National BIM Transformation around the World

Richard Lane
International Programme Manager
Centre for Digital Built Britain
FIG Working Week – Hanoi, 21 April 2019

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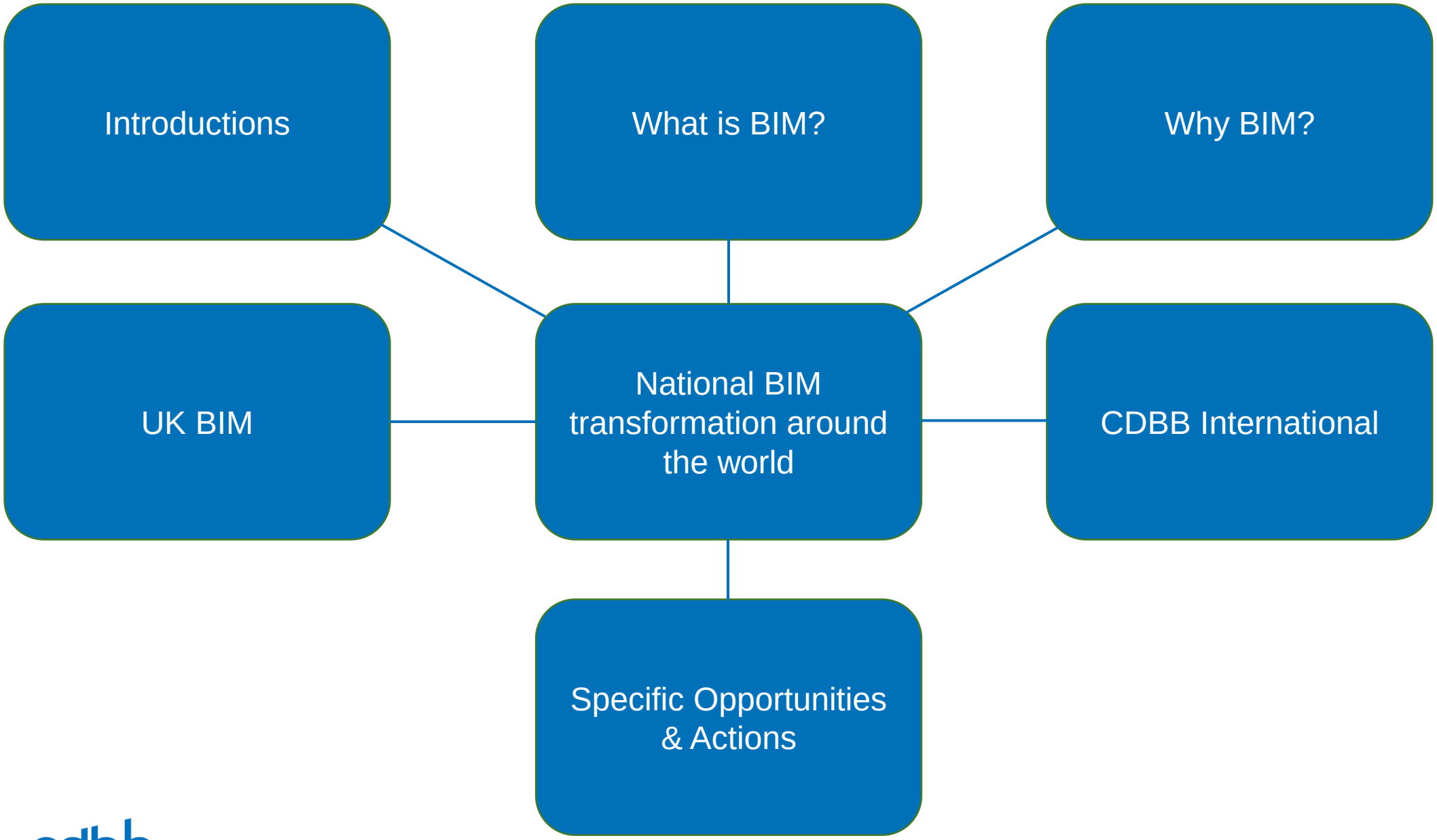

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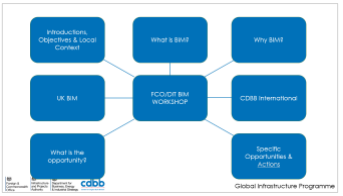
Introductions



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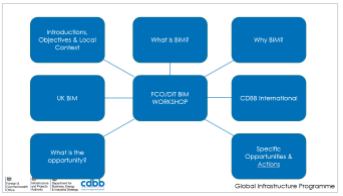
Housekeeping

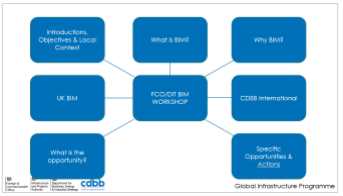
Introductions

- Name & Role
- Any BIM Knowledge / involvement?
- Any specific BIM questions or objectives for the workshop?

Section Summary



What is BIM?



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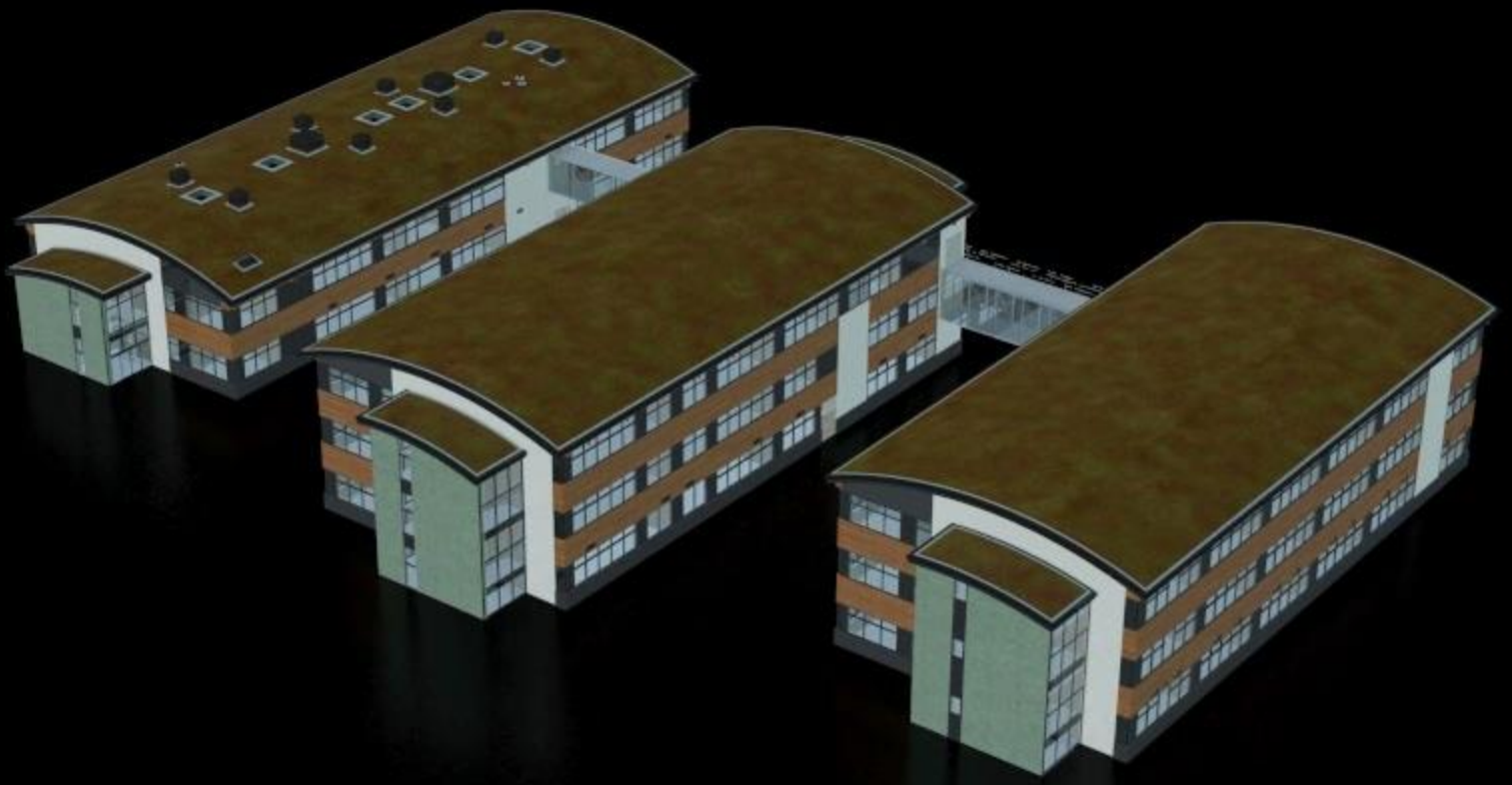


What is BIM?

- ***Building Information Modelling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.***

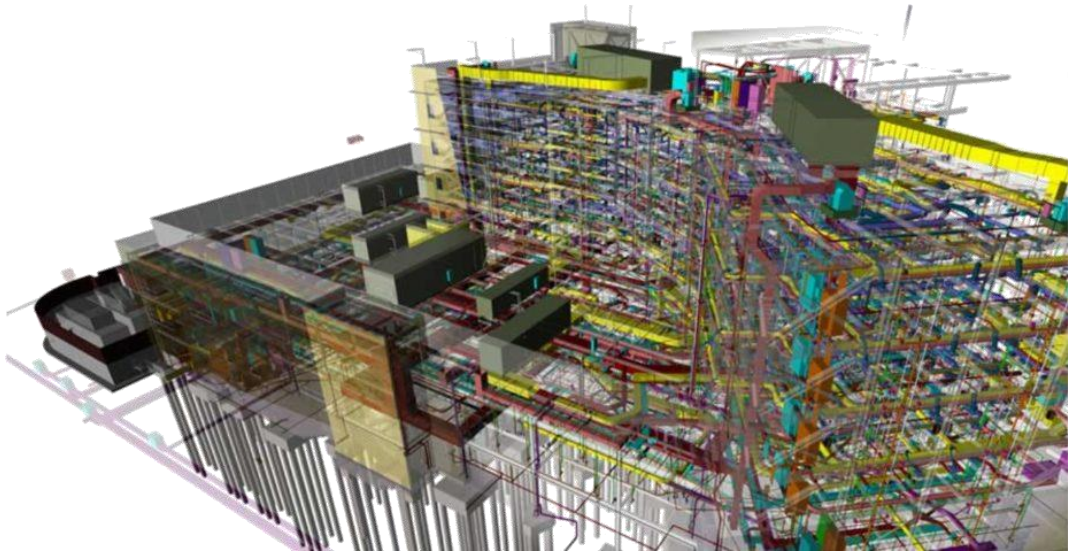
(NBIMS-US)

- ***use of a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions***

(ISO 19650)

BIM = Building Information Modelling

BIM = Better Information Management



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Key terms

- **Digital representation** (data, information, documentation and geometry)
- **Built assets** (relevant to all built assets, not jut buildings)
- **Whole life** (used from inception to decommissioning / demolition)
- **Shared** (used by the entire project team and operations teams)
- **Reliable** (managed effectively to ensure high quality)
- **Basis for decisions** (informing faster / better decisions)

Key principles

- **Outcomes** focused
- Enabled by and enables ***Collaboration***
- Information isn't just documentation of an asset, it should be **regarded as an asset**

Definition "a resource with economic value that an individual, corporation or country owns or controls with the expectation that it will provide a future benefit"

Local Innovation – National Transformation – Open, Global Market

- Public-sector led
- Common principles & definitions (e.g. EU BIM Handbook)
- Standards-based approach (e.g. ISO 19650)

Building a consistent, collaborative industry, with clear and open communication

Information of high-quality is procured to support business outcomes

Modelling the design increases efficiency, enabling simulation & analysis

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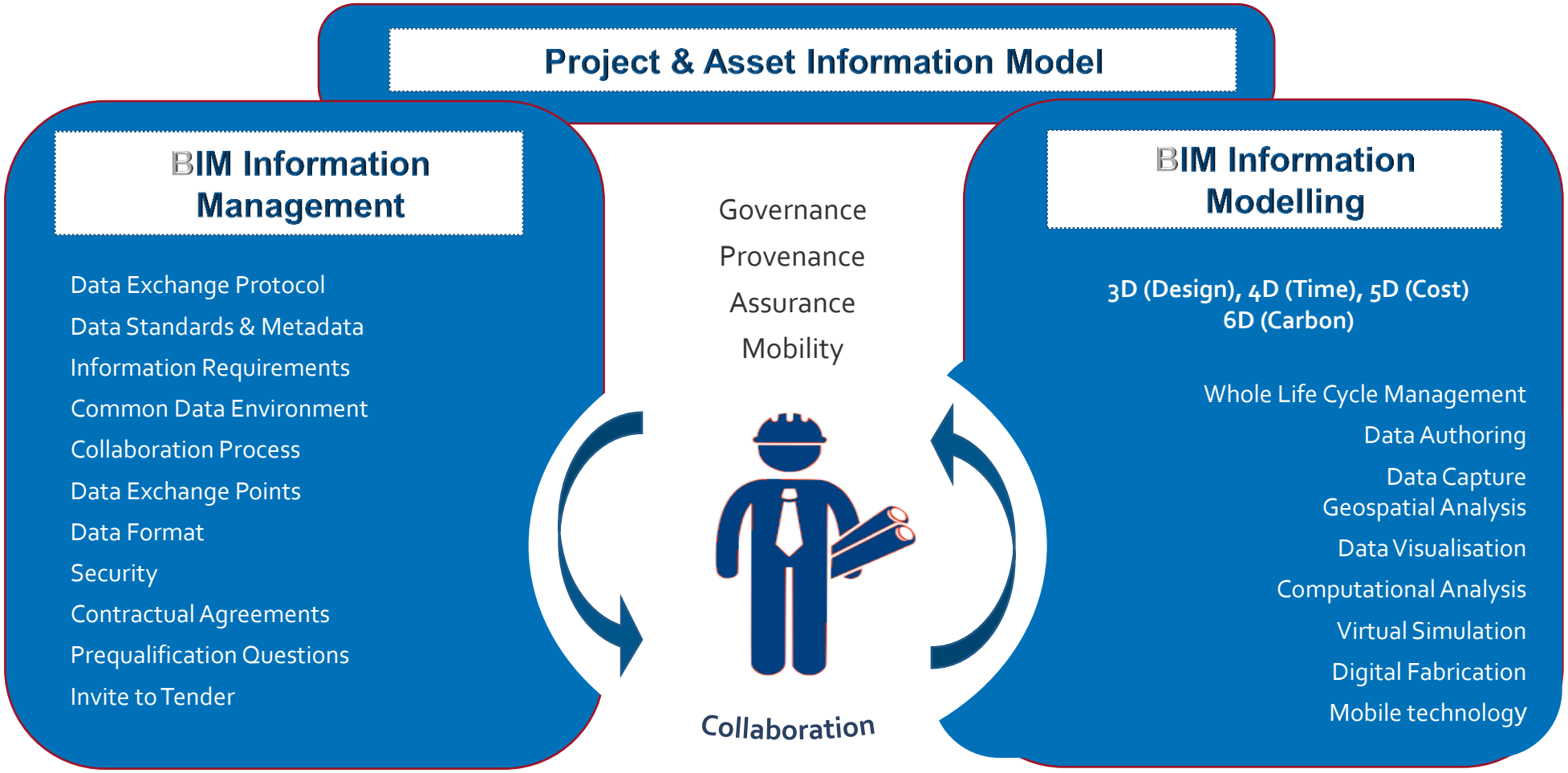
Client Example: What does it mean to HS2?



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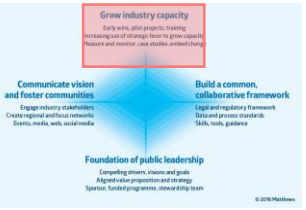
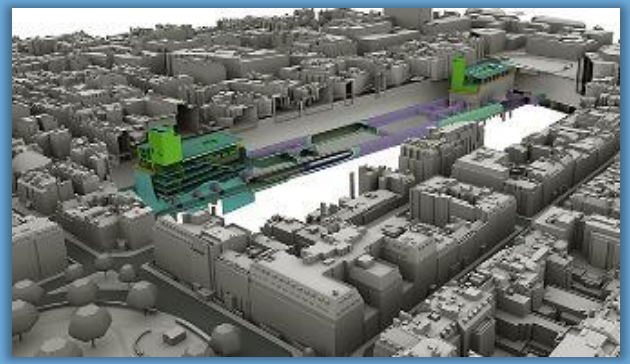
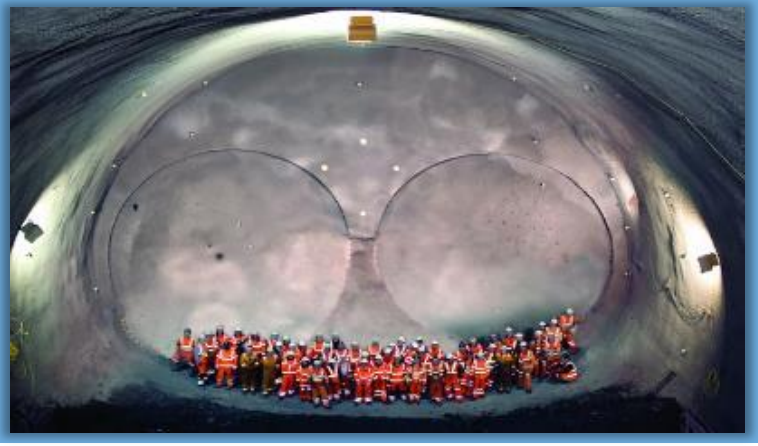


Large infrastructure projects





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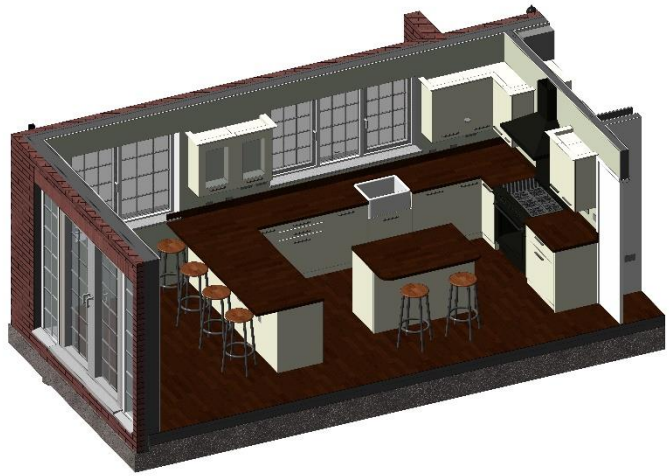
Crossrail

Small projects

http://www.david-miller.co.uk/liberty-fields.php

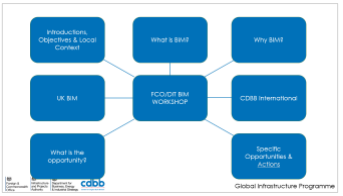


https://www.mapl.co.uk/projects/bimcasestudy/

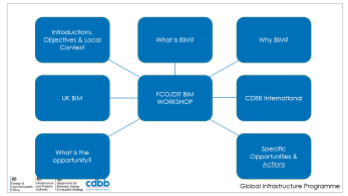
Key results:

- **On budget:** Target margin achieved on first BIM project
- **Early:** Off site 2 weeks early *(would have been 4 weeks)*
- **Zero Defects…**Almost unheard of in Construction
- **High Quality:** very happy Client

Section Summary



Why BIM?



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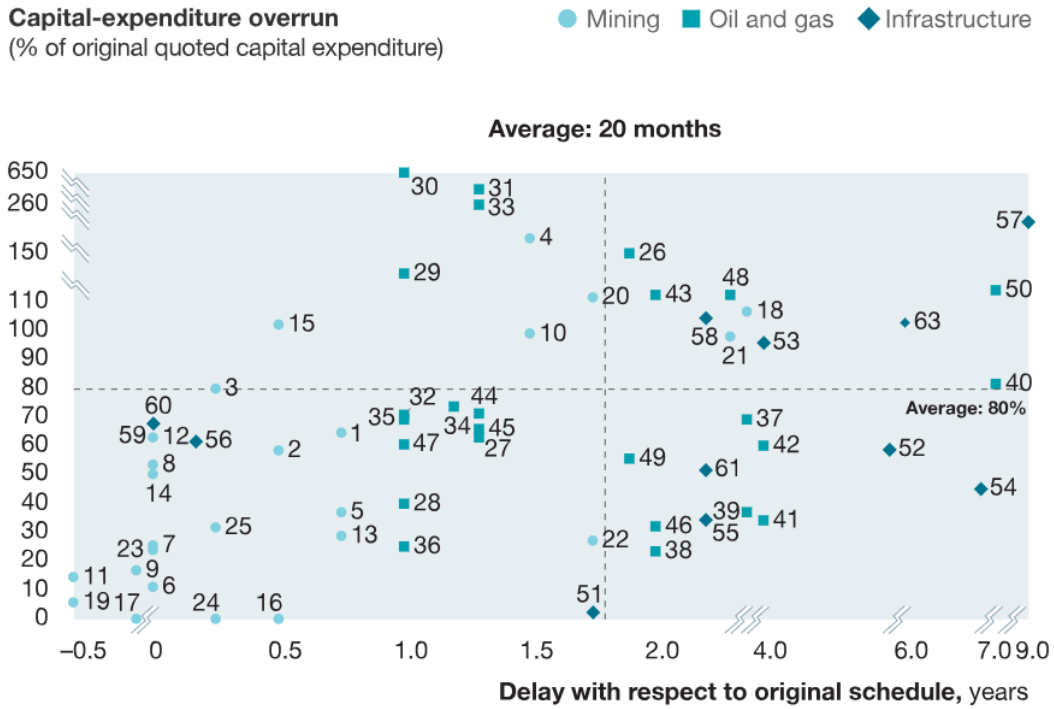
The Delivery Problem

Infrastructure projects are over budget and over-running…

80% cost increase during project, 20 months late



- **98% of projects** incur cost overruns or delays.
- The average **cost increase is 80%** of original value.
- The average **slippage is 20 months** behind original schedule.

http://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/the-construction-productivity-imperative

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"Three out of five construction projects are completed late"

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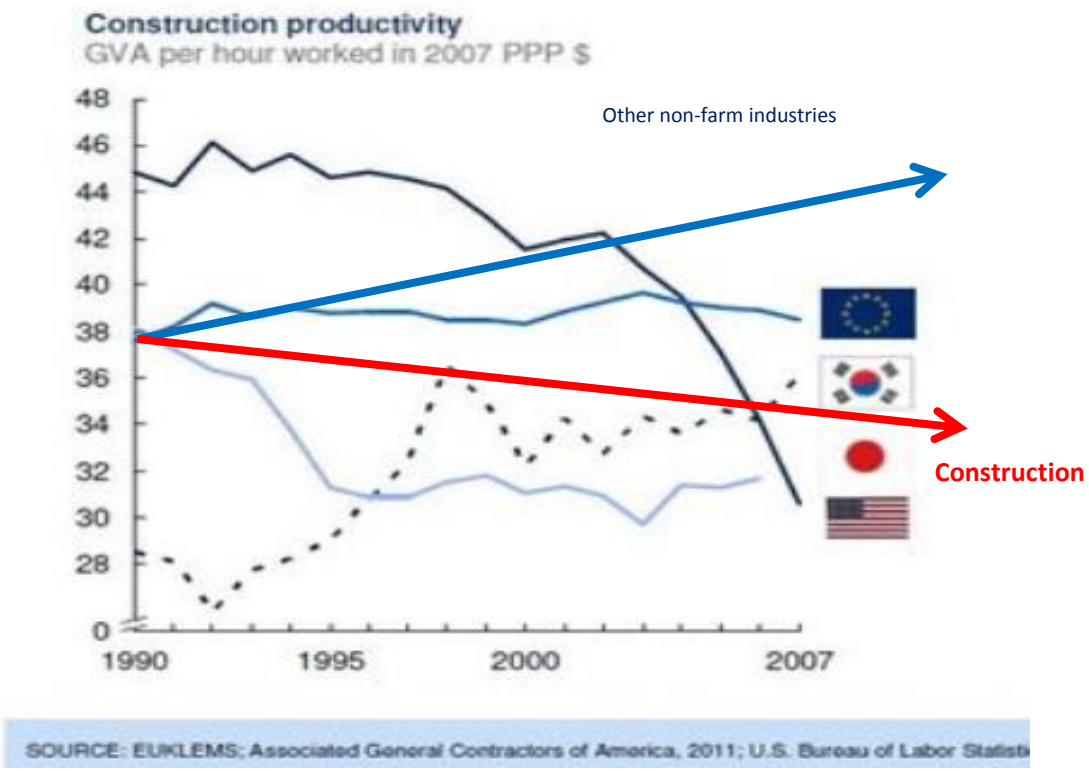
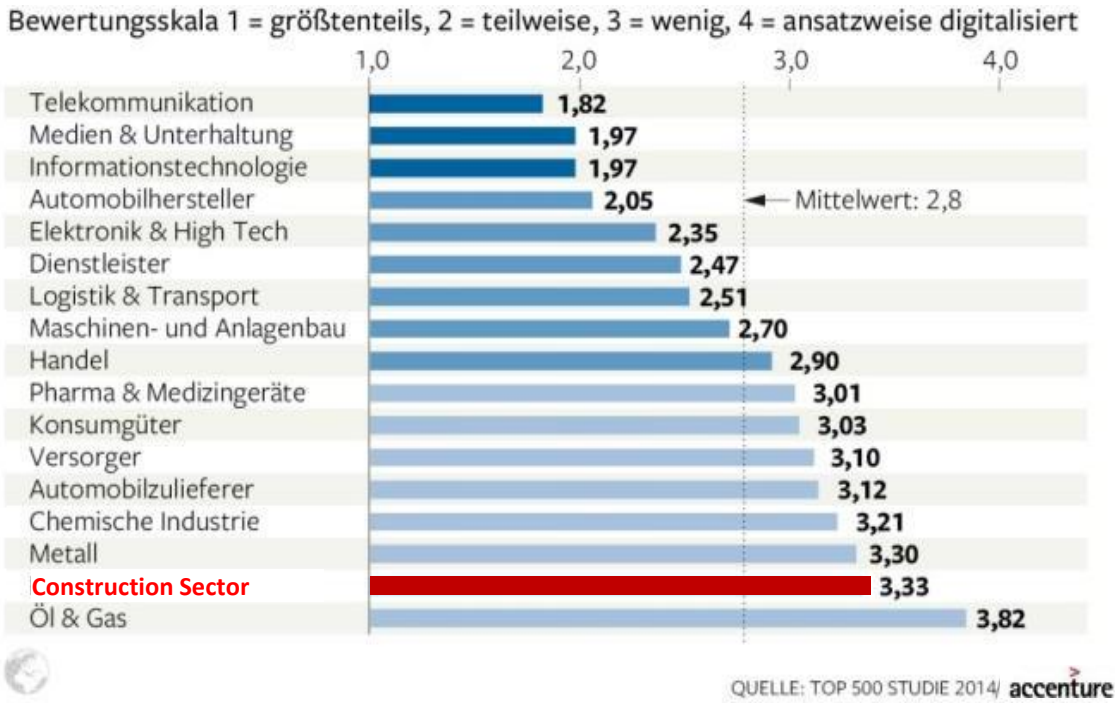
Declining productivity and low digitalisation

Productivity



Digitalisation



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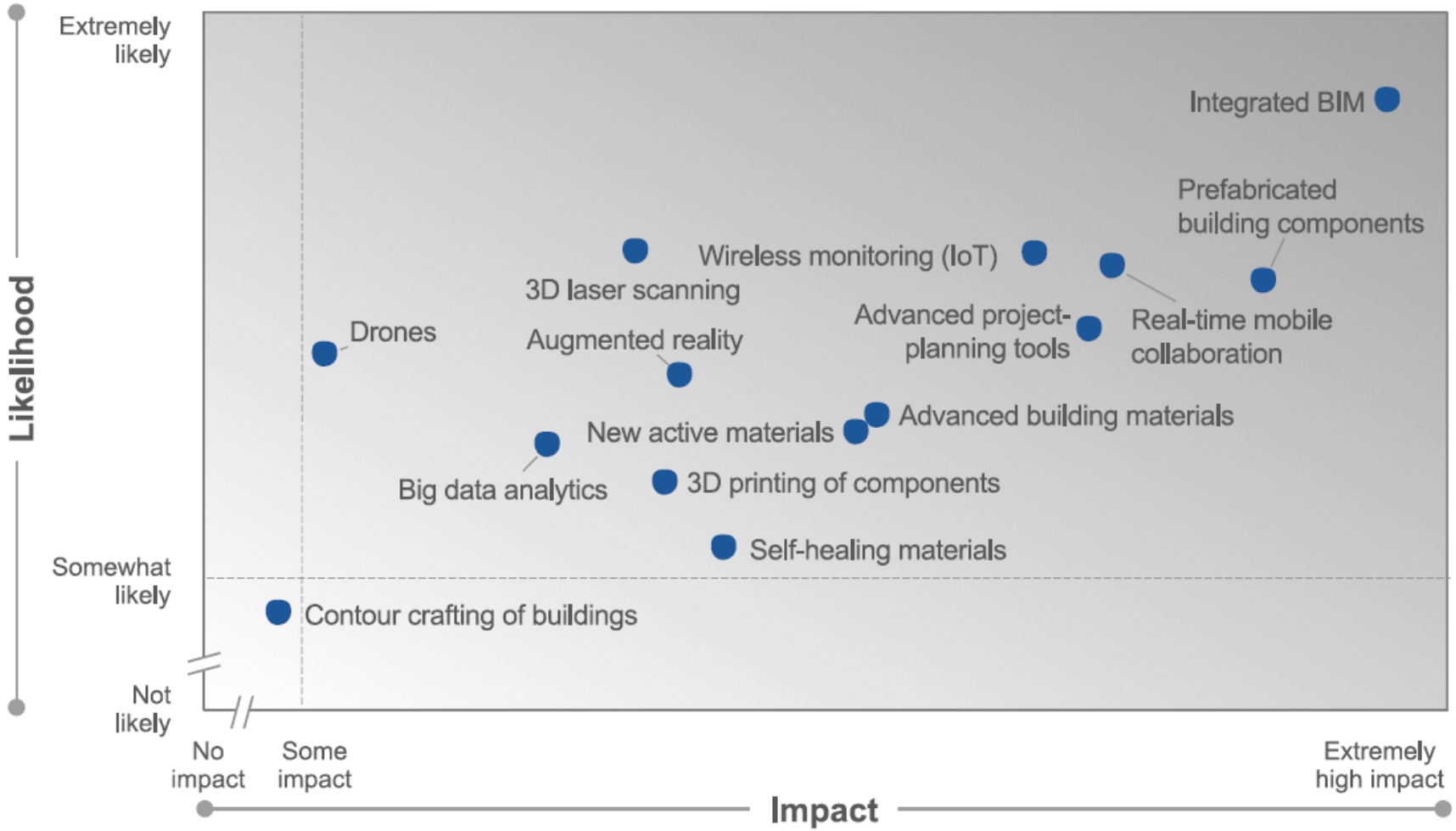
“Construction is an enabling sector which has a massive impact on the performance of the wider economy.”

Construction 2025

“The report suggested that the tendency of clients to simply accept the cheapest price created a situation where tenderers would submit low bids, and then make up their income by reducing quality or making claims.”

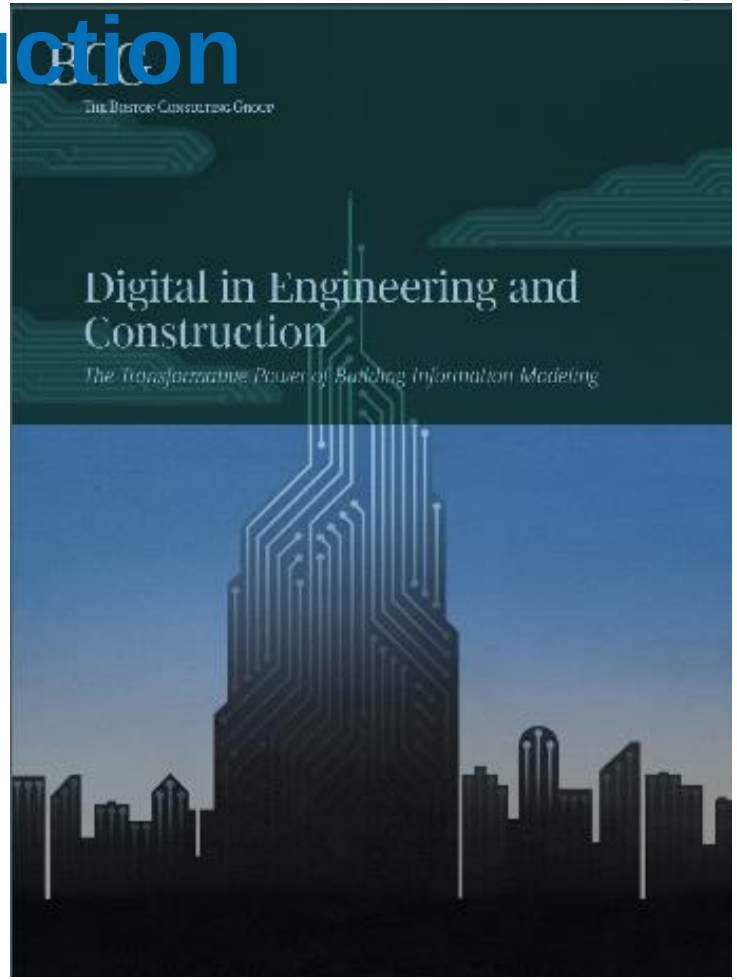
The Simon Report 1944

Impact-likelihood matrix of new technologies



Source: Future of Construction Survey

The Potential of the Digitalisation of Construction



13-21% savings

14-16% productivity

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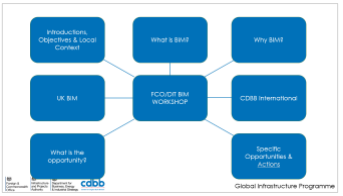
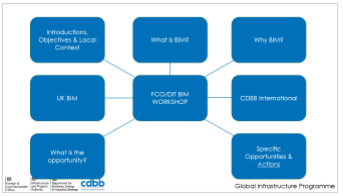


UK BIM



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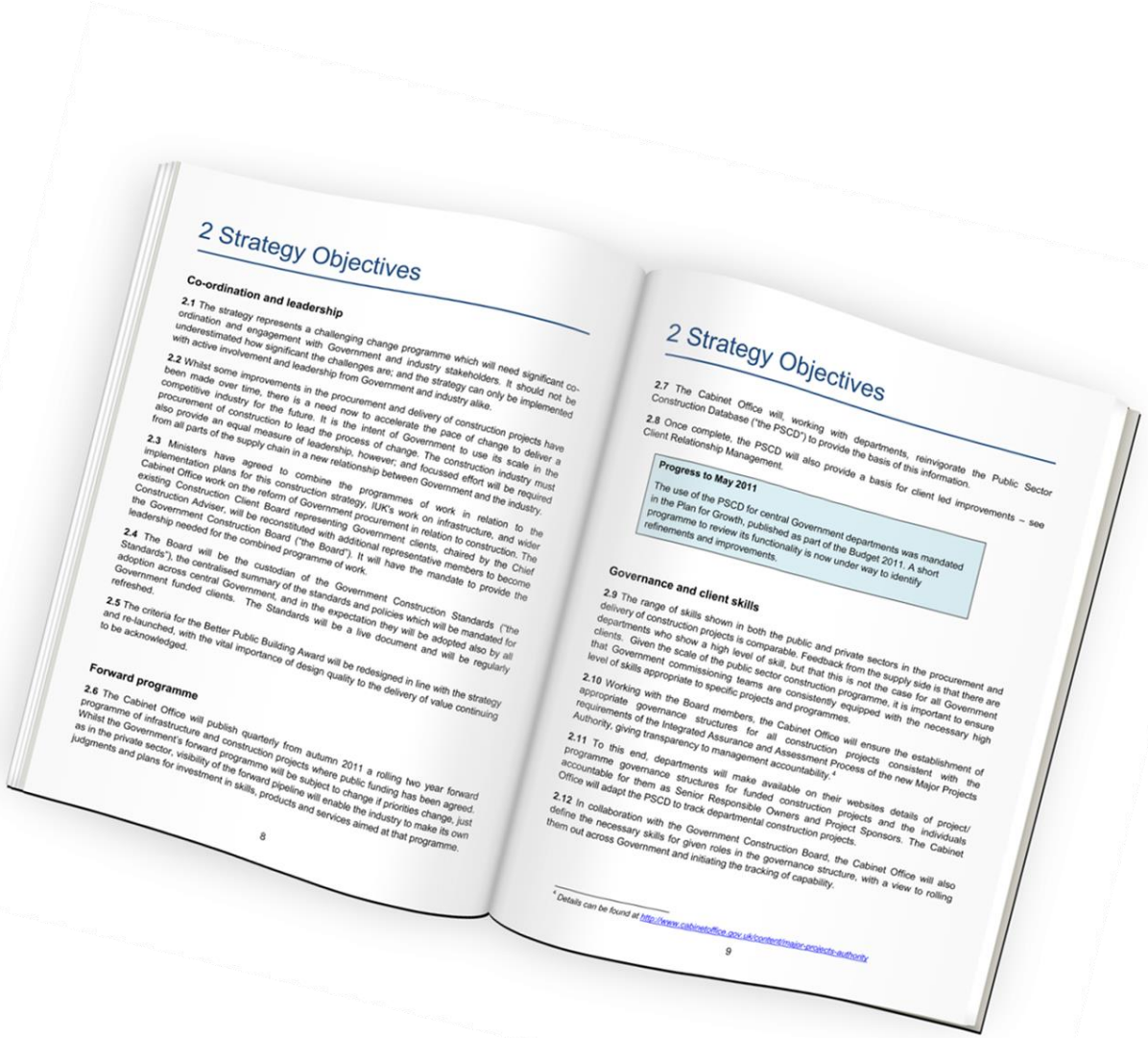
Government Construction Strategy 2011

15-20% cost and carbon reduction on all centrally procured government construction projects **within the current parliament**

2.32 **Government will require fully collaborative 3D BIM** (with all project and asset information, documentation and data being electronic) **as a minimum by 2016**



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Why a Client-Led Approach?

Reason for leadership	Description of the driver
Better value for public money	The public sector procurer has responsibility to gain the most economically advantageous value for public money. The introduction of BIM can offer more accurate and lower construction costs, and the reduction of delays for project delivery of public built assets.
Public procurement as a motivator for innovation	Governments, as the single largest procurers of construction with public sector spending approximately 30% of construction total output, can influence and encourage innovation. This is one of the stated aims for the European Union Public Procurement Directive (2014).
Network effect of adoption: support for SMEs	As the construction industry is highly fragmented with 95% of the industry defined as Small to medium sized Enterprises (SMEs), it is not easily able to organise itself and align on one single direction. Only through the wider adoption of BIM across the value chain will full economic benefits be achieved.
Digitalisation agenda	Governments, policy makers and industry are recognising the benefits of encouraging the digitalisation of industrial sectors. This is an especially important agenda in Europe with the European Commission's Digital Single Market initiative.

Vision: 2025 – Digital Built Britain

Lower costs

33%

reduction in the initial cost of construction and the whole life cost of built assets

Faster delivery

50%

reduction in the overall time, from inception to completion, for newbuild and refurbished assets

Lower emissions

50%

reduction in greenhouse gas emissions in the built environment

Improvement in exports

50%

reduction in the trade gap between total exports and total imports for construction products and materials

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Original State (SWOT Analysis)

STRENGTHS	WEAKNESSES
KEY SECTOR TO UK ECONOMY wider construction accounts for nearly 7% of UK's value added; of which: construction related products and services account for about 1% each and contracting accounts for about 4.7%.[5] Some 3 million jobs are based in construction; 10% of total UK's employment.[6] **WIDER ECONOMIC SIGNIFICANCE** construction sector builds and maintains workplaces to enable businesses to flourish; the economic infrastructure underpinning how economy. functions; provides schools, hospitals and homes. **LARGE SUPPLY CHAIN** accounting for around £124 billion of intermediate consumption,[7] almost all sourced within the UK. In other words, construction spend tends to stay within UK supply chain. **WORLD CLASS DESIGN SKILLS** particularly in architectural design, civil engineering and sustainable construction with BREEAM as an internationally recognised standard. **LOW ENTRY COST AND LOW CAPITAL** required enables small firms to access the market and promotes competition in the sector.	**SECTOR INTEGRATION** vertical integration in the supply chain is low and there is high reliance on sub-contracting. Lack of integration often leads to fracture between design and construction management and a fracture between the management of construction and its execution leading to lost opportunities to innovate. **LOW LEVELS OF INNOVATION** investment in R&D and intangible assets such as new processes (particularly in contracting sub-sector) is low due to uncertain demand for new goods and limited collaboration. **LACK OF COLLABORATION AND LIMITED KNOWLEDGE SHARING** learning points from projects are often team-based and lost when the team breaks up and project ends. Low technology transfer. **HIGH CONSTRUCTION COSTS** in comparison to foreign competitors driven by inefficient procurement and processes rather than material input costs but there are significant opportunities to reduce them through greater use of technology, new materials and innovation.

OPPORTUNITIES	THREATS
LARGE GROWTH OPPORTUNITIES IN EMERGING MARKETS with expected annual growth of 6% in construction output until 2021[8] which creates opportunities for UK companies to expand their exports, both in products and high value services. **LOW CARBON CONSTRUCTION** substantial opportunities both in domestic and foreign markets due to environmental requirements and greater societal demand for greener products. Global green and sustainable building industry is forecasted to grow at an annual rate of 22.8% until 2017. **WIDE IMPLEMENTATION OF BIM TECHNOLOGIES** both domestically and abroad which could improve sector productivity and lower costs due to improved information flow and greater collaboration. **COST REDUCTION** industry is capable of delivering its product at substantially lower cost e.g. through greater efficiency and greater technology and information sharing such as Building Information Modelling (BIM). UK government is committed to reduce the costs of public sector construction by 15-20% by the end of 2014/2015.	**ACCESS TO FINANCE** SMEs in construction face more difficulties in accessing bank finance than other sectors. Late payment is a problem. Companies often unaware of support available to them. **SKILLS** substantial fall in apprenticeship completions in construction related sectors relative to other sectors. Low training among self-employed and skills shortages among trade and professional occupations inhibiting technology deployment and innovation. **LACK OF CAREER ATTRACTION** due to perceived low image, lack of gender diversity, low pay and job security due to cyclical nature of demand for construction. This is especially evident in construction contracting and materials. **INTERNATIONAL TRADE** UK has not yet specialised in construction exports despite its capability in construction technology and services and relatively higher proportion of construction-related patents comparing to its competitors. UK remains a net importer of construction products and materials. **HIGH DEGREE OF FRAGMENTATION** relative to other sectors and countries which impacts on levels of collaboration, innovation and ability to access foreign markets

National BIM Programme

Sponsor

Goal

"In 5 years: Deliver 15-20% savings and a more competitive digital construction sector"

Strategy

- Context and Why
- Business Case
- Alignment
- Public procurement

Implementation Plan

- Governance
- Funding, resources
- Roadmap, plans, deliverables
- Barriers, risks

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Funded stewardship team

5 Year target for BIM Level 2
On centrally funded Government construction projects

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HM Government

Construction strategy

The construction industry is vital to this government's long term economic plan.

The government has been working with the construction industry to get better value from public spending.

2011
Government Construction Strategy was published

2014
It has saved
£1.4bn

Government saved **£840m** last year on construction projects – **exceeding the target by 13%**

£840m

Department of Health **saved £60m** on construction projects last year – equal to the price of

67
MRI scanners

We now build **7 schools for the old price of 5**

#BuildingBritain #GCSummitUK

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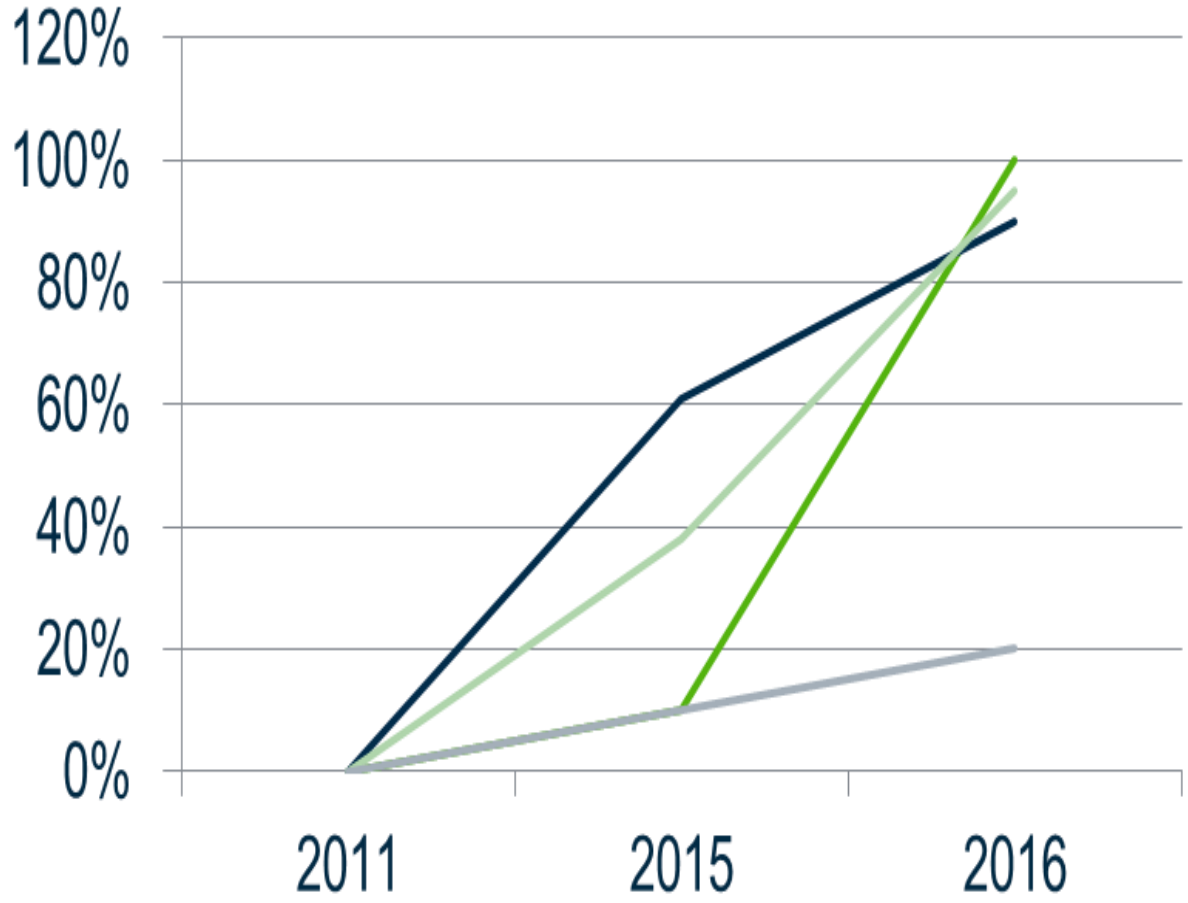
Rate of adoption



Approximate value of BIM Projects as September 2014
(1) HA - This equates to £6bn project value
(2) MOJ - This equates to £760m project value
(3) EA - This equates to £900m project value
(4) LA - This equates to £2bn project value

Total project value c £9.6bn

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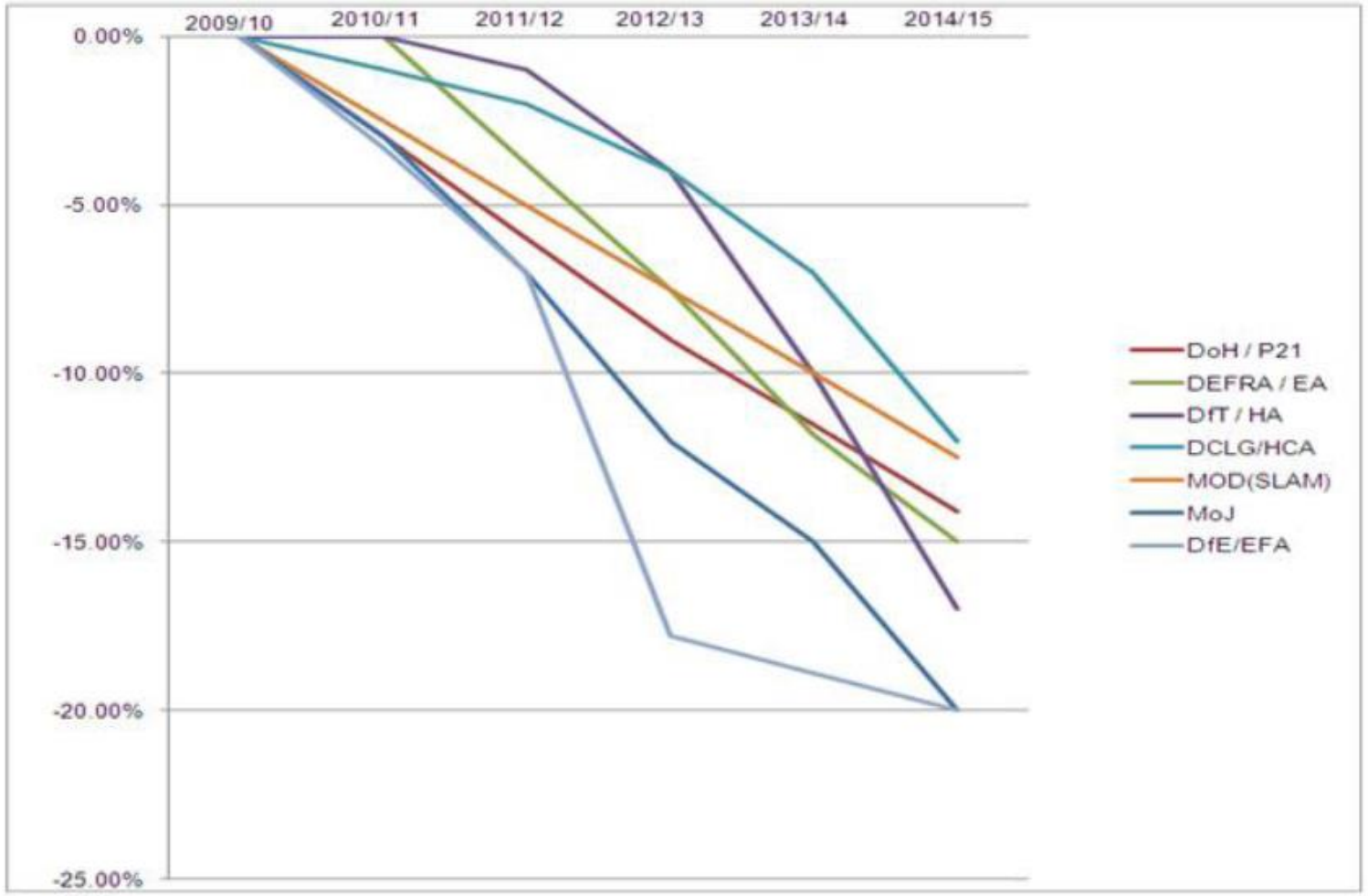
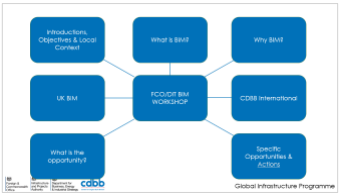
Benefits tracking

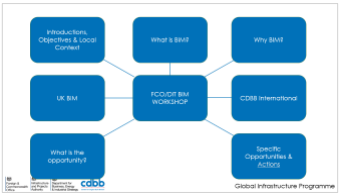


- Savings documented by departments by year

Section Summary



Centre for Digital Built Britain (CDBB) International Programme



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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

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How CDBB supports the Digital Transformation of the Built Environment

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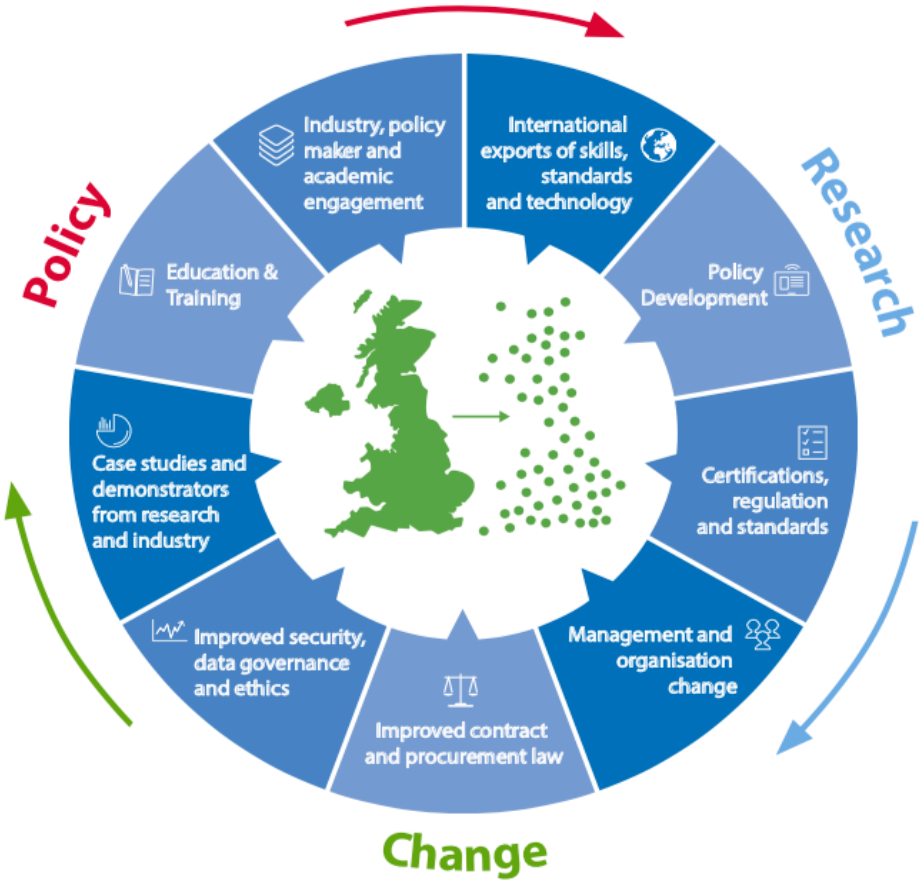

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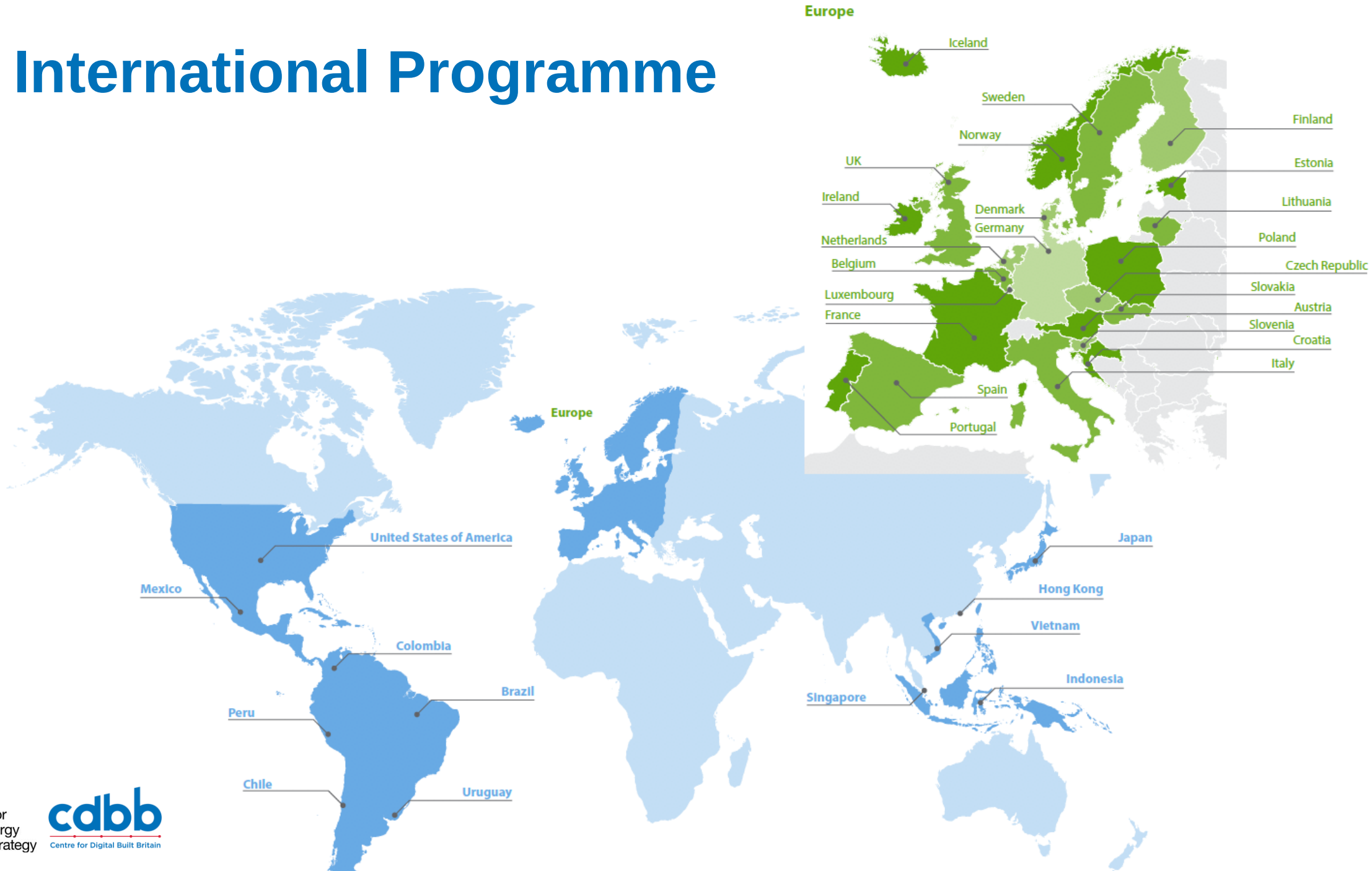
Supporting change

- Coordinated vision and roadmap towards a DBB
- Grow an open and global digital construction market
- Industry engagement programme across the supply chain
- Highlighting current and emerging good practice
- Sharing value cases to encourage the adoption of digital approaches

International Programme



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International Timeline

2014 - EU BIM Task Group

2015 - Chile

2016 - Brazil, *Mexico*, Japan

2017 - Prosperity Global Infrastructure Programme

CDBB International

2018 – Vietnam, Indonesia, Colombia

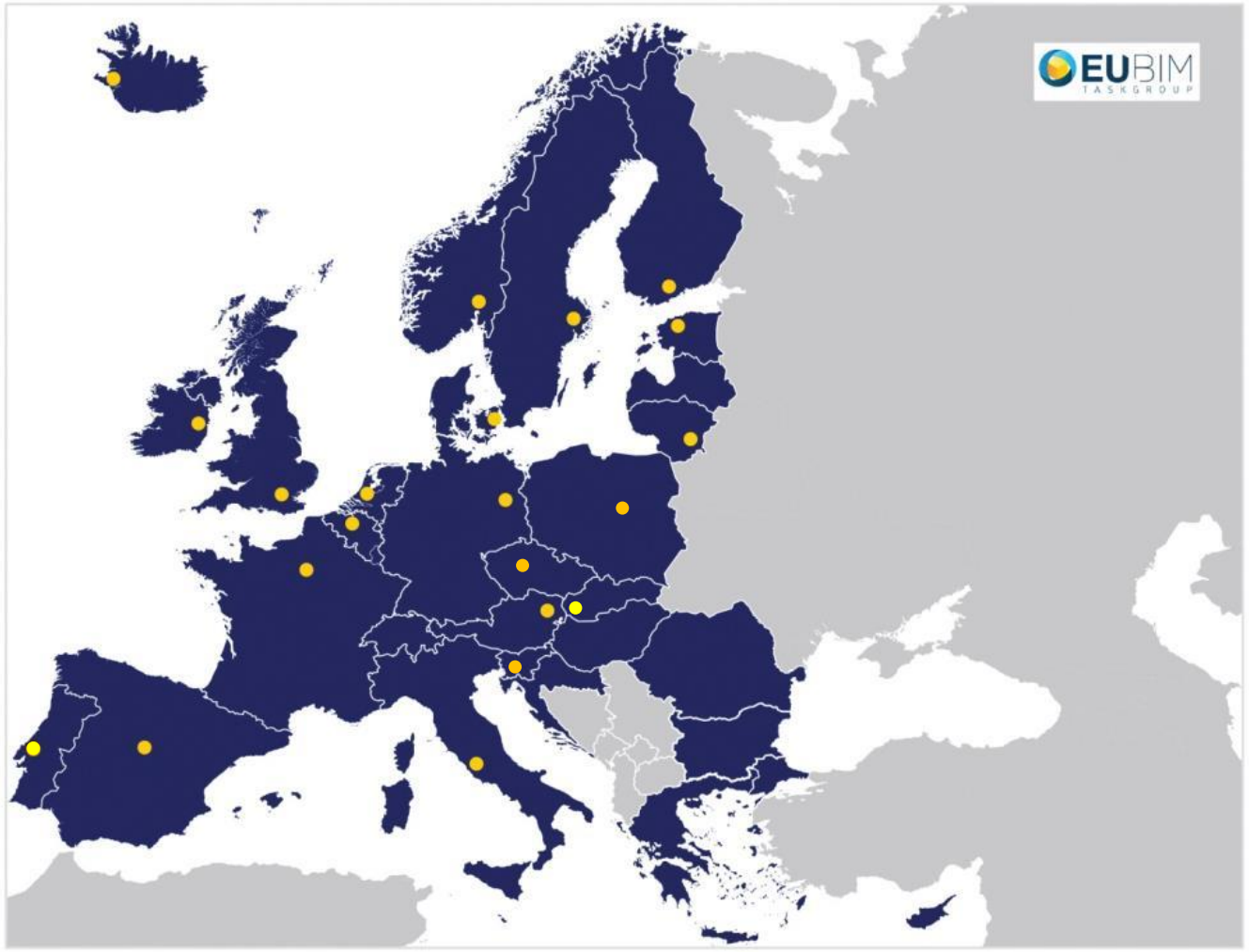
Latin America & South East Asia Regional

Multilaterals

ISO Standards

EU BIM Task Group

- Austria
- Belgium
- Croatia
- Czech Republic
- Germany
- Denmark
- Estonia
- Spain
- Finland
- France
- Ireland
- Iceland
- Italy
- Latvia
- Luxembourg
- Lithuania
- Netherlands
- Norway
- Poland
- Portugal
- Slovakia
- Slovenia
- Sweden
- UK



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The EU BIM Handbook

- The handbook provides a central reference point for the introduction of Building Information Modelling (BIM) by the European public sector and aims to equip Government and public sector construction clients with the knowledge to provide the necessary leadership to its industrial supply chain. It is produced and supported by the EU BIM Task Group (EUBIMTG).

- Now available in 20 languages!
- www.eubim.eu/handbook-selection

Key Principles

Exchanging best practice

Demand-led, country-owned, locally coordinated

Consistent & Standards-based

Adapted / Appropriate to local context

General Approach

Why?

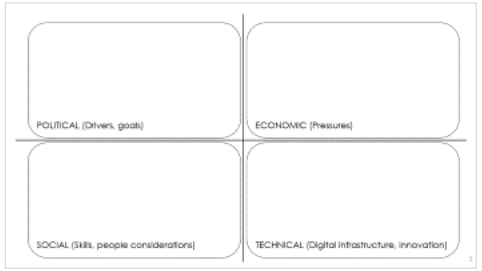
- Challenges & Opportunities
- Business Case

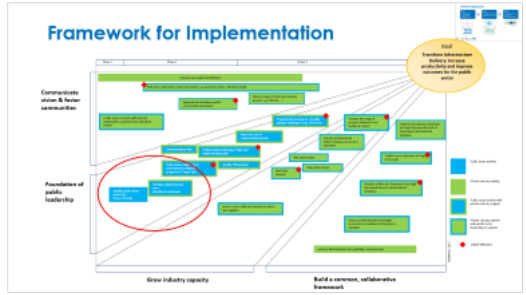
How?

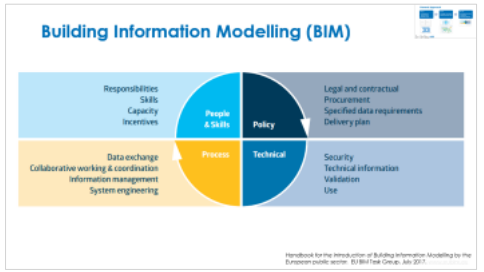
- Strategic Framework
- Implementation Plan

What?

- Building Information Modelling
- National definition







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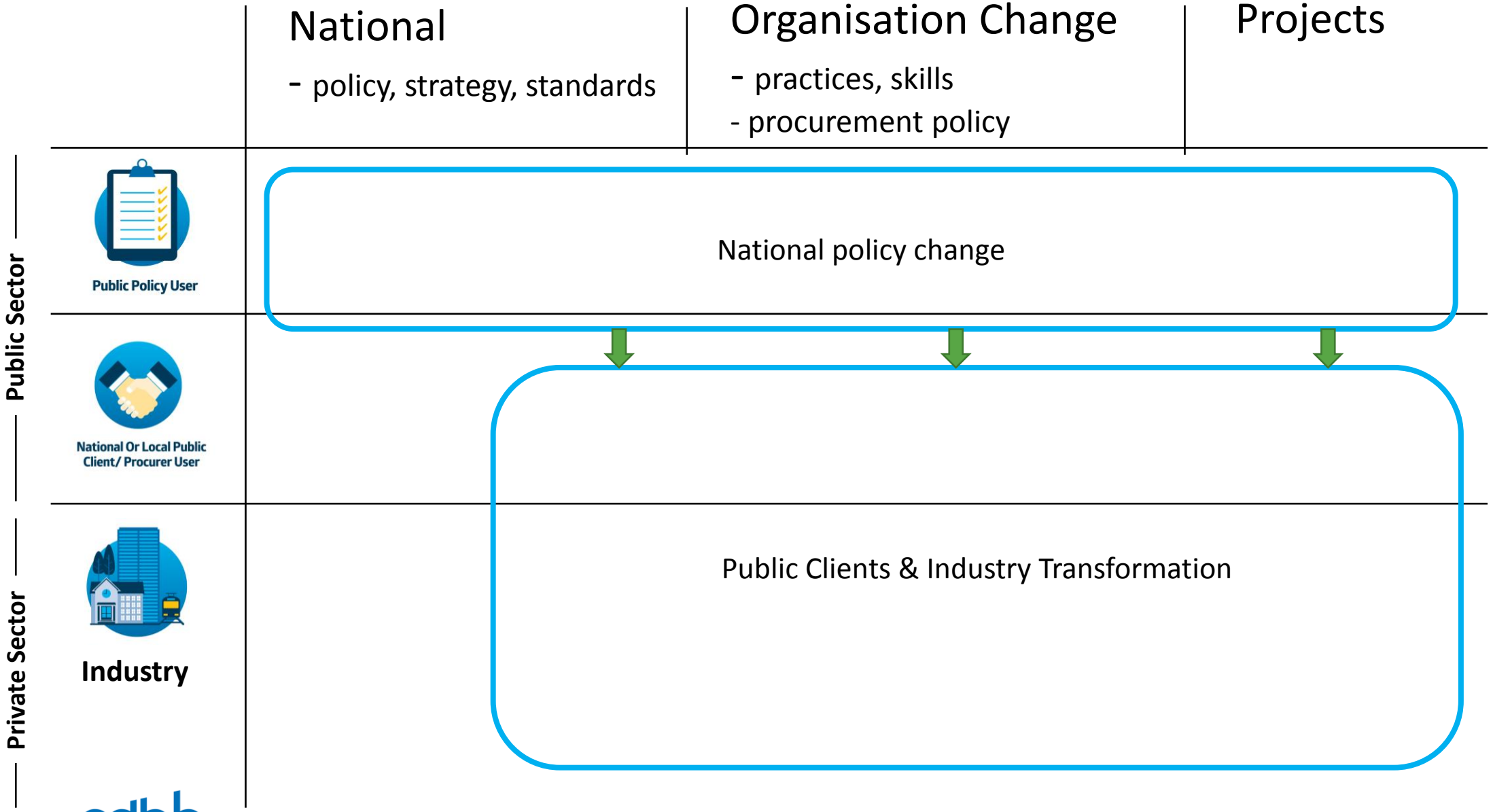

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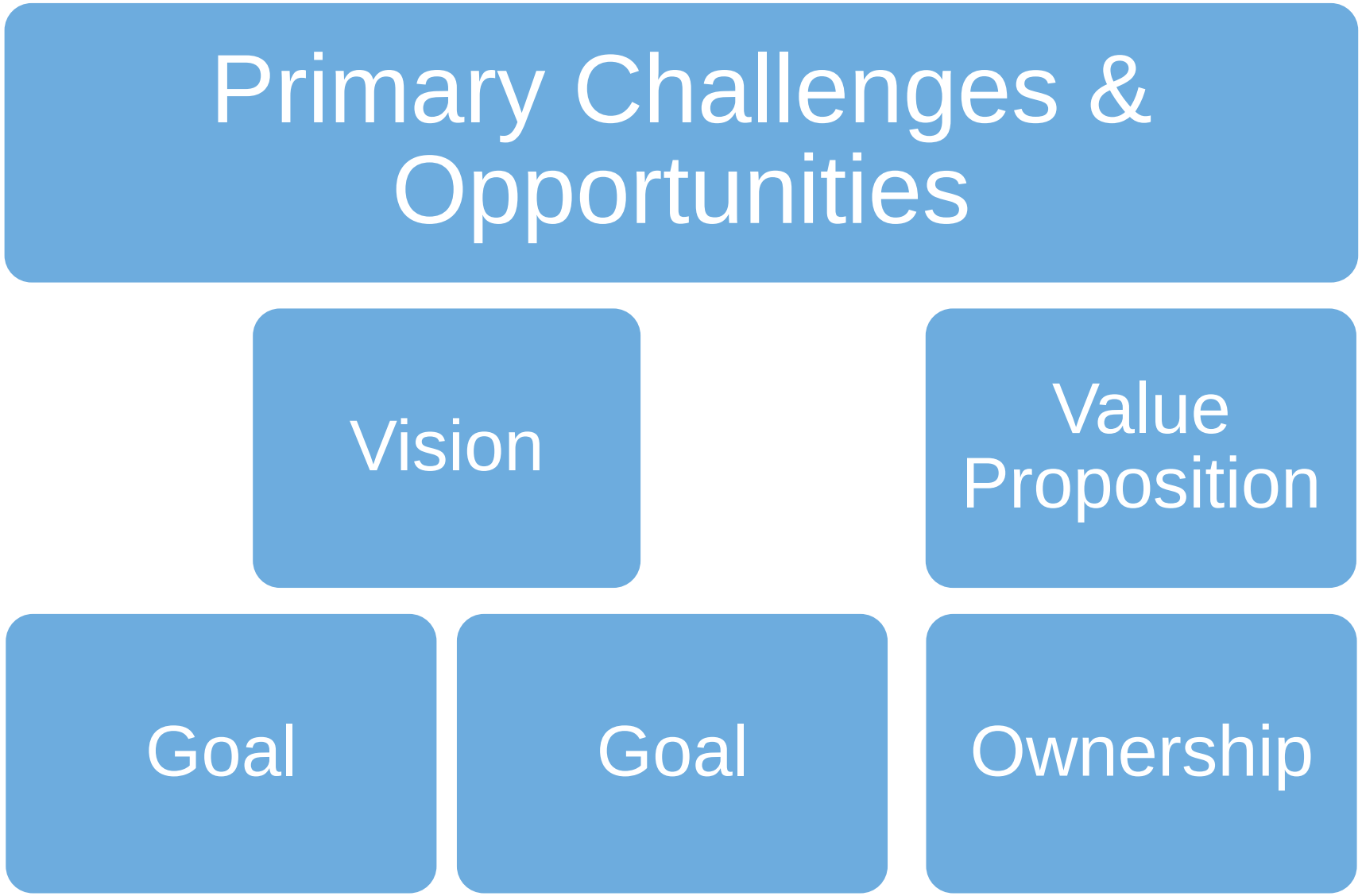
POLITICAL (Drivers, goals)

ECONOMIC (Pressures)

SOCIAL (Skills, people considerations)

TECHNICAL(Digital infrastructure, innovation)

Establish Challenges, Goals, Ownership



Strategic Transformation Framework

Grow industry capacity

Early wins, pilot projects, training
Increasing use of strategic lever to grow capacity
Measure and monitor, case studies, embed change

Communicate vision and foster communities

Engage industry stakeholders
Create regional and focus networks
Events, media, web, social media

Build a common, collaborative framework

Legal and regulatory framework
Data and process standards
Skills, tools, guidance

Foundation of public leadership

Compelling drivers, visions and goals
Aligned value proposition and strategy
Sponsor, funded programme, stewardship team

Framework for Implementation

Goal

Transform Infrastructure Delivery: Increase productivity and improve outcomes for the public sector

Communicate vision & foster communities

Foundation of public leadership

Phase 1 | Phase 2 | Phase 3

Industry and academia initiatives

Web, press interviews, media and events: e.g. announce vision / strategy / goals

Diverse range of client and industry groups: e.g. "BIM for ..."

Regional and discipline specific communities of practice

Public sector consults with industry stakeholders, academia and standards bodies

Progressively increase no. of public projects requiring 5-Case, PIR & BIM

Increase the range of projects delivered: case studies & metrics

Improve and enhance standards and legal framework based on learning and international definition

Resources and an Implementation group

Industry and academia deliver training courses and education

Communications Plan

Publish National Strategy / High level implementation plan

Pilot case studies

Publish set of standards and legal framework

Public sector statement of commitment to National programme: Target Year

Identify Pilot projects

Start Pilot projects

Train public clients

Develop unified set of standards and legal framework based on international definition

Identify public sector sponsor(s) – Drivers & Goals

Develop outline business case – Benefits & Investment

Assess current skills and capacity in clients and suppliers

Assess current standards and legal documents as enablers and barriers to adoption

Industry BIM standards and guidelines developments

Public Sector activity

Private industry activity

Public sector activity with private industry support

Private Industry activity with public sector leadership or support

Critical Milestone

Matthews, 2017

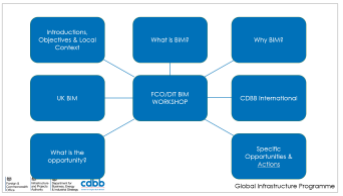
Grow industry capacity

Build a common, collaborative framework

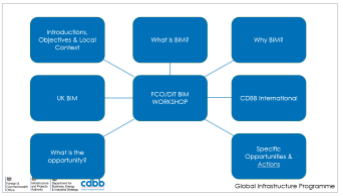
Building Information Modelling (BIM)

Handbook for the Introduction of Building Information Modelling by the European public sector. EU BIM Task Group. July 2017. www.eubim.eu

Section Summary



Potential Next Steps



Department for Business, Energy & Industrial Strategy

cdbb
Centre for Digital Built Britain

Possible next steps

- Identify objectives / outcomes for how BIM can enable your organization / you to be more efficient & effective
- Consider how BIM enables / requires changes to roles, responsibilities and deliverables
- Contribute to the development of a structured strategy for the introduction of BIM in your organisation
- Consider if you can contribute to transformation beyond your current role, project or organization
- Leverage best practice from around the world and adapt to your context

Section Summary