

Introduction

Our work within the Design Innovation Research Centre, at the School of Construction Management and Engineering at the University of Reading is developing new knowledge. It works closely with the UK Building Information Modelling (BIM) initiative, working with Infrastructure UK Client Group, and Crossrail. Research is also having an impact internationally, in Europe, America and Asia. New research activities are planned for 2014.

Research outputs

Infrastructure Clients, Collaborative Teams, Information and Digital Technologies

As part of our work with the Infrastructure UK Client Working Group (IUK CWG) Collaborative Project Teams Programme, we held a seminar for major infrastructure clients on *“Information and Digital Technologies”* on the 29 November 2013. The purpose of the event was to bring together the work that has been done at Reading’s Design Innovation Research Centre, the results of a recent study at UK Power Networks and the experience of the CWG members and identify the issues that are critical in implementing information and digital technologies successfully on infrastructure projects. Presentations were given by the research team: Dr Sunila Lobo, Dr Richard Davies and Professor Jennifer Whyte; and also by UK Power Networks, Anglian Water, London Underground and Heathrow Airport with other representatives from Environment Agency, UK Power Networks, TFL, Highways Agency, Anglian Water and BAA.



University of Reading hosts international workshop on BIM

A workshop on *“Building Information Modelling”* was hosted at the University of Reading on Friday 1 November 2013, provided a forum for discussion of internationally leading research on BIM and its relationship to the international industry and policy developments. Presenters included Assoc. Professor John Messner (Penn State); Assoc. Professor Rafael Sacks (Technion University); Professor Bimal Kumar (Glasgow Caledonian University); and PhD students from Reading, Penn State and UCL. Visiting Professor Mervyn Richards, also attended, and delegates had the opportunity to take part in demonstrations using the immersive displays in the Visualization and Interactive Technologies Centre.

Working papers on Immersive Visualisation and Laser Scanning

We have published new working papers, based on the work of 2013 and 2012 summer placement students. [Working paper 6](#) is based on work by Ben Dalton, who worked on [Immersive Visualisation of Building Information Models](#) in the Design Innovation Research Centre for 6 weeks through the UROP (Undergraduate Research Opportunities Programme). His research was to investigate and produce efficient work-flows, for conversion of 3D CAD and BIM data, for use with the University of Reading’s fully immersive visualisation systems (the CAVE). The working paper series is designed to rapidly disseminate findings to industrial partners, and to ensure that the latest research contributes to ongoing policy debates. [Working paper 7](#) is based on work by John Scorgie, who worked on [Using laser scanning for data capture and BIM](#) as an EPSRC Vacation Bursary Student in 2012.

International research impact

Digital Project Delivery presentations in Washington



Professor Jennifer Whyte was invited to present at workshops in Washington, and cited as a motivation for these and for set up of the ASCE committee on Digital Project Delivery.

She presented in three sessions at the National Institute of Building Sciences (NIBS) and Transportation Research Board (TRB) conferences in Washington DC in January 2014; where there was substantial discussion of digital design interfaces, particularly the interface

between design and construction; and the implications of the supporting of 3-dimensional digital modeling in USA ‘MAP21’ legislation for the delivery of federal highways.

Interaction patterns and digital practices – Tsinghua University and CIB W78 conference, Beijing

Geyang Guo and Professor Whyte spent a week in Beijing in October 2013. Geyang presented her research on interaction patterns in digital delivery, which uses social network analysis (SNA) techniques at the CIBW78 conference on construction IT. They visited the construction management school at Tsinghua University, a top Chinese university, where Professor Whyte introduced the school's research on digital practices and discussed what makes a good PhD.



Building Safely by Design

A report on research by the team has now been launched by the Institution of Occupational Safety and Health (IOSH) – see their [press release](#), which links to the [summary report](#). The full report is also [available](#).

Forthcoming events

Great Railway Debate: How Britain's railways can meet the needs of the 21st century

This event, at 6pm on 18 March 2014 at the University of Reading, provides a briefing on the way in which the Railways are changing over the next 10 to 20 years, with the opportunity for the audience to ask questions and to express their own views. Professor Jennifer Whyte will be on the panel to talk about Digital Asset Information, discussing research on managing data from delivery into operations, alongside other speakers Rob Avery, Construction Planner for HS2; Terry Morgan, Chairman of Crossrail, Paul Newman, Network Rail. Chaired by Professor Stuart Green, this is the eighth in a series of similar events covering topics of general interest to both engineers and the general public, organised by the Engineering Institutions in the Thames Valley to demonstrate how engineering is contributing to developments in our railway system that will benefit the travelling public. For further information or to book to attend: <http://www.reading.ac.uk/news-and-events/about-event-reg-greatdebate.aspx>

Visit to University of Reading, Malaysia

Professor Whyte will visit Malaysia with senior colleagues from the School to present at a 2 day colloquium in Johor Bahru, 19-20 February, where the University of Reading Malaysia <http://www.reading.ac.uk/malaysia/> is located. Johor Bahru in the southern-most part of Malaysia, strategically located in the Iskandar Development Region. Professor Whyte will present on the team's research in both the industry day and the research day.

Other team updates

Energy Maradza and Dr Maxwell Parfitt feature in University Graduate School Bulletin



The November [Graduate School Bulletin](#) features an article on the front cover regarding the School of Construction Management and Engineering's 2013 [PhD Research Conference](#), which attracted over 250 research students from across the University. Energy Maradza, one of the Design Innovation Research Centre PhD Researchers, is pictured describing his work on BIM process standardisation in construction innovation systems as part of the poster competition. In the same [Bulletin](#) Dr Maxwell Parfitt, a Research Fellow in the Design Innovation Research Centre was featured describing his work and experience since graduating. The article describes why Dr Parfitt chose the University of Reading for his PhD studies, challenges faced in his PhD research and advice for current 1st year PhD students.

Amna Shibeika submits thesis and takes up a Research Fellow role

Amna Shibeika submitted her PhD thesis "*Diffusion of Digital Innovation in a Project-based Firm*" in December 2013 and is working as a Research Fellow in the Design Innovation Research Centre through to April. Her thesis work was sponsored by Halcrow/CH2M Hill as an EPSRC case studentship, and provides insight into: a) the evolution in the use of digital delivery technologies within a project-based firm, b) the firm-project interface and spread of systems for managing digital project data across this interface, and c) firm central support for and strategy-making about the diffusion of BIM. Amna is currently engaged in work on project-based learning within the Centre; and disseminating findings from the study. We wish her luck with her viva which is on 4 February.

Dr Sunila Lobo's award winning paper on digital privacy

Dr Sunila Lobo has recently won an award for a co-authored paper on privacy issues in Saudi Arabia. The paper titled [The BlackBerry veil: mobile use and privacy practices by young female Saudis](#) and published in *Journal of Islamic Marketing* has won an award (Highly Commended Paper 2013) from the Emerald Literati Network, 2013 Awards for Excellence.

Immersive visualization: MiddleVR tutorials online

As part of the active research on immersive visualization and its uses in construction, [online tutorials](#) have been created by Dr Maxwell Parfitt to help researchers and students bring their simulations into the University of Reading CAVE. These guide you through how to create a Unity project, import the MiddleVR configuration and deploy the simulations to the CAVE platform in full Active Stereo with head and hand tracking. Dr Parfitt will be presenting on related research at the School Seminar on the 23 January 2014.

Teaching in the BIM week

The annual MSc module on 'Building Information Modelling' was taught in the week starting 18 November. The students conducted hands-on work with Industry Foundation Class (IFC) models; engaging with BIM Protocols and Execution Plans, and standards such as Uniclass and COBIE. Convened by Professor Whyte, with inputs from Energy Maradza, Dr Dragana Nikolic, Dr Richard Davies and Professor Mervyn Richards and visiting speakers from Heathrow, Costain and Atkins. The students worked intensively in teams to use collaborative processes to deliver open shareable asset information; and they impressed us with the quality of their work on the final day. A number of members of the team are also supervising MSc and UG dissertations relating to BIM.

Other participation in industry and academic communities

- **Business Models workshops, Cass Business School** – Dr Sunila Lobo and Professor Jennifer Whyte attended a workshop 11-13 Dec, 2013, designed to share ideas on what business models are about; define common problems and important research sites; and validate an approach to the topic. Dr Lobo presented a poster based on her research, while Professor Whyte gave a short presentation on how digital technologies change business models in construction.
- **UK architecture and the built environment: value, exports and policy to deliver design excellence Keynote Seminar** – Suha Jaradat, and the Head of School, Professor Stuart Green, attended the Westminster Media Forum Keynote Seminar in London on 12th December, which discussed next steps for British architecture after the Farrell Review of the architecture profession. The Review, which will be presented to the government in 2014, is organised around four core themes: Design Quality, Economic Benefits, Cultural Heritage and Education. Issues discussed in the seminar including London-forgotten spaces; building on the past; education, talent and skills-next steps to ensuring accessibility to the profession and the policy context: delivering design excellence and improving public appreciation of the built environment.
- **COMIT annual IT conference** – Geyang Guo, Energy Maradza and Professor Jennifer Whyte attended this Construction Mobile Information Technology conference November 7, at the Institute of Physics, London. The conference was chaired by Duncan Evans of Crossrail with a keynote speech by Phil Jackson from the ICE.
- **2nd International Through-life Engineering Services Conference** – Angelos Stasis, and Professor Jennifer Whyte attended this conference in Cranfield, November 5-6, presenting two papers related to Angelos' work: *A critical examination of change control processes*, and *Configuration management in complex engineering projects* (details in list of conference papers below). These papers formed part of a session chaired by Professor Whyte, which drew together researchers on configuration management across manufacturing and construction sectors.
- **CONVR 2013: 13th International Conference on Construction Applications of Virtual Reality** – Dr Maxwell Parfitt joined Laura Maftei and Dr Dragana Nikolic, who were presenting research findings at the CONVR 2013 conference in London on 30-31 October. The conference included presentations on Augmented Reality in Construction, Data capture for BIM through LIDAR and Photogrammetry, Applications of Multi-Agent Simulations for Crowd Analysis; and Automatic Analysis of Safety Breaches using BIM.
- **The Year in Infrastructure Conference** – Angelos Stasis, and Professor Jennifer Whyte attended this Bentley conference in London, October 29-31, attending presentations by Ted Stephens (Bentley) and Ross Dentten (Crossrail), who are industrial supervisors for Angelos' EngD research, as well as by others involved in applications of BIM for infrastructure.
- **Transforming Built Environment Professions: the new Professionalism Seminar at the Centre for the Study of the Production of the Built Environment (ProBE), University of Westminster** – Suha Jaradat attended this seminar on 10 October in which Frank Duffy reviewed changes in the architectural profession over the last fifty years, arguing that construction professionals need to place more emphasis on the public good by creating and sharing an open-ended, disinterested interdisciplinary body of knowledge about

buildings. The debate started out with Frank Duffy talking about his recent article with Andrew Rabeneck in *Building Research and Information* on 'Professionalism and architects in the 21st century' – and touched on areas related to Suha's doctoral research on the role of BIM in the integration of construction professionals (a topic on which Suha has a paper in the same BRI special issue).

Recent publications and presentations

Journal publications

Jaradat, S. (2014) Educating the next generation of architects for interdisciplinary BIM environments, Forthcoming in *Charrette, the new journal of the Association of Architectural Educators*.

Comi, A. Bischof, N. and Eppler, M.J. (2014) Beyond projection. Using collaborative visualizations to conduct qualitative interviews. Forthcoming in *Qualitative Research in Organizations and Management* [[pdf of submitted version](#) 436KB].

Comi, A. Eppler, M.J. (2014). "Diagnosing Capabilities in Family Firms: An Overview of Visual Research Methods and Suggestions for Future Applications". Forthcoming in *Journal of Family Business Strategy* [[pdf of submitted version](#) 510KB].

Conference presentations

Comi, A. and Whyte, J. (2014) Developing the building object: The role of cascades of visual representations, *Giving visual and material form to ideas, identity and imagination: Architecture, urbanism and sustainable construction* (organizers: Meyer, R.; Jones, C.; Boxenbaum, E.; Velikova, S.S.), May 12-13, WU Vienna, Austria.

Maradza, E. (2014) Process innovation standardisation in project-based firms: examining the implications on sources of knowledge and its exchange practices, *DRUID Academy Conference*, January 15-17, Aalborg, Denmark.

Comi, A., Eppler, M., Herrmann, A. and Schlager, T. (2013). Cognitive Biases in New Technology Appropriation: An experiment on the impact of judgmental and presentational priming. *International Conference on Information System*, December 15-18, Milan, Italy.

Stasis, A., Whyte, J., Dentten, R. (2013) [A critical examination of change control processes](#), *2nd International Through-life Engineering Services Conference*, November 5-6, Cranfield, UK.

Lindkvist, C., Stasis, A. and Whyte, J. (2013) [Configuration management in complex engineering projects](#), *2nd International Through-life Engineering Services Conference*, November 5-6, Cranfield, UK.

Guo, G., Larsen, G.D. and Whyte, J. (2013) Digital interaction patterns on construction projects: A study of dynamic approval processes, *CIB W78*, October 9-12, Beijing, China.

Working papers

Scorgie, J., Radosavljevic, M. and Whyte, J. (2013) [Using Laser Scans to Visualize and Make Decisions about Built Infrastructure](#). DIRC Working Paper 7, version 1.0.

Dalton, B. and Parfitt M. (2013) [Immersive Visualization of Building Information Models](#). DIRC Working Paper 6, version 1.0.

Please contact the Centre at designinnovation@reading.ac.uk or individual authors for further details or to request copies of these papers.

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