and transport resilience, with particular reference to the railway sector, will be spending three days a week at the Catapult, while maintaining his role on iBUILD.

Says Chris, "My iBUILD work is focused on investigating and modelling infrastructure dependencies and interdependencies. The results will be used, together with systems engineering techniques, to explore the potential impact on existing infrastructure, of the arrival of HS2 in the centre of Birmingham. I can see strong synergies between my Catapult and iBUILD activities".

For further information, Chris can be contacted on [c.j.baker@bham.ac.uk](mailto:c.j.baker@bham.ac.uk)

## Upcoming Events

### • iBUILD National Stakeholder Event

The second iBUILD stakeholder event will take place on Wednesday 2 April in Newcastle. Here there will be an opportunity to hear about progress that has been made in the project in particular around analysis of City Deals for infrastructure financing, innovative business models for urban heat networks and our latest thinking on what infrastructure business models comprise. There are also opportunities to co-create and explore aspects of our work programme through several interactive workshop sessions. Speakers at the event also include Chris Murray, Director of Core Cities and Kathryn Vowles from Balfour Beatty.

*Further details including the programme for the day and how to register can be found at: <http://www.ibuild.ac.uk/newsevents/ibuildnews/ibuildstakeholderday.html>*

### • Recent or forthcoming iBUILD outputs

1. Analysis and interpretation of the term, 'infrastructure'
2. The iBUILD definition for Infrastructure Business Models
3. Sandham, R, Bower, D and Madter, N. 2014 (in print). Infrastructure Routemap: reflections on the first year. Journal of Infrastructure Asset Management, ICE publishing, March 2014.
4. A methodology to develop common framework for classifying and analysing infrastructure inter-dependencies

### • Undermining Infrastructure: avoiding the scarcity trap

Final meeting of the EPSRC Undermining Infrastructure Project: Thursday 13 March.

The UI project goal was to model and quantify the requirements of critical materials and rare metals in the UK's planned low carbon infrastructure. At this even the team will present the project's outcomes, its relevance to ongoing policy debates in the UK and beyond, and challenges for future research. This work has significant links to iBUILD Work Package 2.3 (whole life design and re-use of infrastructure components). Achievements from the project include: a novel stocks and flows modelling approach to low carbon infrastructure (Busch et al. 2014); dynamic and comparable metrics of critical materials used in low-carbon energy technologies (Roelich et al. 2014), and a new general framework for the assessment of technology design encompassing local performance with global consequences (Dawson et al. in review).

Register at: <http://sureinfrastructure.leeds.ac.uk/ui/workshop/>

### • Urban Integration Symposium

Richard Dawson and Oliver Heidrich have been leading a European COST Action Network on Urban Integration. The final symposium for this project is taking place in Sheffield, 6-7 March. Please visit the conference website at <https://blogs.shu.ac.uk/urbanintegration2014> for more information, or email Richard to request a copy of the final report of the COST Action.

### • ITRC Conference: Future of national infrastructure systems and economic prosperity

iBUILD team members Andy Pike, Peter O'Brien and Tim Foxon, will be presenting papers, and Expert Advisory Board member Geoffrey Hewings will be giving a keynote presentation at this event being held at St Catharine's College, Cambridge, 27-28 March.