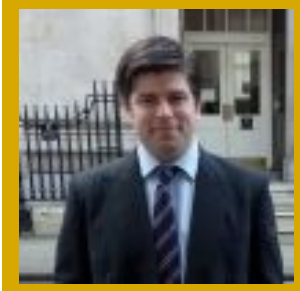
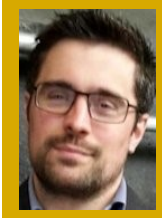
ISSUE
05
May
2016

At No. 9



iBUILD Director Professor Richard Dawson (Newcastle University) was invited to No 9 Downing Street to meet with Oliver Letwin MP to contribute to his review of National Flood Resilience. The review was established following Storm Desmond and the 2015/16 winter floods, and is looking to assess how the country can be better protected from future flooding and increasingly extreme weather events. Richard also leads the Infrastructure Section of the UK Climate Change Risk Assessment which will report to the Committee on Climate Change on later this year. https://www.gov.uk/government/news/national-flood-resilience-review-government-action-to-tackle-floods

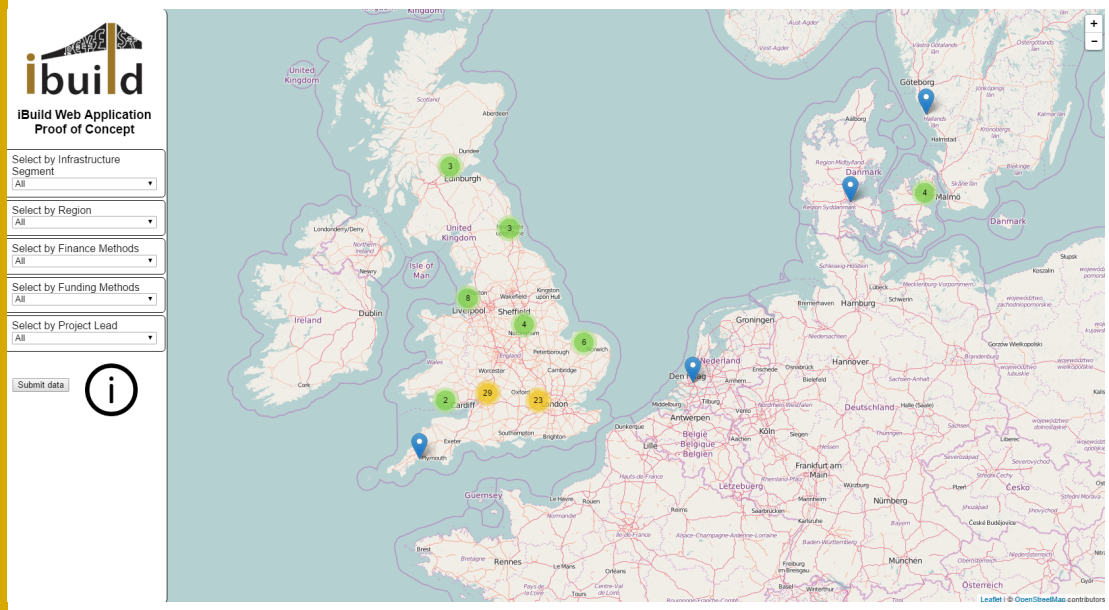
Fellowship Success



Stephen Hall, University of Leeds has been awarded an EPSRC fellowship. Stephen will continue his work on Infrastructure interdependency and complex value business models. This research will consider two examples of the complex value problem for climate change mitigation in cities: (i) systemic links between electric vehicles, cities and electricity networks; (ii) the link between green infrastructure systems and urban heat networks will be explored.

Business Model Web Tool

http://ceg-research.ncl.ac.uk/ibuildDemo/



Everyday living depends on being able to access local infrastructure of all types – bridges, libraries, broadband access, light rail, water, power, etc. Business models play a critical role in the creation and management of all types of local infrastructure. A business model balances funding (revenue) with financing (investment). Reductions in local government expenditure are challenging the existing ways in which infrastructure is financed and funded. iBUILD has undertaken the first rigorous and objective analysis of the business models developed to create local infrastructure. This is an important topic; understanding the diversity of business models provides a valuable tool to support the development of new and alternative infrastructure business model development. It is critical that infrastructure providers understand the diversity of financing and funding that is available to support local infrastructure. iBUILD has identified all financing and funding types that are used to support the development of infrastructure and has developed a tool that can be used to explore the most appropriate financing and funding solutions for an infrastructure development. This tool or infrastructure business model conceptual framework is based on the analysis of over 140 infrastructure business models, including current, historical and planned developments across the UK and internationally.

The iBUILD on-line local infrastructure tool allows free access to anyone interested in developing or understanding local infrastructure business models.

This tool provides an analysis of over 120 existing business models to show the different ways in which solutions have been developed to the financing and funding of local infrastructure. These solutions include conventional and more radical or alternative solutions. Infrastructure providers are able to use this tool to understand the complex solutions that have been developed to finance and fund local infrastructure in different contexts. Users are able to search by infrastructure type of financing and funding mechanism as well as the companies and organisations responsible for the development of the business model. This tool illustrates the ways in which local infrastructure requires a blend of financing and funding inputs. It also shows the critical importance of funding or revenue streams to support financial investment but also long-term maintenance and renewal.

Do you know of a local infrastructure business model that is missing from our database? If so, please upload some basic information on our website:

http://ceg-research.ncl.ac.uk/ibuildDemo/

New iBUILD Team Members

Jonathan Ward is a PhD student at the University of Birmingham.

Jonathan has experience in multi-disciplinary research and delivering sustainability and climate change projects in local government and third sector. Originally a Research Assistant at the Human Radiation Effects Group (Bristol), Jonathan switched to the environment and social change to impact upon policy. Jonathan has also worked with LEPs and economic regeneration, developing European Funding projects to assist small businesses in the low-carbon economy, including energy efficiency retrofit packages.

Jonathan's research focus is on incorporating and understanding the digital technology impacts upon human interactions in city system models, including socio-physical connections, in relation to Smart Cities and future infrastructure development.

First announcement

On 13-15 February 2017, iBUILD will be organising a 3-day conference on valuing infrastructure. This will take place in Leeds. More details in due course.

UK Collaboration for Research in Infrastructure and Cities (UKCRIC)

All three iBUILD Centres are involved with the new £138m capital investment, UKCRIC. Newcastle University will host the water laboratory, University of Birmingham, the buried infrastructure laboratory and the University of Leeds, the material laboratory.

In Newcastle, the funding is being used to establish a new state-of-the-art urban water facility at Science Central – Newcastle's flagship project which brings together academia, the public sector, communities, business and industry to create a global centre for sustainable innovation in the heart of the city. Population growth, extreme weather events and changes to the way we live and work are creating new challenges which demand a revolution in our infrastructure thinking if we are to respond in a sustainable manner. The new facility will provide and enable an internationally unique experimentation and testing of new 'smart' technologies and urban flood management features. Given its co-location on the Science Central development site there is opportunity to integrate these new urban water infrastructure facilities into equivalent urban infrastructure testbeds for energy, transport and ICT that are already under development as part of Newcastle University's investment on Science Central. This will provide an improved understanding of the critical infrastructure systems that we rely on to improve our health, safety and quality of life.

This investment in research infrastructure has been informed by, and will be aligned with, several iBUILD case studies (e.g. green infrastructure, smart grid and electric vehicles).

The UKCRIC National Buried Infrastructure Facility (NBIF) at Birmingham is centred around a £27.6m laboratory facility to test buried infrastructure at and near full scale. Developments thus far have focussed on three key threads: (i) strategy and programme scoping, (ii) collaboration events, and (iii) user engagement and brokerage. Four strategically-themed, high-profile workshops aimed chiefly at a small group of leading thinkers have been held with a brief to think widely on aspects of buried infrastructure systems, sensors, the TRAIN Rig (a 1/25 scale model of a train travelling at full speed for researching train aerodynamics), and geo-structures, dealing with today's problems and cities of the far future in equal measure. The workshops provided the basis for collaboration by encouraging creative thinking, thus beginning the process of developing projects around current pressing challenges. Throughout, engagement with industrial and university partners has been actively pursued to build partnerships that will facilitate long and fruitful research collaborations.

University of Leeds will host one of the Centres for Infrastructure Materials. Their existing Infrastructure Materials Exposure Facility, which is a field exposure site and controlled environment chambers for natural and accelerated ageing of the full range of infrastructure materials., will be refurbished and upgraded. This will form a networked facility for underpinning materials research. With Imperial College London and University of Manchester.

Science Central: location of Newcastle's UKCRIC laboratory

Art Commissions

iBUILD have teamed-up with project partner Tipping Point to develop a series of art projects that explore the way we deliver infrastructure .

A multi-disciplinary group of artists and researchers were brought together by iBUILD and TippingPoint at an intensive two day event held in June 2015 to begin the process of exploring the relationship between art and infrastructure. The event yielded the following six projects:

Inside-Out house: a research and development project into building an inside-out house that reveals the infrastructure behind an average home.

Repertoire: a project exploring sustainable infrastructure decision-making through creative practices.

MiBody: a research and development collaboration aimed at creating an iconic sculptural interpretation of national infrastructure represented through the homeostatic systems of the human body.

SILVa: Soft Infrastructure for Local Value: considering how creative practice can engage Science Central's neighbours in identifying different forms of sustainability value from proposed infrastructure initiatives.

Mean Street: researching and promoting the stories of a street in Leeds and its varied communities and users, looking at its value in personal terms.

iMAP the neighbourhood/Streets on show; a multi layered residency: aims to gain an understanding of our community by creating over-layered maps of the complete infrastructure through community participatory activity with artists and engineers.

Mark Powell has been involved in four projects and here describes two recently completed.

The SiLVA Project (Soft infrastructure for Local VAlue) considered the relationship between public stakeholders and the development of Newcastle's Science Central, and specifically the University's Urban Sciences Building (USB). While currently an empty space, the SiLVA Project examined the changing relationships and experiences of people living on the site's perimeter.

Two central objectives of SiLVA were to firstly explore the possible contribution that creative practice can make to environmental sustainability and, secondly to identify different kinds of value prompted by new infrastructural investments. One of the project outcomes was a list of ten good practice principles clustered around how to develop good neighbourliness, the suggestion being that investing in the social dimension of the local neighbourhood of Science Central is fundamental for ensuring local urban sustainability. Led by Teo Greenstreet, the project team included Beth Ramsey, Ruth Leven, Shanaz Gulzar and Llana Mitchell.

The Repertoire Project, also recently completed, focused on understanding the dynamics of decision-making and infrastructural development. This project was inspired by a presentation at the sandpit from Zoe Svendsen describing decision-making processes and insights generated by the theatrical production 'World Factory' http://www.youngvic.org/whats-on/world-factory. [Zoe worked in association with Simon Daw and Zhao Chuan http://metisarts.co.uk/world-factory/).

The Repertoire Project considered the value of applying theatrical approaches to iBuild decision theatre research. A theatre approach differs to performance methodologies in that a theatre approach to decision-making will not involve participants in role-play. Instead, a theatre approach centres on incorporating a degree of play and imagination into decision-making by referring to case studies that, while perhaps containing familiar infrastructural tensions, do not have the same local resonance for participants. This detachment allows theatre participants to reframe various tensions and discover new ways of resolving contentious decision-making situations by opening up alternative value models.

The project developed a collection of new 'props' to prompt this playful dynamic. A very successful example of this was the prototype of a large-scale floor map designed to aid the presentation of different viewpoints and environmental perceptions. In addition to Mark Powell, the project team included Teo Greenstreet, Zoe Svendsen, and prop maker Sarah Lewis.

New iBUILD Team Members

Laura McGinty , Newcastle University

Laura has both a BA in Human Geography and an MSc in Sustainable Communities and Environments from Sheffield Hallam University. With a particular interest in sustainable transport and the role of natural functions in built environments, she went on to work for the sustainable transport charity, Sustrans: spending four years in their research team. Laura then moved to the Royal National Lifeboat Institution as a statistical analyst. Here she managed a project transforming use of data within the charity, as well as helping shape the monitoring and evaluation strategy for drowning prevention projects.

Laura joined Newcastle University in October 2015, working for a PhD with iBUILD, on *evaluation and funding of Green Infrastructure in urban areas*. The PhD will build on her academic interest in sustainability and the built environment, as well as incorporating her experience in Monitoring and Evaluation practice.

Building the Infrastructure for Regional Powerhouses

Monday 6 June 2016, Leeds

You can register to attend HERE.

New iBUILD Team Members

Amy Beierholm is a part-time project manager with iBUILD and Liveable Cities, based at the University of Birmingham. She grew up in Canada, and has an engineering background, with Mechanical Engineering and Aeronautics degrees from McGill and Caltech. Amy has worked on visual systems of flight simulators at CAE, and has been involved in hypersonic boundary layer research for the US Air Force.

Tackling Grand Challenges

Phil Purnell, iBUILD Leeds, is leading an EPSRC that will tackle the Grand Challenge of: Zero disruption from Streetworks in UK Cities by 2050 The project which also involves Chris Rogers, iBUILD Birmingham. Richard Dawson and Claire Walsh, iBUILD Newcastle are involved in a Grand Challenge project led by the University of Sheffield. TWENTY65 will address the grand challenge of providing sustainable water for all by working in partnership across the water sector to tailor water systems so that they deliver positive impact on health, the environment, the economy and society.

Upcoming Events

Building the Infrastructure for Regional Powerhouses: an iBUILD Stakeholder Event: 6 June 2016, Leeds. You can register to attend HERE.

Recent Publications

Adam, K., Hoolohan, V., Gooding, J., Knowland, T., Bale, C. S. E. & Tomlin, A. S. Methodologies for city-scale assessment of renewable energy generation potential to inform strategic energy infrastructure investment. Cities. http://dx.doi.org/10.1016/j.cities.2015.10.015

Affleck, A. and Gibbon, J. 2016. Workington: A case study in coordination and communication, Proceedings of ICE: Muncipal Engineer. In Press. http://dx.doi.org/10.1680/muen.15.00004

Caparros-Midwood D; Barr S; Dawson RJ. 2015. Optimized Spatial Planning to meet Urban Sustainability Objectives, Computers, Environment & Urban Simulation 54, 154-164. http://dx.doi.org/10.1016/j.compenvurbsys.2015.08.003

Dawson RJ (2015) Handling Interdependencies in Climate Change Risk Assessment, *Climate*, 3(4):1079-1096. http://dx.doi.org/10.3390/cli3041079

Dawson D; Shaw J; Gehrels WR. 2016. Sea-level rise impacts on transport infrastructure: The notorious case of the coastal railway line at Dawlish, England. Journal of Transport Geography, 51, 97-109. http://dx.doi.org/10.1016/j.jtrangeo.2015.11.009

Gouldson A; Kerr N; Millward-Hopkins J; Freeman M; Topi C; Sullivan R. Innovative Financing Models for Low Carbon Transitions: Exploring the case for revolving funds for domestic energy efficiency programmes, Energy Policy. http://eprints.whiterose.ac.uk/90723/1/1-s2.0-S0301421515300562-main.pdf

Hall S; Roelich KE. 2016. Business model innovation in electricity supply markets: the role of complex value in the United Kingdom, Energy Policy, 92, 286-298.

http://dx.doi.org/10.1016/j.enpol.2016.02.019

Heidrich O; Reckien D; Olazabal M; Foley A; Salvia M; De Gregorio Hurtado S; Orru H; Flacke J; Geneletti D; Pietrapertosa F; Hamann J-P; Dawson RJ. 2016. Cross-national policies and their impacts on cities strategies to tackle climate change; Journal of Environmental Management 168, 36-45. http://dx.doi.org/10.1016/j.jenvman.2015.11.043

Iacovidou E; Purnell P. 2016. Mining the physical infrastructure: Opportunities, barriers and interventions in promoting structural components reuse. Science of the Total Environment, 557-558, 791-807.http://dx.doi.org/10.1016/j.scitotenv.2016.03.098

Metje N; Ahmad B; Crossland S. 2015. Causes, impacts and costs of strikes on buried utility assets. ICE Municipal Engineer, Vol. 168, Issue 3, pp. 165-174. http://dx.doi.org/10.1680/muen.14.00035

O'Brien P; Pike A 2015. City Deals, Decentralisation and the Governance of Local Infrastructure Funding and Financing in the UK. National Institute Economic Review, 233(1), R14-R26. http://dx.doi.org/10.1177/002795011523300103

Pregnolato M; Ford A,; Robson C; Glenis V,; Barr S; Dawson R. 2016 .Assessing urban strategies for reducing the impacts of extreme weather on infrastructure networks. R. Soc. open sci.3: 160023. http://dx.doi.org/10.1098/rsos.160023

Tiwary A; Williams ID; Heidrich O; Namdeo A; Bandaru V; Calfapietrac. 2016. A novel performance index for multi-functional streetscape vegetation as part of the green urban infrastructure. Environmental Pollution 208, 209-220. http://dx.doi.org/10.1016/j.envpol.2015.09.003

Vemury C; Heidrich O; Thorpe N. 2015. Sustainable Design Education to Meet the Ever-Changing Worlds of Civil Engineering and Urban Infrastructure Systems; Indian Journal of Science & Technology, Vol 8(28), IPL0661. http://dx.doi.org/10.17485/ijst/2015/v8i28/83632

About iBUILD

iBUILD is developing new business models to improve the delivery of infrastructure systems and the services they provide.

For further information about the iBUILD programme visit our website: www.ibuild.ac.uk

EPSRC Engineering and Physical Sciences Research Council · E·S·R·C Economic & Social Research Council · Newcastle University · University of Birmingham · University of Leeds