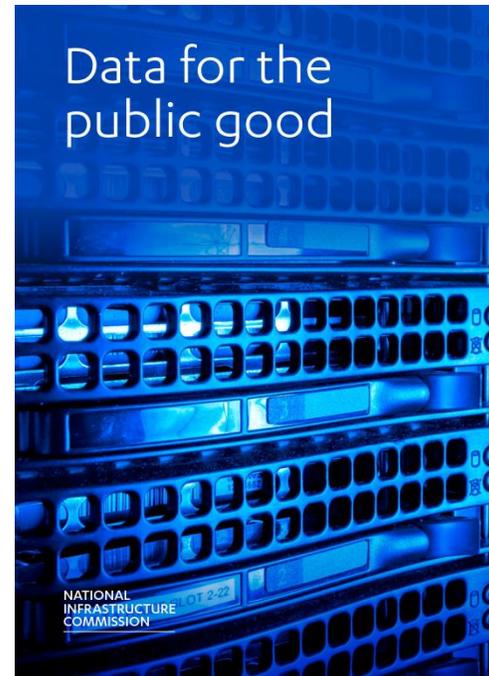
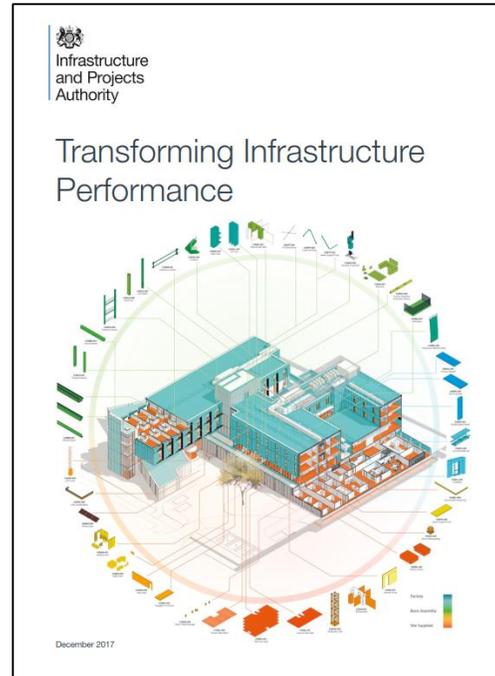
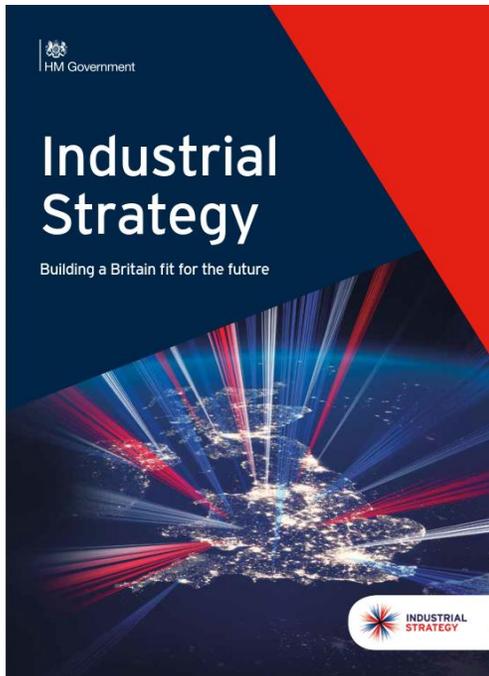


Bytes and Mortar: the potential for digital to transform the construction and infrastructure sectors

Alexandra Bolton, Deputy Director
deputy-director@cdbb.cam.ac.uk
Centre for Digital Built Britain

Aligned Government policy driving digital transformation



The scale of the challenge

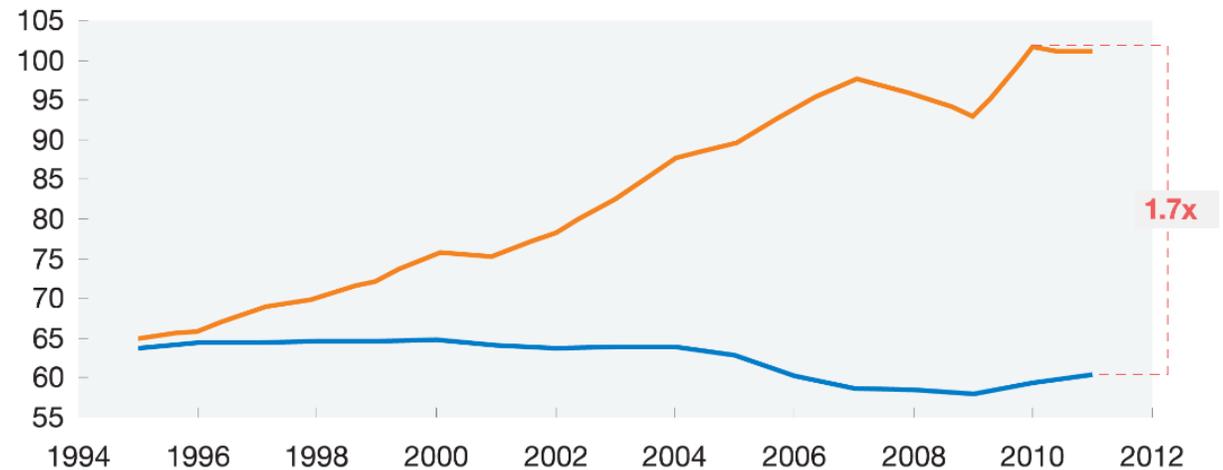
“Productivity in manufacturing has nearly doubled, whereas in construction it has remained flat”

Source:
McKinsey&Company, “The construction productivity imperative”
By S Changali, A Mohammad and M van Nieuwland, July 2015

Overview of productivity improvement over time

Productivity (value added per worker), real, \$ 2005

\$ thousand per worker



The scale of the challenge

“The construction industry is among the least digitized”

Source:
McKinsey&Company, “The construction productivity imperative”
By S Changali, A Mohammad and M van Nieuwland, July 2015

McKinsey Global Institute industry digitization index; 2015 or latest available data

Relatively low digitization  Relatively high digitization
● Digital leaders within relatively undigitized sectors



Centre for Digital Built Britain

Set up in August 2017 by Government at the University of Cambridge to support the digital transformation of the built environment. It does this through:

- building academic capacity
- informing policy
- supporting industry change



Building research capacity

- Centered in Cambridge, delivered by the UK
- Multidisciplinary research community to connecting dB's social, economic and technological ambitions
- Provides the long term research agenda needed to deliver the ambitions of the Digital Built Britain programme
- 34 cross-disciplinary research projects and networks funded in the UK
- Close links with industry to enable innovative research to become part of professional practice

Informing policy

- Research outputs informing evidence based policy
- Home Nations Working Group
- Public Sector BIM Working Group
- Digital Framework Task Group
- International and Prosperity programmes to grow the market for the export of UK skills and services

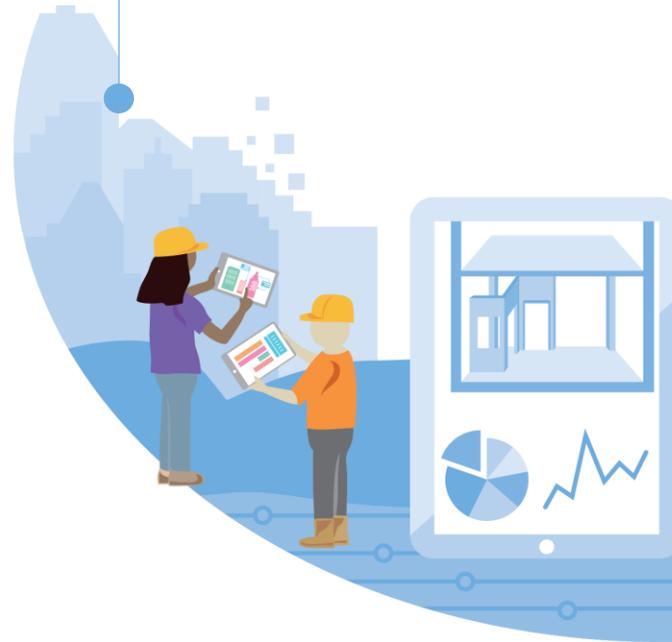
Supporting change

- Coordinated vision and roadmap towards a dbB
- Industry engagement programme across the supply chain
- Building an evidence base for change
- Highlighting current and emerging good practice
- Sharing value cases to encourage the adoption of digital approaches

What is a digital built Britain?

Design

- Deploy digital techniques to design better performing buildings, homes and infrastructure
- Use good practice, secure by default, information management to get data right from the start



Design

Build

- Exploit new and emerging digital construction and manufacturing technologies and techniques
- Secure, shared information, enabling clients, design teams, construction teams and the supply chain to work more closely together to improve safety, quality and productivity during construction

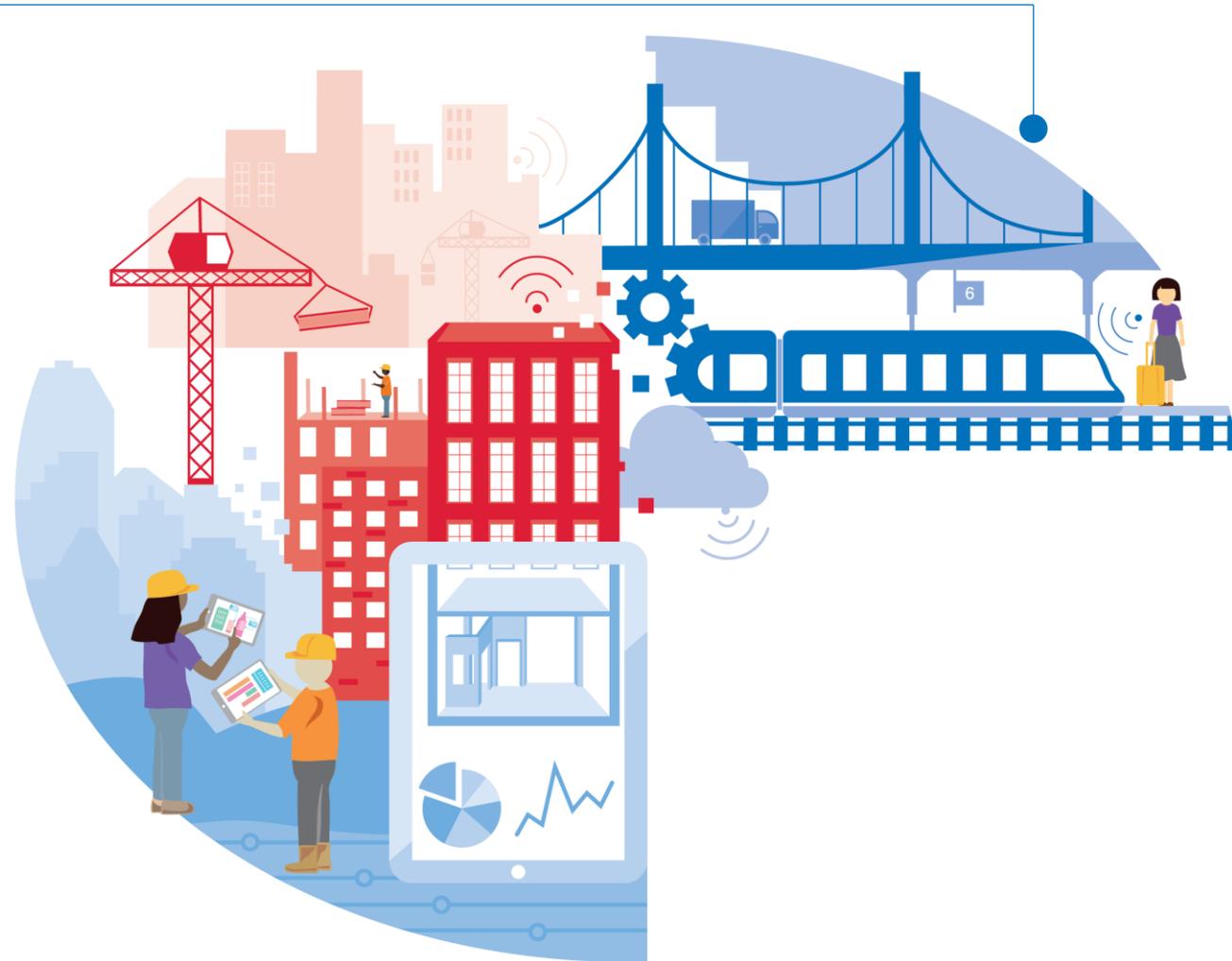


Design

Build

Operate

- Use real time information to transform the performance of the built environment and its social and economic infrastructure
- Smart asset management to predict and avoid disruption of services
- Digitising existing assets



Design

Build

Operate

Integrate

- understand how spaces and services can improve citizen quality of life
- feed that information in to the design and build of our economic and social infrastructure and the operation and integration of services they deliver



Design

Build

Operate

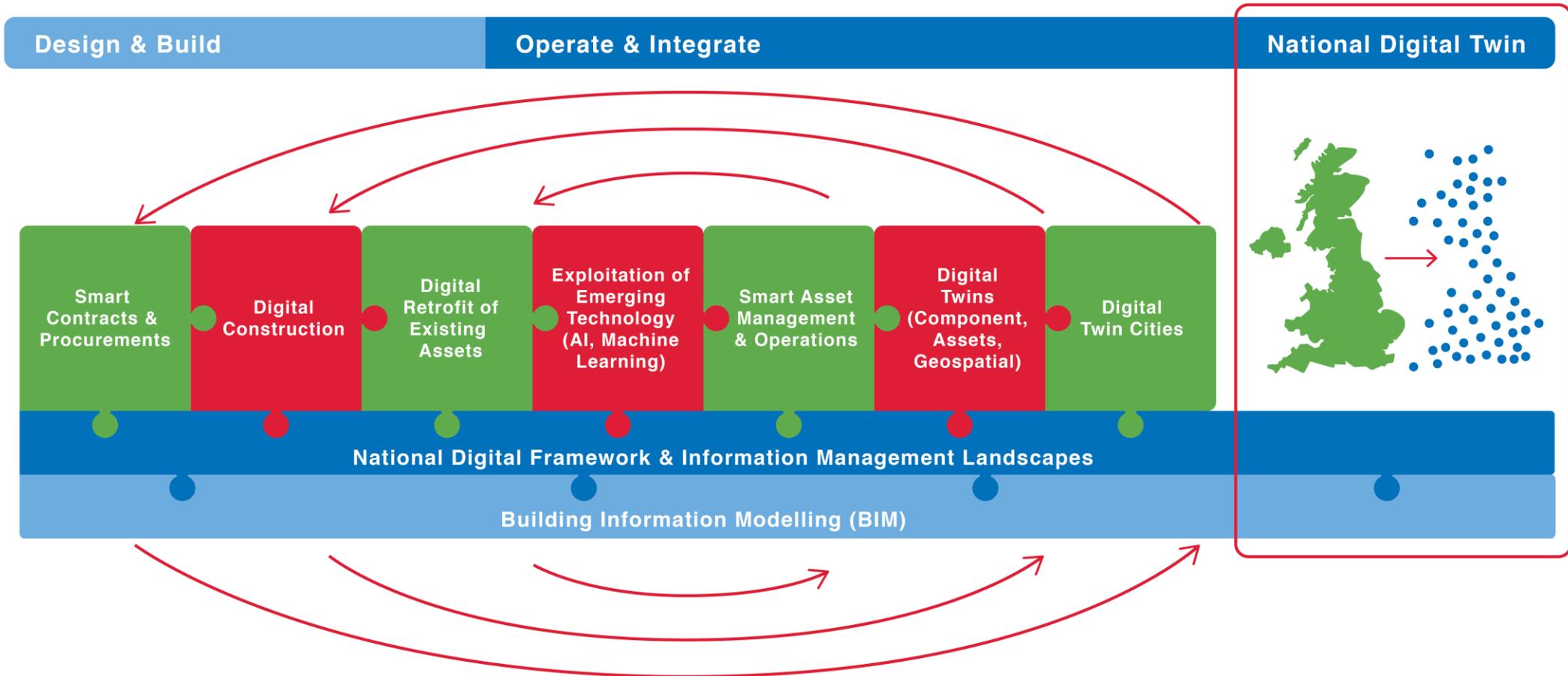
Integrate

A digital built Britain:

- understanding what information is needed right from the start
- ensuring feedback loops are in place throughout an asset's lifecycle
- information enabling better whole life value and optimising services to improve socio-economic outcomes for citizens
- exploit new and emerging skills and technology to increase productivity.



Technical drivers towards a digital built Britain



Technology alone is not enough to deliver change.

The journey towards a digital built Britain will be enabled by:

 Education & training

 Industry, policy maker & academic engagement

 International export of skills, standards and technology

 Policy development

 Certifications, regulation and standards

 Case studies and demonstrators from research & industry

 Improved data governance and ethics

 Improved contract and procurement law

 Management and organisational change.

CDBB Case Studies

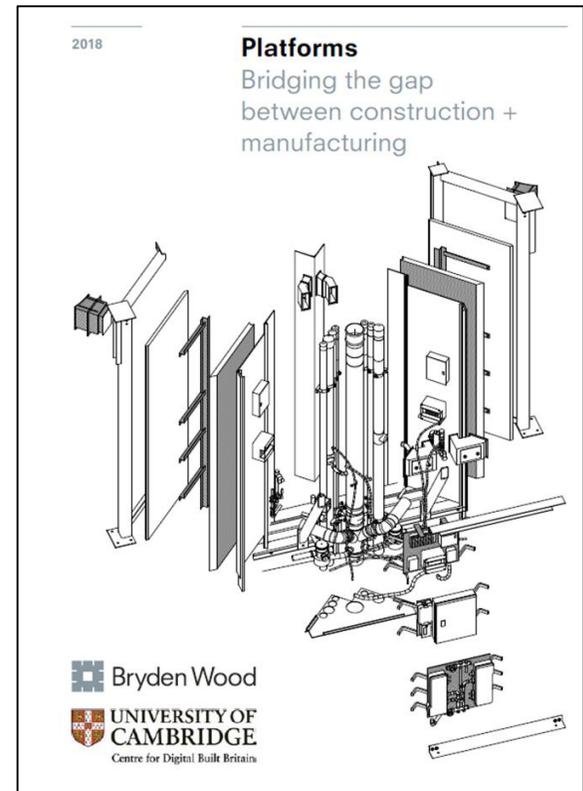
Platforms: bridging the gap between manufacturing and construction

The built environment challenge:

- There is a productivity gap between manufacturing and construction which could be improved through increased standardisation

The research question:

- How can a platform-based approach, common in the manufacturing and software industries, be adopted by the construction sector and what benefits could this unlock?



Platforms: bridging the gap between manufacturing and construction

The project:

- Within platforms, connections and interfaces can be standardised so that just a few designs meet a huge range of needs, and many components are repeatable.

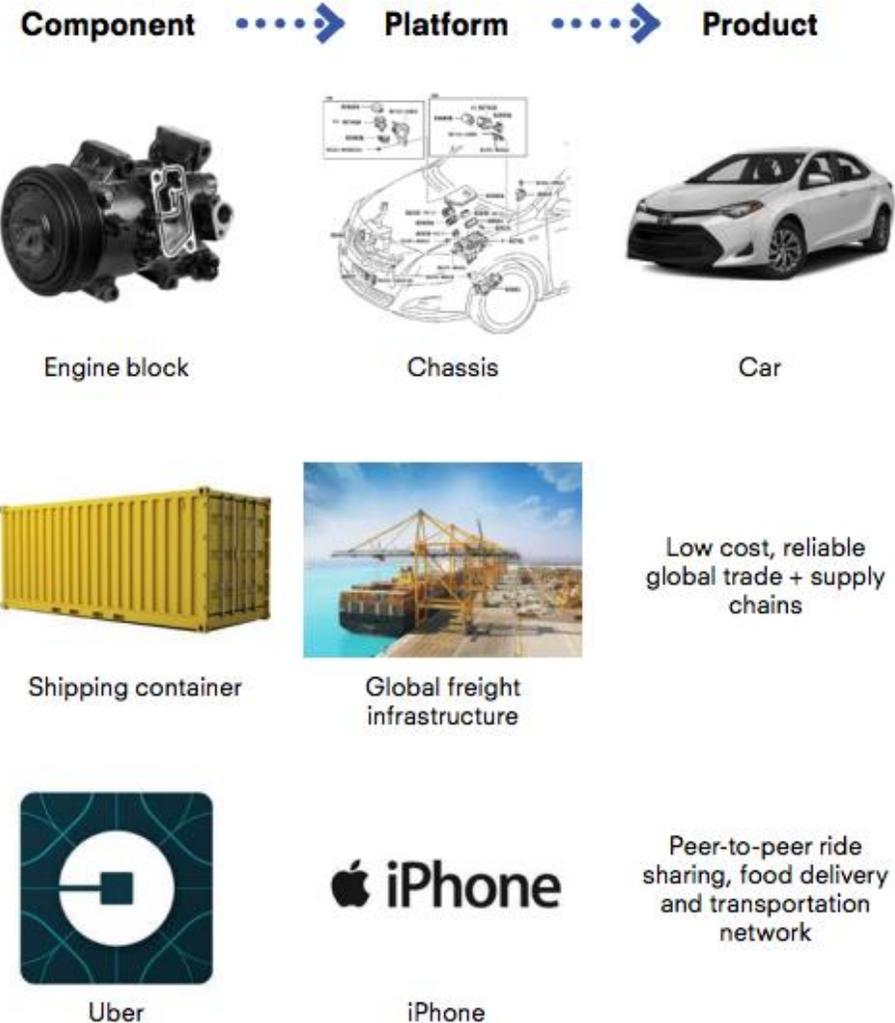
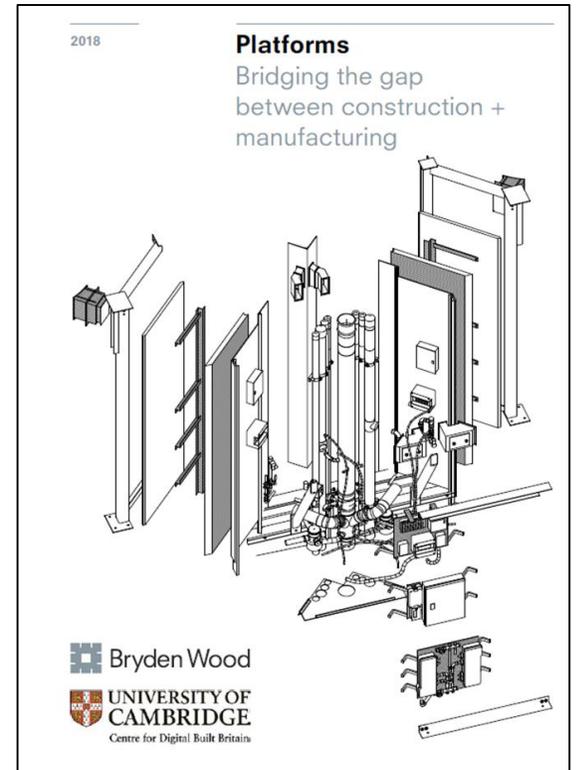


Image taken from Platforms: bridging the gap between manufacturing and construction

Platforms: bridging the gap between manufacturing and construction

The outcome:

- In construction, pretty much all buildings relate to the human form. This means that dimensions such as ceiling heights fall within predictable ranges and a small number of platforms that can accommodate a huge range of needs.
- Bryden Wood have made all the IP generated on their public sector projects available to the Government.



Designing Safe Complex Environments

Dr Thomas Stone

The built environment challenge:

- The built environment can disable people with functional limitations through design.
- We need to design building for accessibility and to meet the needs of those with complex sensory conditions.

The research question:

Is it possible to use virtual reality to support the design of safer built environments for people with complex sensory impairments?



Designing Safe Complex Environments

Dr Thomas Stone

The project:

- Developing low-cost virtual reality hardware and software, combined with off-the-shelf sensors and open source games engine to create a complex environment for a user to walk in.
- The project tested the feasibility of measuring a user's movement response and enabled the collection of high fidelity movement data alongside low-cost motion capture sensors.
- The pilot was supported by a literature review.

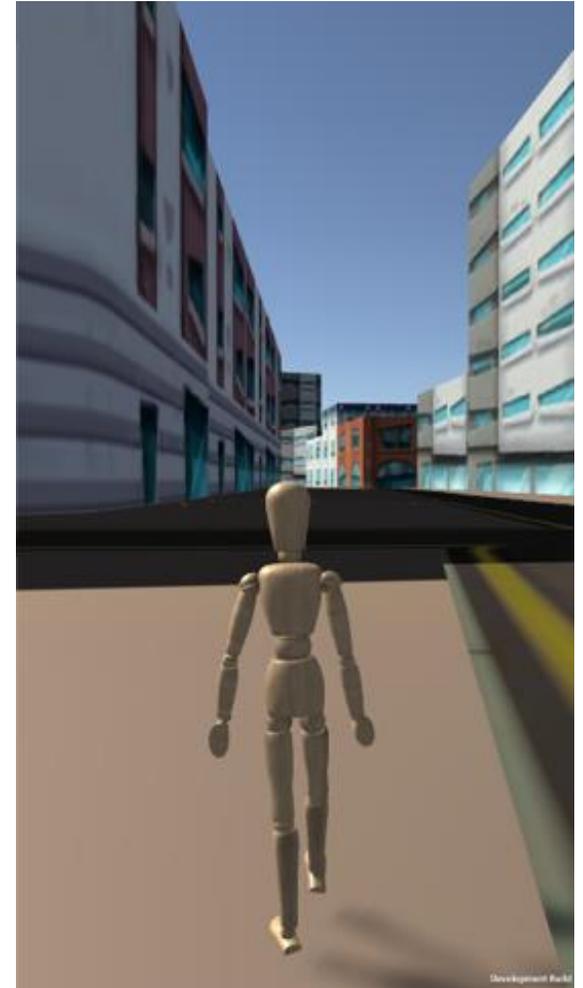


Designing Safe Complex Environments

Dr Thomas Stone

The outcome:

- Modern neuro-architectural approaches give an insight into the use of virtual reality to support the design of new buildings.
- Virtual reality is able to affect a change in the motor response in those with complex sensory problems.
- Virtual reality can be argued as a useful tool to evaluate different built environments in this population.



The Edge, Amsterdam: Showcasing an exemplary IOT building Dr Michael Ramage & PLP Architecture

Built environment challenge:

- As digital built environments gain momentum, how can we effectively pass on lessons learned about deploying IoT and BIM processes on 'smart buildings'.

Research question:

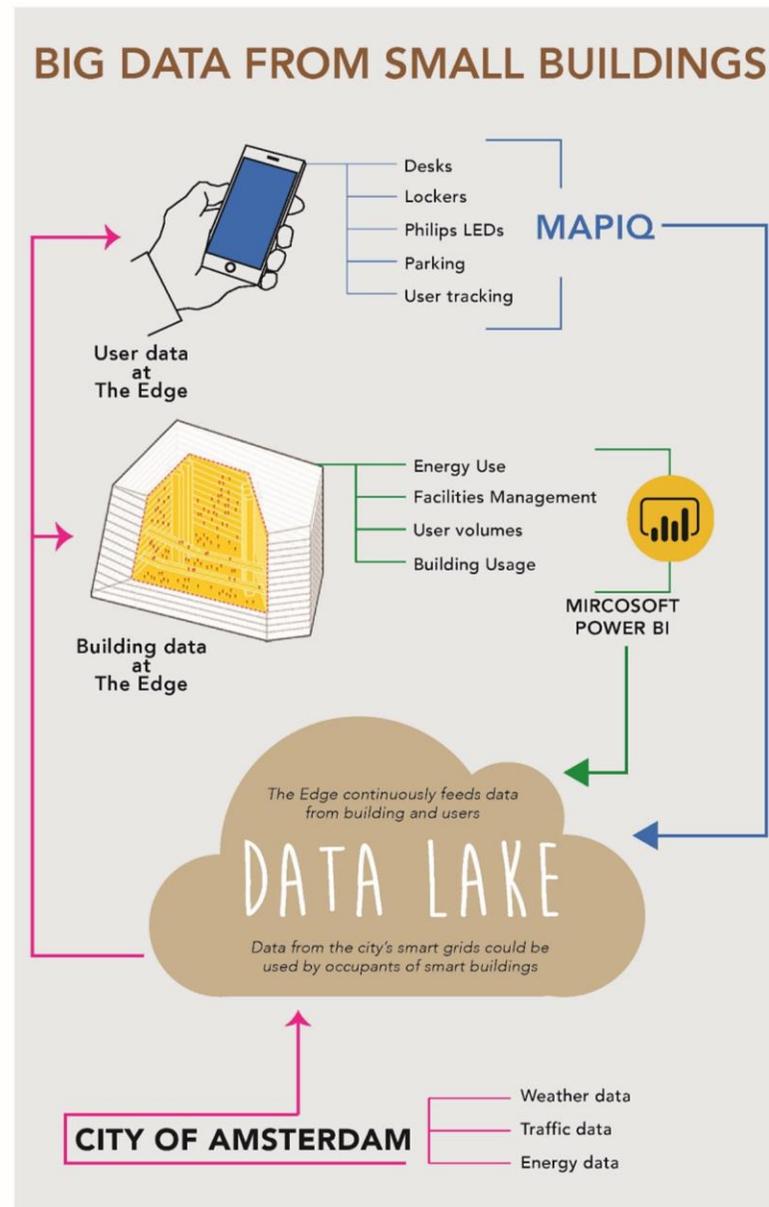
- How can case studies of built examples incorporating smart technologies help further adoption in building and industry?



Photo credit: Ronald Tilleman

The project:

- Absence rate -45%
- 2.5x increase in number of applicants
- Increased productivity & levels of employee satisfaction
- Maintenance management costs down 40%



Although at present Deloitte's Data Lake is not connected to the city's smart grid, with the eventual proliferation of IT across scales this remains a likely reality. *Illustration: Aftab Jaha*

The Edge, Amsterdam

Showcasing an exemplary IOT building

Dr Michael Ramage & PLP Architecture

The outcome:

- Effective communication between key drivers who championed and co-operated to realise diverse and original ideas added more value than technology



Photo credit: Ronald Tilleman

Collaborate with CDBB

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