Progressing a Strategic Research Agenda for the UK Built Environment

20 November 2007
Today’s agenda

• Introduction
• Reduced resource consumption
• New construction process
• ICT and automation
• Summary
Key Dates/ Chronology

- EU SRA published (November/ December 2005)
- UK consultation (early 2006)
- UK SRA launch (June 2006)
- Working groups established and champions nominated (September 2006)
- Industry roadmapping studies (March – November 2007)
- ECTP meeting, Amsterdam (November 2007)
- Confirmation of UK research programme by UK HLG (next week)
- Launch of UK NP website (December 2007)
Identify Key Stakeholders

- Research customers (industry)
- Researchers
- Research funders
- Relevant government departments
Building On Current Work

Not re-inventing wheels!!

- What has already been done?
- Who has done it?
- What’s the good stuff?
- What needs to be developed further?
- Who should be involved?

- Then develop two or three key project ideas
Action Plan for Topic Areas

• Leadership (HLG and SG)

• Management support (CE)

• Core membership and corresponding members

• Industry engagement

• Links with the research community, government and Europe
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Topic Champions

- Reduced Resource Consumption
  - Peter Bonfield (BRE)

- New Construction Process
  - John Findlay (UCL)

- ICT and Automation
  - Martin Ong (Arup)
Reduced Resource Consumption

- Construction Resource & Waste Construction Platform
- Waste
- Energy efficiency
- Water
- Links with Government funding organisations
New Construction Process

• “Building a client orientated, knowledge based industry”
• Scoping study currently being carried out by UCL
• A number of issues relevant to this theme are seen as central to the newly emerging construction and built environment industry including:
  ▪ Greater understanding of the client business and stakeholder analysis;
  ▪ Improved data and decision support in making decisions regarding whole life
  ▪ Economic, environmental & social
  ▪ Optimizing value balance (outcome focused) and associated trade offs
  ▪ Better understanding and exploitation of existing knowledge bases, educating the whole supply chain through knowledge management and organisational learning
  ▪ Retrospective demonstration reviews – addressing the issue of whether improved processes result in better product and performance in use and overall outcomes
  ▪ Outcome measures
• To date, industry engaged through 14 interviews with senior leading figures and 2 workshops
• Study completed by early January 2008
Our Approach

1. Primary Issues at the global scale
2. Sector-specific issues
3. Issues that characterise and affect the BE ‘industry’
ICT & Automation Scoping Study

• An industry-led initiative that aims to:
  – Mobilise the whole built environment sector in a focused way
  – ‘Pave the way’ for research by establishing a clear set of common industry priorities

• Provides an opportunity to:
  – Re-think the process of designing and building our environment
  – Transform the built environment industry

• Long-term (10-15 year) ICTA research programme/roadmap

• Concentrates on ICTA as a means to an end, rather than the end in itself i.e. the value that ICTA can bring
Roadmapping Workshop Companies

- Arup
- Buro Happold
- BIW Technologies
- Constructing Excellence
- Capita Symonds
- Taylor Woodrow
- MR1 Consulting Ltd
- University of Reading
- Skanska
- Loughborough University
- Land Securities
- Bentley (UK)
- University College London
- Shepherd Construction
- Mobile Computing
- Department for Business, Enterprise and Regulatory Reform (BERR)
- Wates
- AEC3 Ltd
Key ICT & Automation research topics

• Collaborative prototyping to define and deliver client requirements
• Efficient, seamless sharing of information across the Built Environment stakeholders
• Ability to interact with real-time information regardless of physical location or timezone
• Adoption and application of off-site manufacturing, automation & mechanisation processes and systems
• Skilled and competent workforce able to use the latest, best practice technologies
Real time connectivity & mobile working

**Drivers**
- Increase in productivity
- Reduction in waste
- Reduction in construction time
- Reduction in capital cost

**Remote Working Technologies (R3.1)**
- Enhanced ‘telepresence’/virtual co-location / virtual site visit technologies
- Single comprehensive toolkit (light and robust) with multiple applications for mobile working by wearable devices, which delivers real-time information in an optimal format
- Digital pens/paper

**Connectivity Technologies (R3.2)**
- Improved mobile/site networks and systems for the efficient connection of mobile sites to corporate information networks
- Developed WiMAX & Wide Area WIFI technologies

? (To be determined at future roadmap reviews)

? (To be determined at future roadmap reviews)

Ability to Interact with Real-Time Information Regardless of Physical Location or Timezone

**Research/Enablers**
- Investigate advanced possibilities offered by wireless or mobile communication technology (and potential WiMAX and wide area WIFI)
- Research and develop enhanced telepresence technologies, and implementing their widespread use both in the workplace and from home—giving increased flexibility of working and reduced travelling
- Embed & promote the use of existing virtual co-location technologies (e.g., video conferencing technology, webinars, etc.) in the industry
- Define & develop infrastructure requirements to support site working
- Research & develop better viewing capabilities for PDRs, etc.
- Research & develop remote management of data process via PDRs, etc.

**Intelligent Assets Enablers**
- Develop GPS (or similar) to deliver data to mobile staff
- Research & develop a virtual site visit capability, e.g., network of webcams linked to digital model of site, real-time BIM, etc.
- Identification & development of new human interface technologies
- Further research/enablers to be determined at future roadmap reviews

**Asset Lifecycle Information System Enablers**
- Further research/enablers to be determined at future roadmap reviews

*National Platform for the Built Environment*
*Construting Excellence*
Off-Site Manufacturing

**DRIVERS**
- Reduction in waste
- Increase in productivity
- Reduction in accidents
- Reduction in construction time
- Increase in predictability

**PRODUCTS / SERVICES / TECHNOLOGY**
- Off-Site Manufacturing
  - R4.1
- On-Site Automation
  - R4.2
- Intelligent Logistics
  - R4.3

**SHORT**
- Design for efficient manufacture/off-site construction/assembly and pre-assembly to be in common use

**MEDIUM**
- Efficient off-site manufacturing and pre-assembly in widespread use
- Complete digitisation of sites and processes, enabling improved communication between stakeholders and improved site conditions

**LONG**
- Lean Production: automated design, factory production, and modular assembly in widespread use
- On-site robotic assembly (especially for hazardous or monotonous work - providing safer and more controlled working environments)

**RESEARCH / ENABLERS**
- **INTELLIGENT ASSETS ENABLERS**
  - Adaptation of new concepts developed by other manufacturing industries (e.g., automotive & aerospace)
  - Research materials to simplify, reduce cost, improve HSE, etc., for automated off-site fabrication and on-site erection
  - Development and deployment of solutions (e.g., RFID) to identify and track off-site materials from delivery to installation
- **INTEROPERABILITY ENABLERS**
  - Development of transport and logistics management tools to automate tracking of actual vs. planned progress
  - Use of GIS to manage site data and logistics
- **INTEGRATED PROCESSES ENABLERS**
  - Investigate rationalisation of construction processes with focus on off-site assembly of large, fully-fitted components
  - Research the automation of construction plant, equipment, and mechanisation of site activities aided by new automation and guidance technologies, including advanced embedded electronics
  - Research process optimization of flows of resources for optimal build efficiency
- **Research ENABLERS**
  - Investigate the use of integrated data models (BIM) to facilitate modularisation

**National Platform for the Built Environment**
**CONSTRUCTING EXCELLENCE**

**Mass Adoption & Application of Off-Site Manufacturing, Automation & Mechanisation Processes & Systems**
(To be determined at future roadmap reviews)
Skilled and Competent workforce

**Drivers**
- Effective training and skills are essential to provide a well-trained and qualified workforce capable of transforming the industry, i.e., all other research topic areas are reliant on the success of this topic area.

**Products/Services/Technology**

**Training & Skills**
- Effective e-learning tools and concepts for the construction sector.
- Flexible learning courses for all levels and workstreams within the construction industry, resulting in recognised qualifications/could become new industry-wide training standards.

**Short**
- Establish requirements for awareness, training, skills, and higher knowledge in construction generally (incl. ICT & automation).
- Explore & develop methods of how to communicate/present what is already available to potential users, in particular SMEs representing more than 90% of industry, where the ICT skills generally do not exist.
- Industry to work together with universities, professional institutions, and training professionals to develop new construction e-learning tools/courses.

**Medium**
- Raise awareness of ICT in construction in schools to enhance attractiveness of industry and reduce negative culture by immersing early.
- Industry to work together with universities, professional institutions, and training professionals to develop new construction e-learning tools/courses.

**Long**
- New career/employee qualification for ICT data management.
- Higher education courses on ICT in construction context, underlying theories, models, and methodologies (undergraduate and postgraduate).
- Industry to work together with universities, professional institutions, and training professionals to develop new construction e-learning tools/courses.
- Embed a 'learning' culture in the industry.

Well trained, well qualified workforce, able to use the latest, best practice technologies.

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Constructing Excellence
Next steps

- HLG meeting this week to agree recommendations from each of the working groups
- Agree research themes and scope projects
- Develop industry led research consortia to take forward research issues
- Engage research organisations and universities
- Seek potential European partners
- Undertake research projects
UK National Platform website

From mid-December information on all UK NP outputs including:

– General information on the UK NP and SRA
– Working group outputs, meeting details, etc
– Roadmapping study outputs
– Research themes and projects
– Who’s involved in projects

www.nationalplatform.org.uk
Thank You!

Integrating research and innovation with standard business processes