



# DIGITAL TRANSFORMATION IN CONSTRUCTION

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September 2020

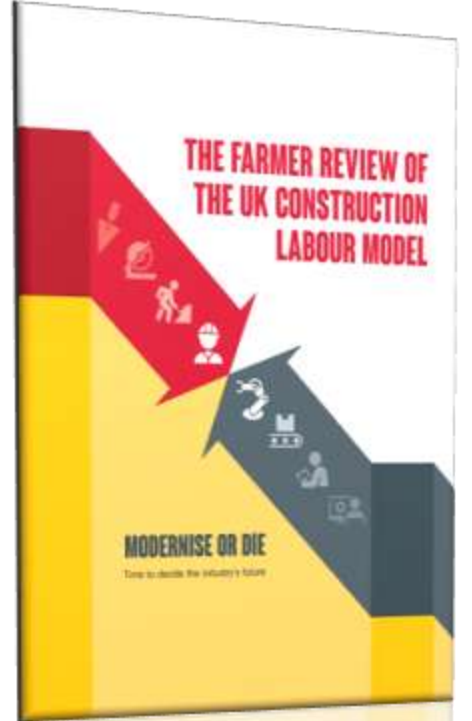
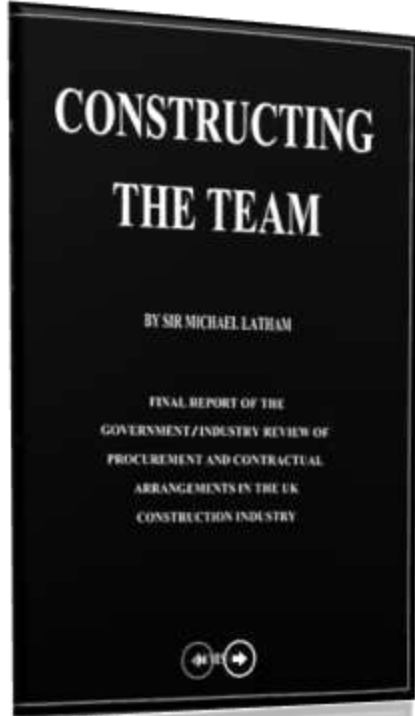
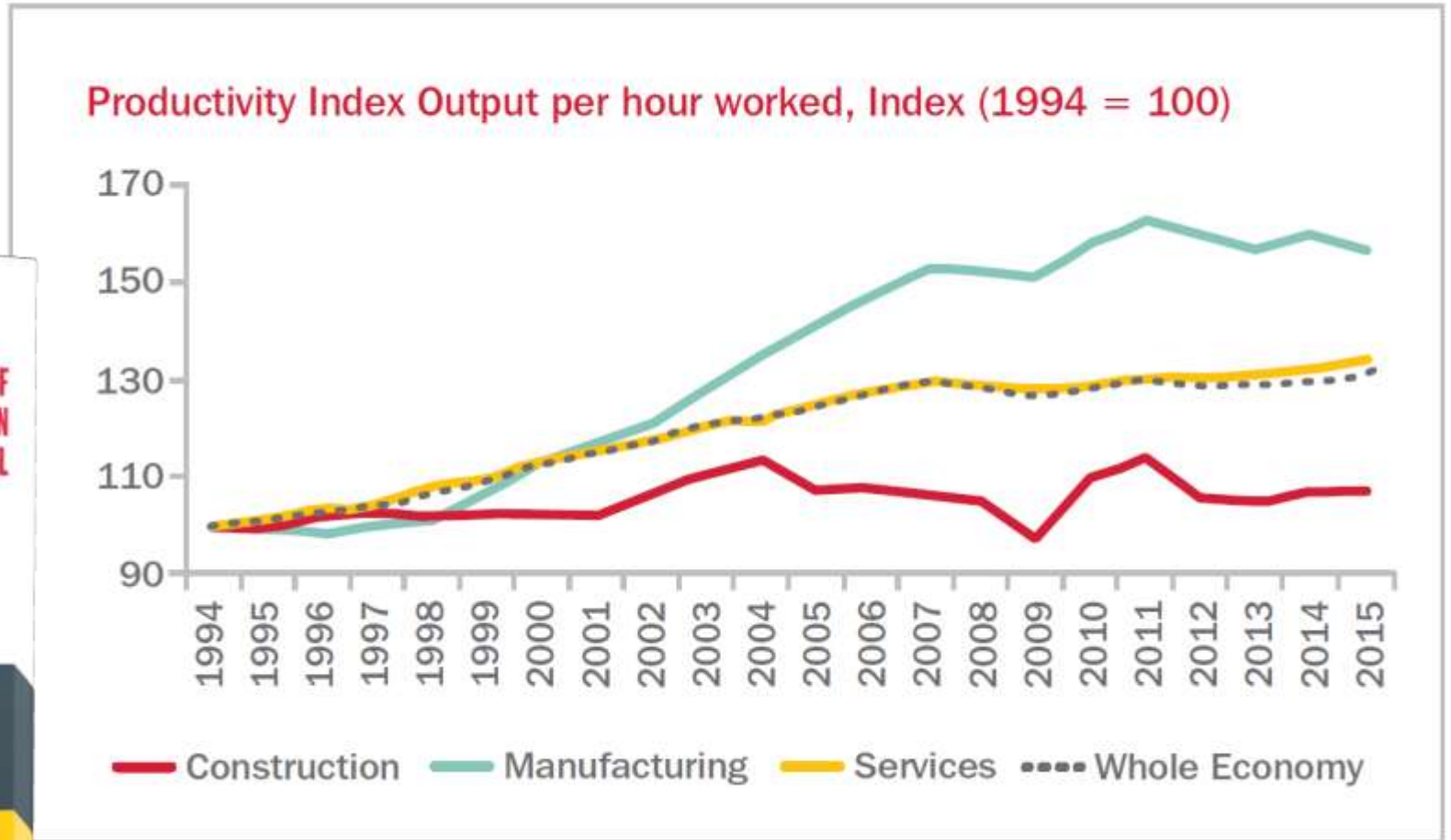
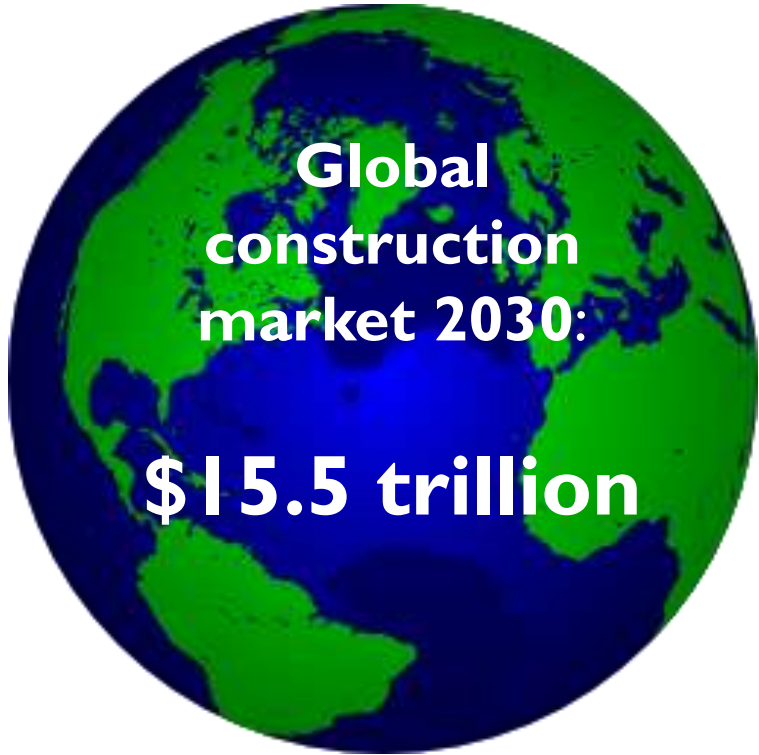


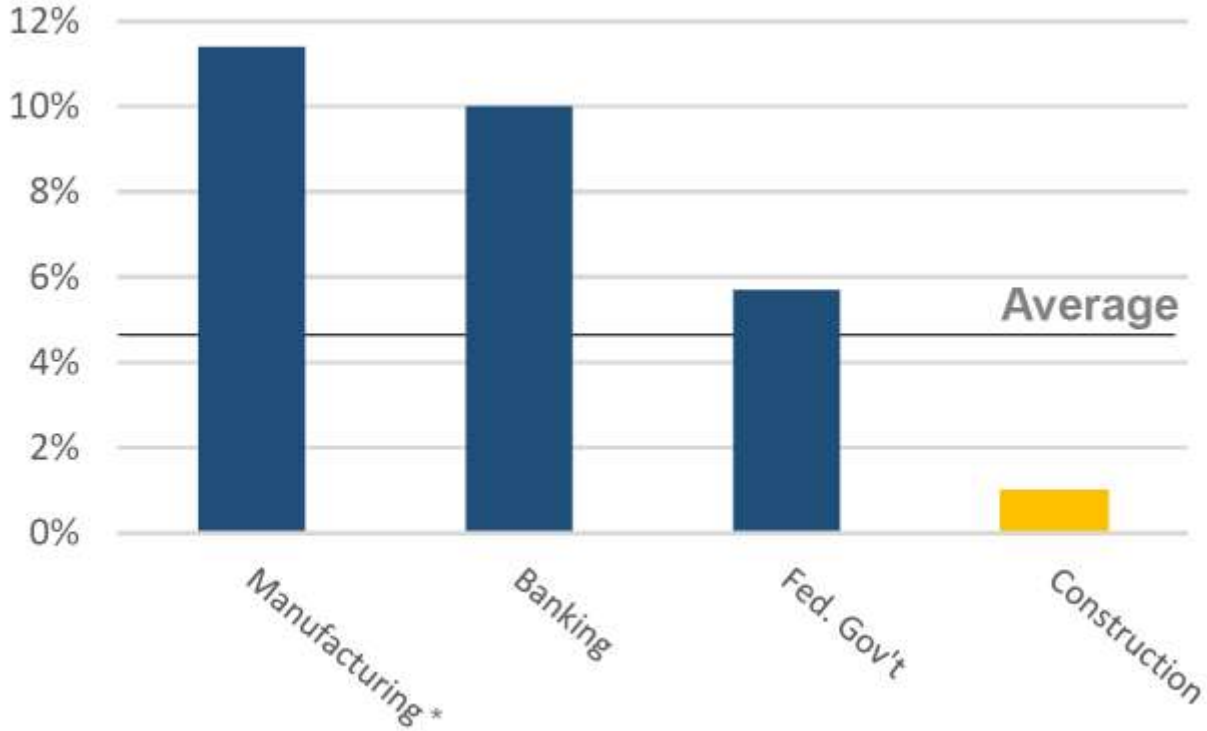


Figure 3: ONS Labour Productivity, Q4 2015. Table 1 and 8. April 2016.





# Construction under-invests in IT



# digitization

/dɪdʒɪtaɪˈzeɪʃ(ə)n/

noun

noun: digitisation

the conversion of text, pictures, or sound into a digital form that can be processed by a computer.  
"the digitization of the rare map collection at the library"

Translate digitisation to

Use over time for: digitisation



Show less

## The MGI Industry Digitisation Index for Europe

2015 or latest available data

Relatively low digitisation Relatively high digitisation

● Digital disruptors within relatively less-digitized sectors

Sector	Overall digitisation	Assets		Usage		Labour			Share of value added, 2013 <sup>1</sup> %	Share of employment, 2015 <sup>2</sup> %
		Digital spending	Digital asset stock	Digital transactions	Digital interactions	Digitised business processes	Digital spend per worker	Digital capital deepening		
ICT	Green	Green	Green	Green	Green	Green	Green	Green	4.5	2.7
Media	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	1.2	1.1
Finance and insurance	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	5.4	3.0
Professional services	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	6.3	6.0
Wholesale trade	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	6.5	5.3
Advanced manufacturing	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	4.4	4.2
Chemicals and pharmaceuticals	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	1.9	2.3
Utilities	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	2.3	1.0
Oil and gas	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	0.2	0.1
Basic goods manufacturing	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	8.1	7.8
Mining	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	0.8	0.4
Real estate	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	12.1	1.0
Transportation and warehousing	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	5.0	5.2
Retail trade	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	4.4	8.8
Personal and local services	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	6.3	7.8
Government	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	6.5	7.1
Education	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	5.3	7.7
Health care	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	7.4	11.1
Entertainment and recreation	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	1.3	1.7
Hospitality	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	3.0	4.7
Agriculture	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	1.7	4.2
Construction	●	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	5.3	6.8

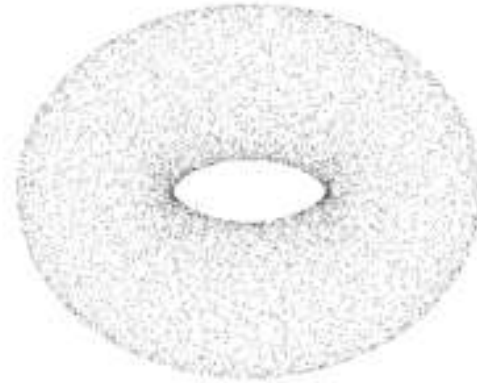
Mckinsey Global Institute (June 2016)  
Digital Europe: Pushing the Frontier, Capturing the Benefits.



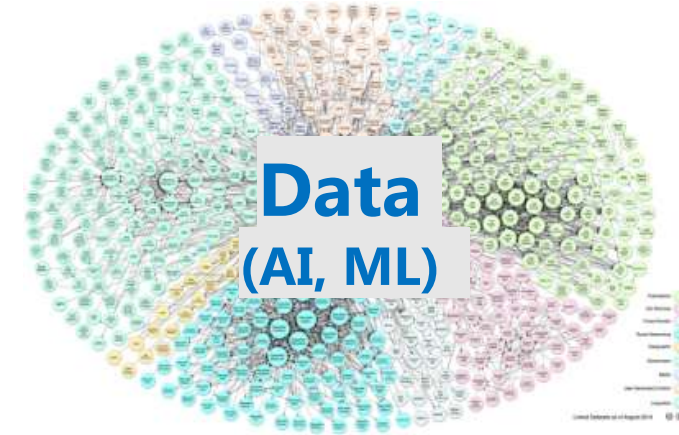
**connectivity**



**mobile  
computing**



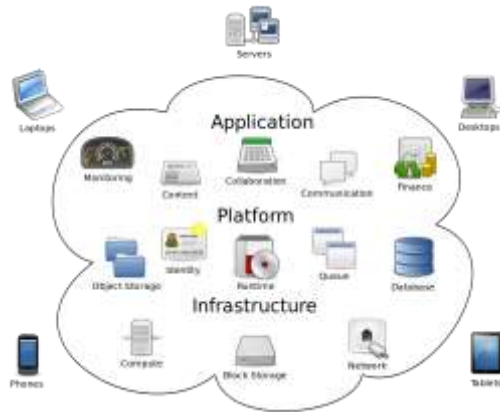
**reality capture**



**Data  
(AI, ML)**



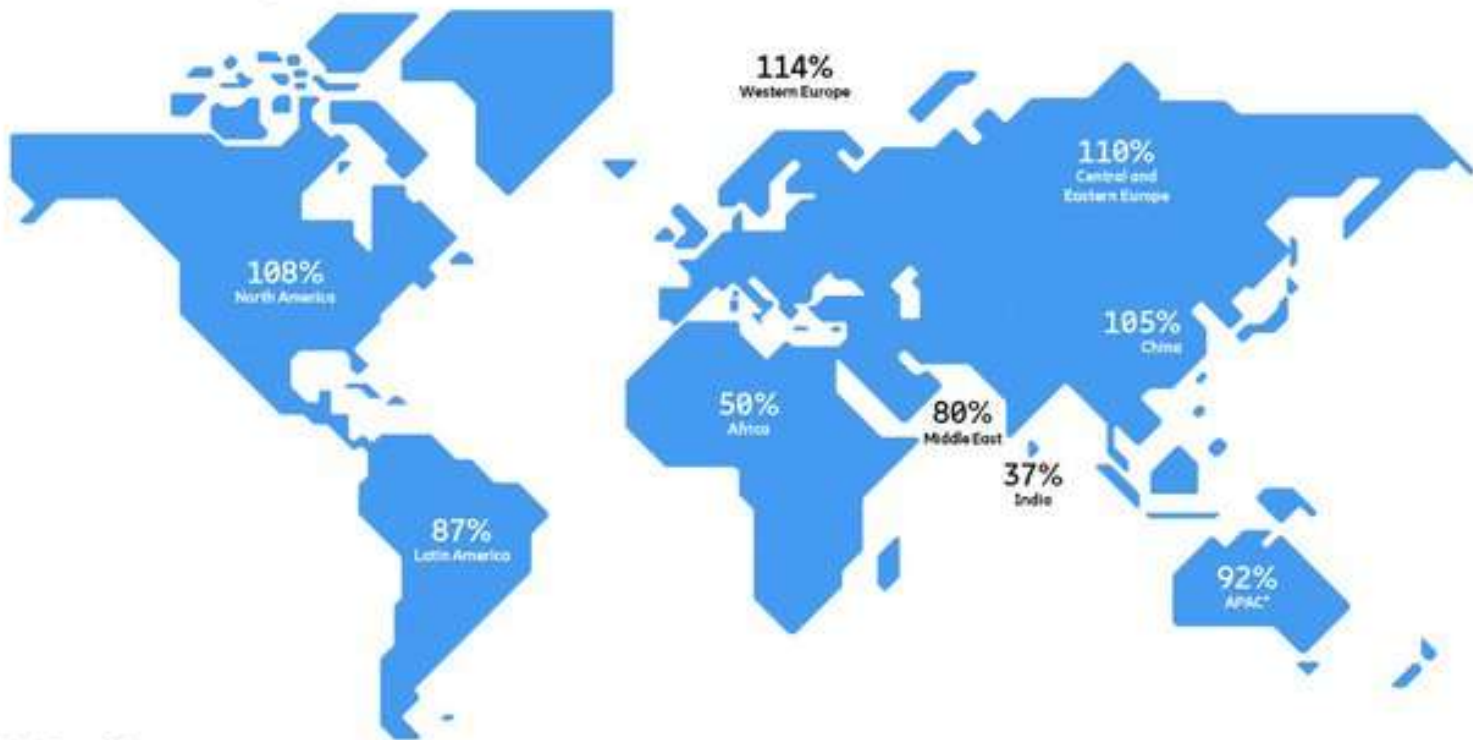
**cloud computing**



**Internet of  
THINGS**



## Mobile broadband subscriptions penetration 2018



\* excluding China and India

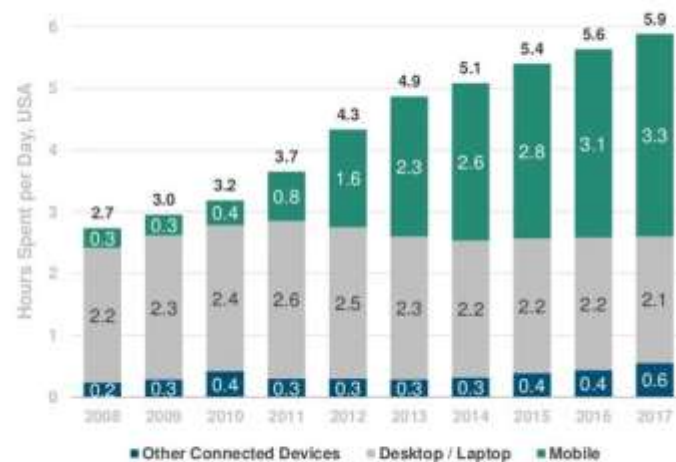
Note: The number of mobile broadband subscriptions exceeds the population in many regions, which is largely due to inactive subscriptions, multiple device ownership or optimization of subscriptions for different types of calls

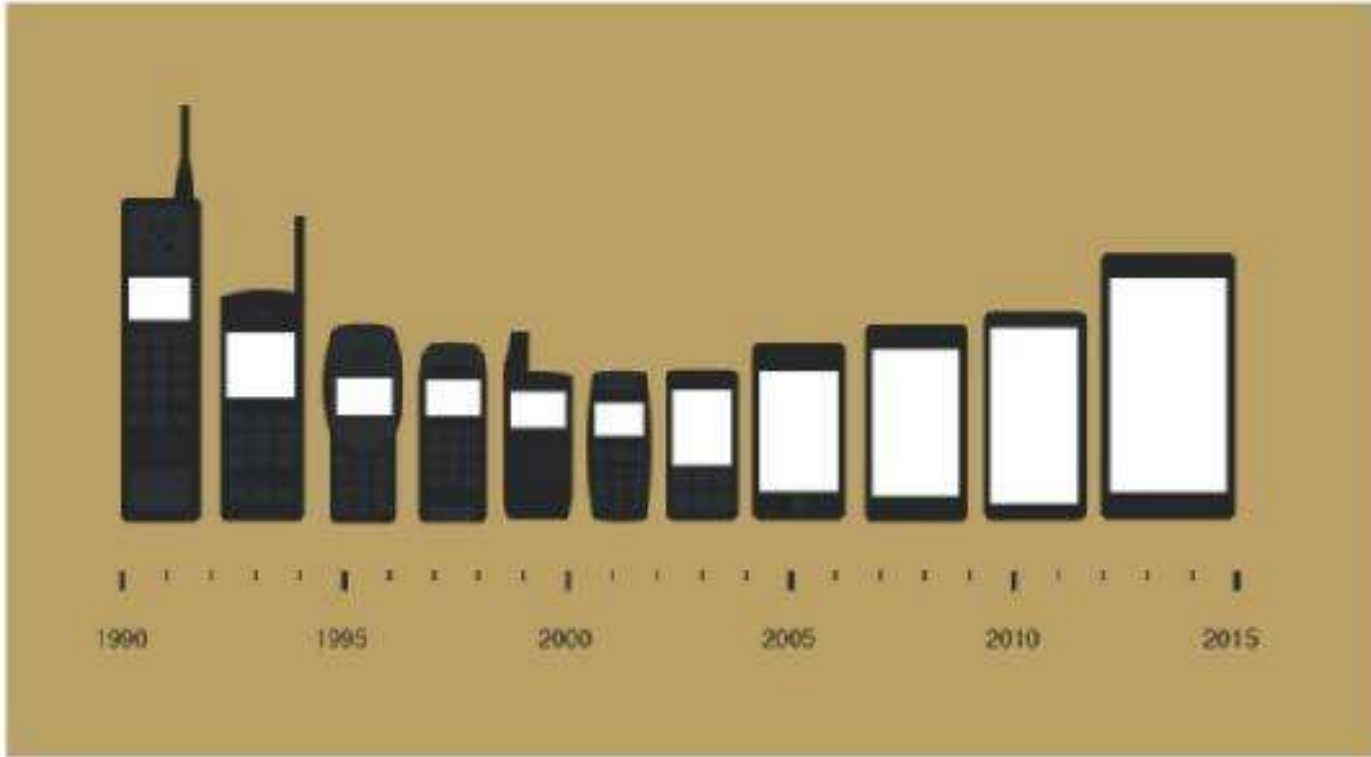
Ericsson Mobility Report January 2019



# connectivity

## Daily Hours Spent with Digital Media per Adult User





# mobile computing

How we use our smartphones

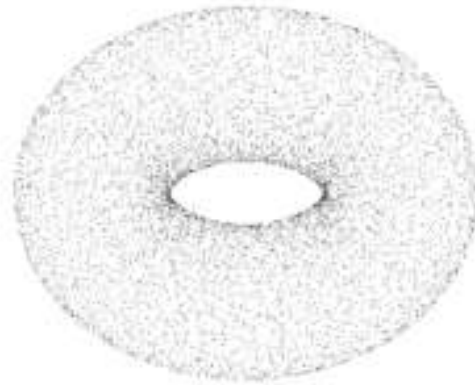
ACTIVITY BY AVERAGE TIME PER DAY



Source: O2

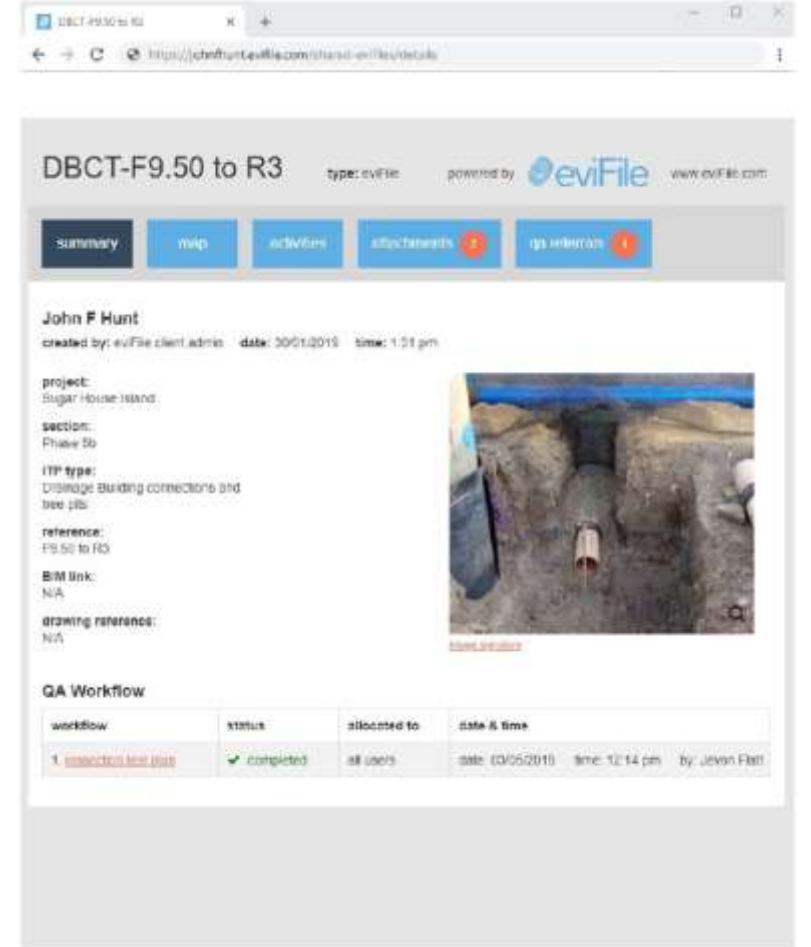
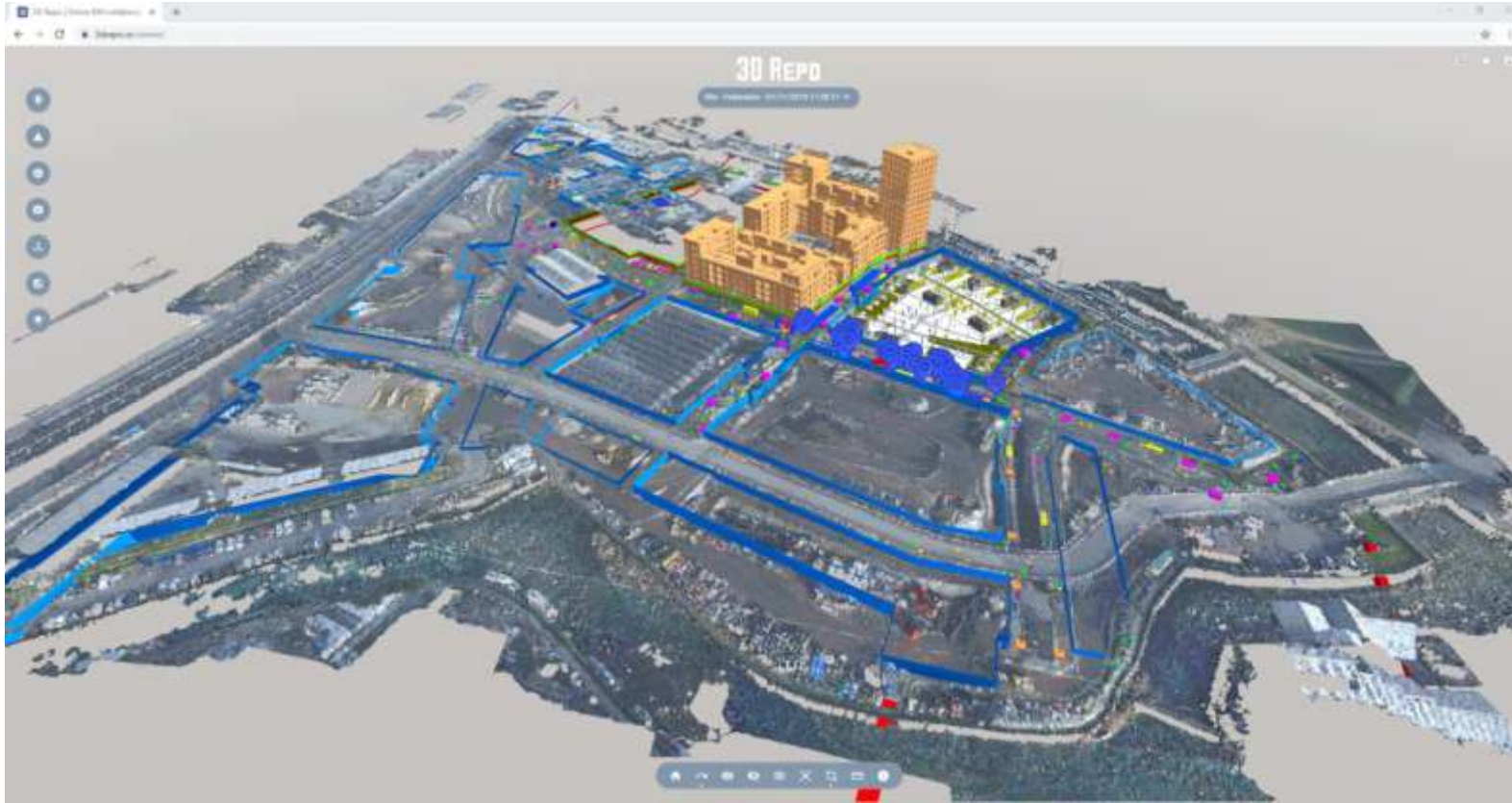


- **Laser-scanning (static, mobile + drones)**
- **Photogrammetry**
- **360-degree photography**
- **2D data conversion ('RetroBIM')**



## **reality capture**

- **Virtual reality**
- **Augmented reality**
- **Mixed reality**
  
- **Immersive worlds ('caves')**
- **Headsets**
- **Screen-viewed (PC, smartphone, etc)**



**3D REPO** 

Figure 5: Evidence collected in the field via eviFile, and linked to the model in 3D Repo.



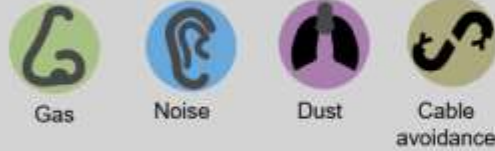
 Microsoft  
HoloLens



# REACTEC

INFORM : PROTECT : DEPLOY

## Third party sensors



Connect to Bluetooth enabled 3rd party systems

Cirrus doseBadge<sup>5</sup>



Pambry PED0828



Leica – Cable Detection.



Manage all your monitoring inventory within Reactec's connected worker system



## Reactec sensors



### HAWEAR

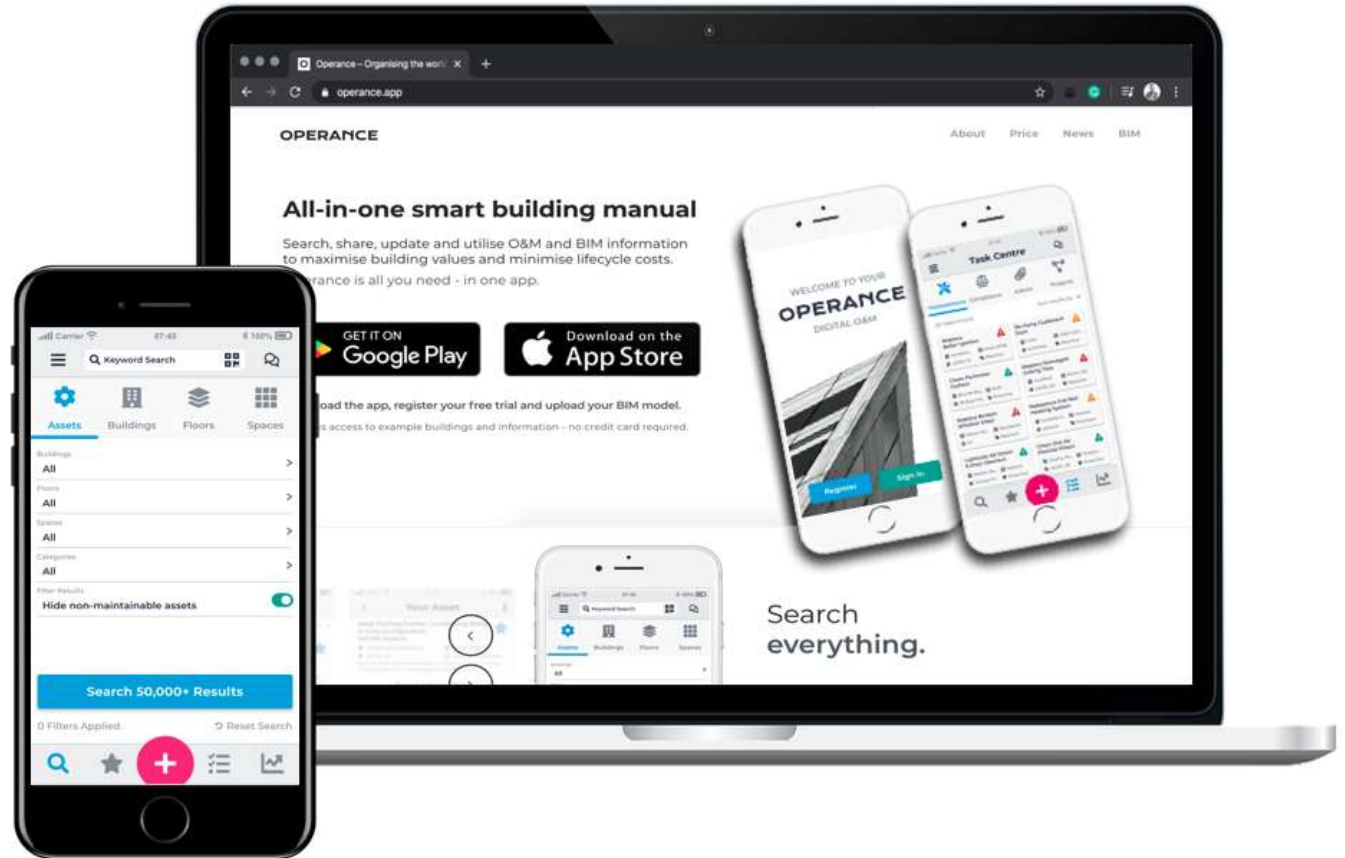
Leading edge HAV sensor  
Proximity detection



### RASOR

Communication hub to allocate 3<sup>rd</sup> party sensors and manage data  
Proximity detection  
Lone worker protection.

# OPERANCE



ATMO<sup>®</sup>  
TUBE


PRODUCTS ▾ COMPARE SUPPORT BLOG EUROPE ▾ EN ▾ CART 0

A NEW GENERATION OF

# Wearable Air Pollution and Weather Trackers

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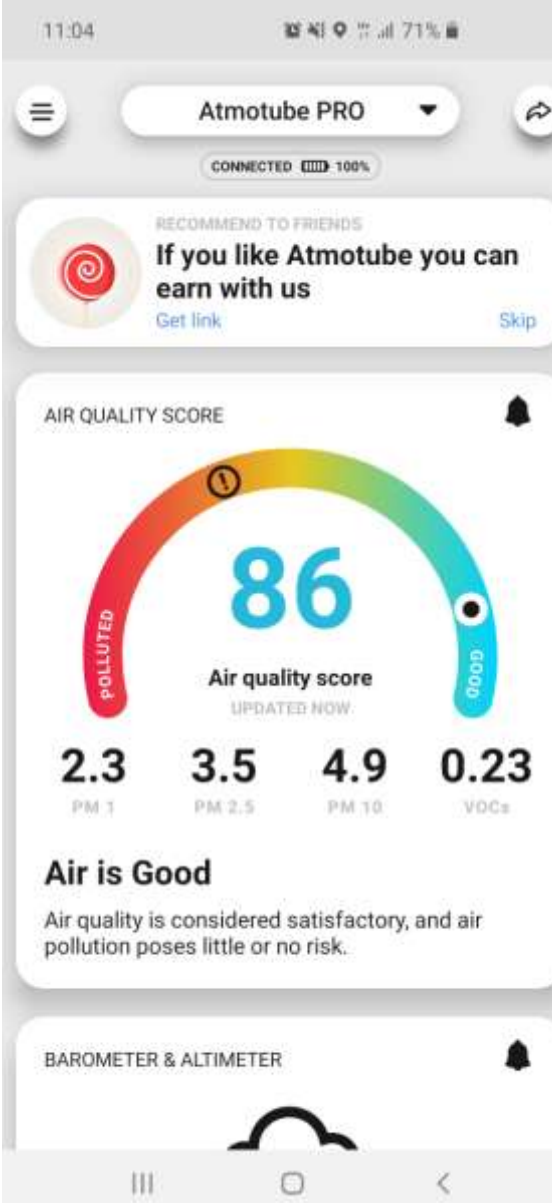
2.3 3.5 4.9 0.23

PM 1 PM 2.5 PM 10 VOCs

**Air is Good**

Air quality is considered satisfactory, and air pollution poses little or no risk.

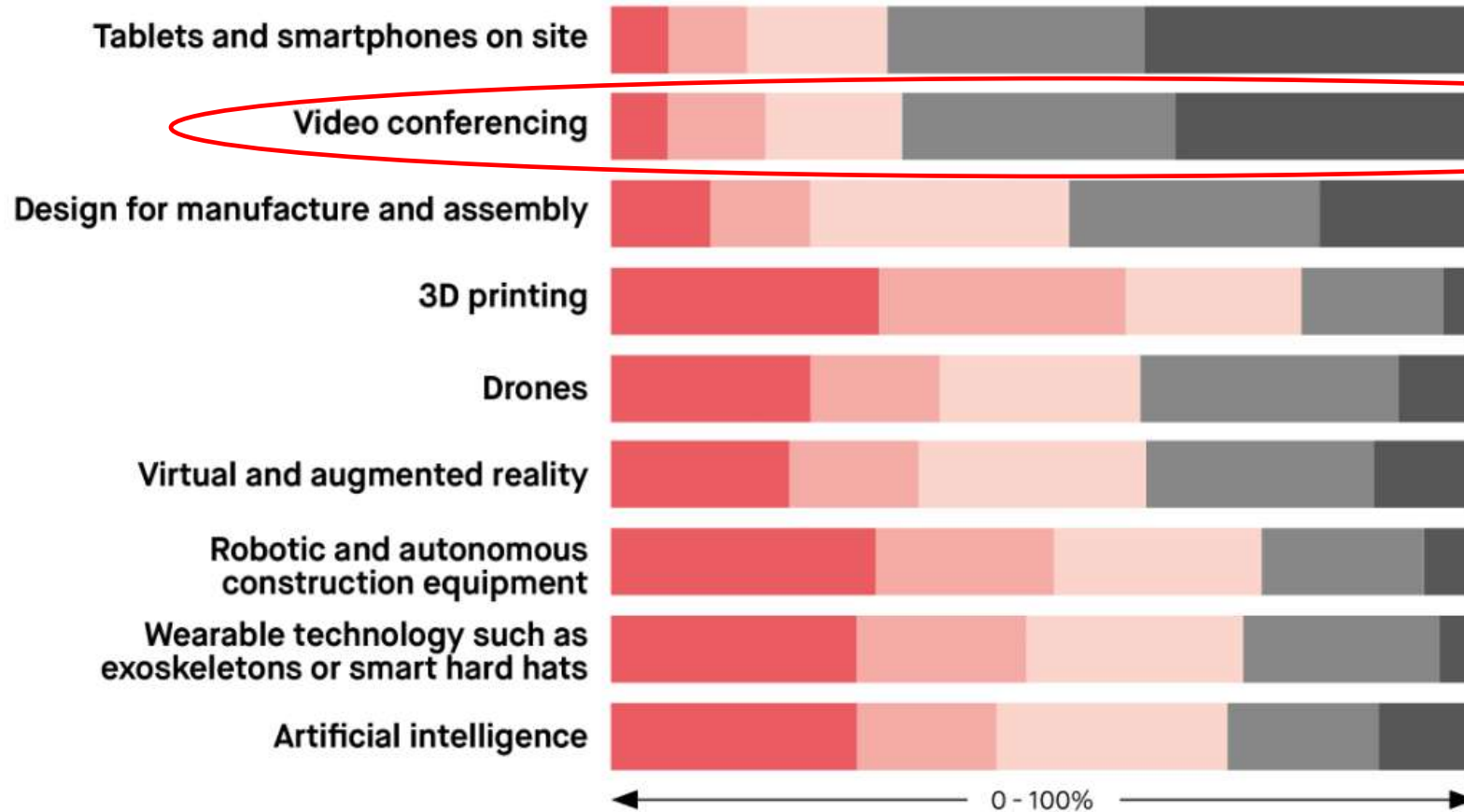
BAROMETER & ALTIMETER



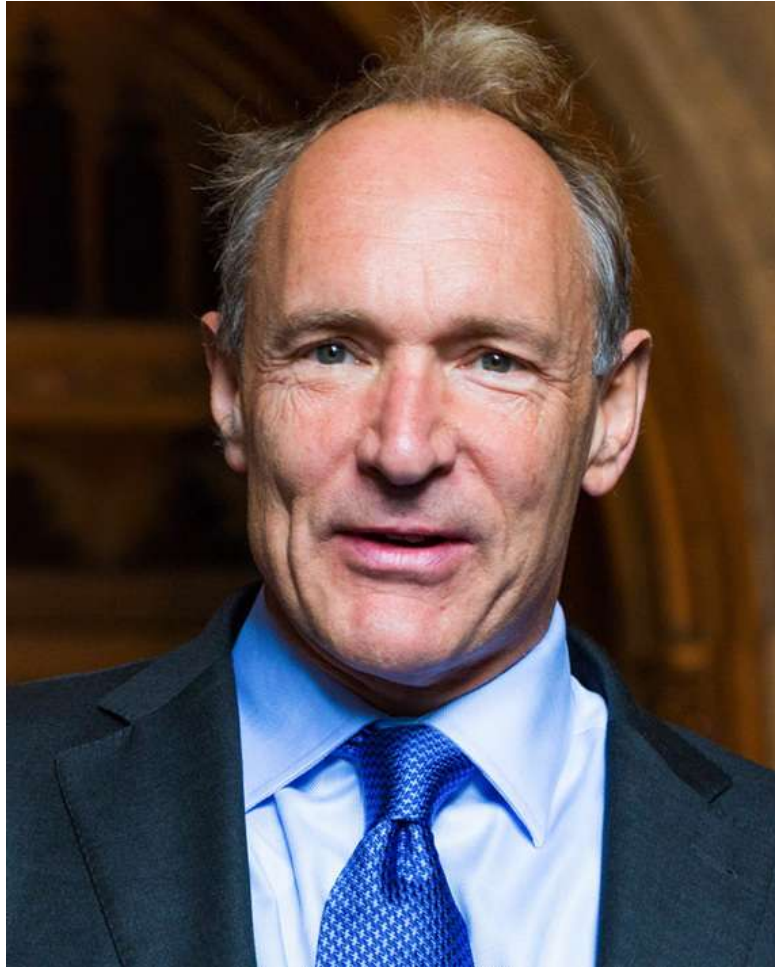
## Which of the following technologies are benefiting or are likely to benefit your operations?

On a scale of 1 to 5, where 1 is little benefit and 5 is high benefit

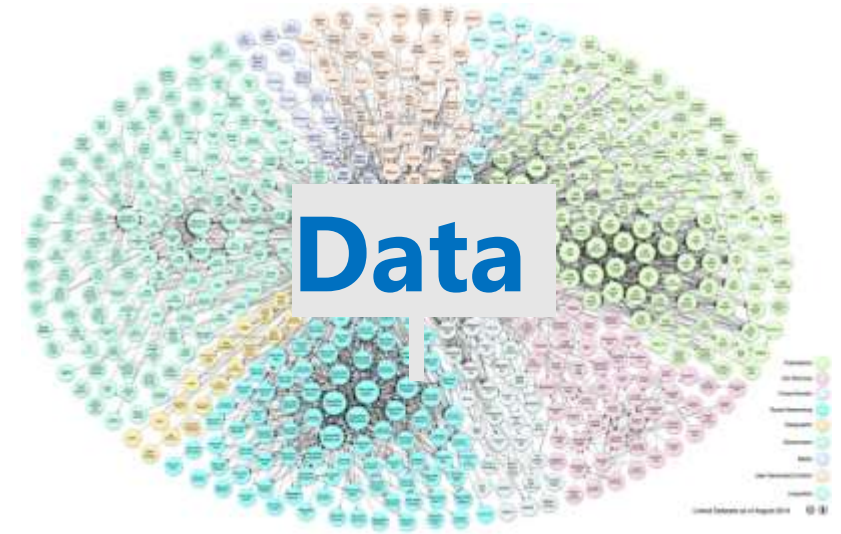
1 2 3 4 5



*BIM+ / Construction Manager  
BIM survey. (published 26  
May 2020) – survey of 291  
respondents*



**“... if the past  
was document  
sharing, the  
future is data  
sharing”  
(Tim Berners-Lee)**

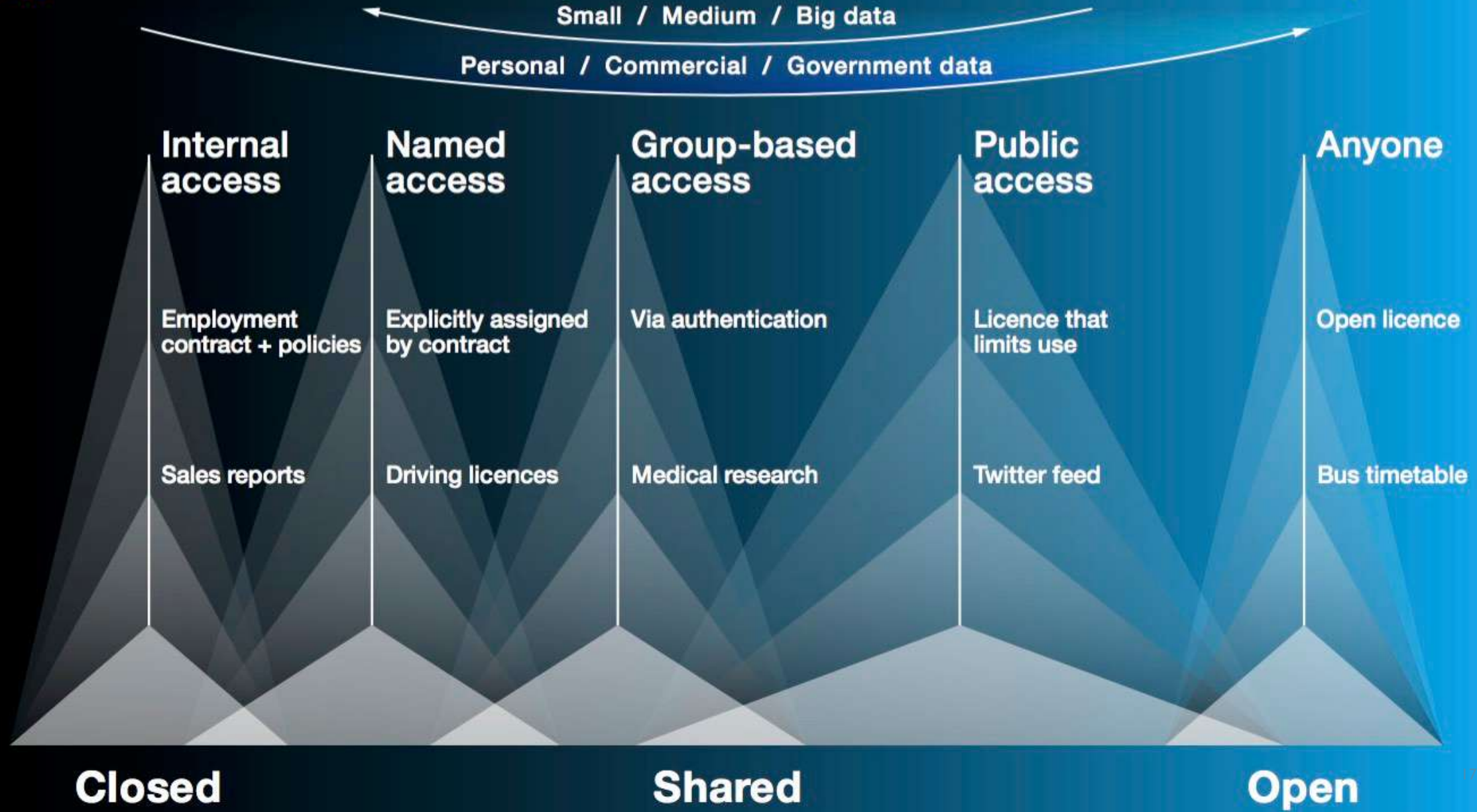


- Big
- Open
- Linked

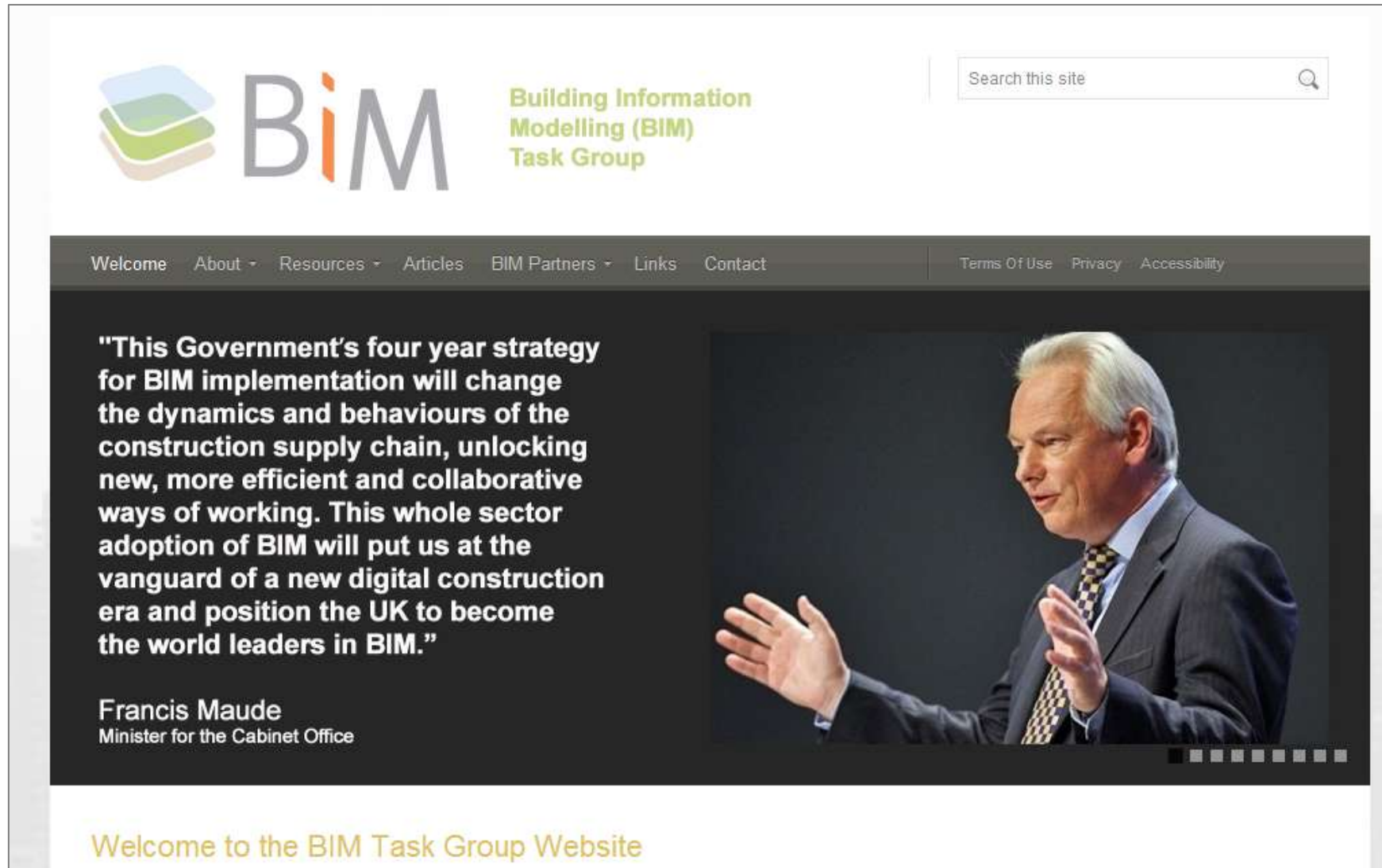




# The Data Spectrum



2012



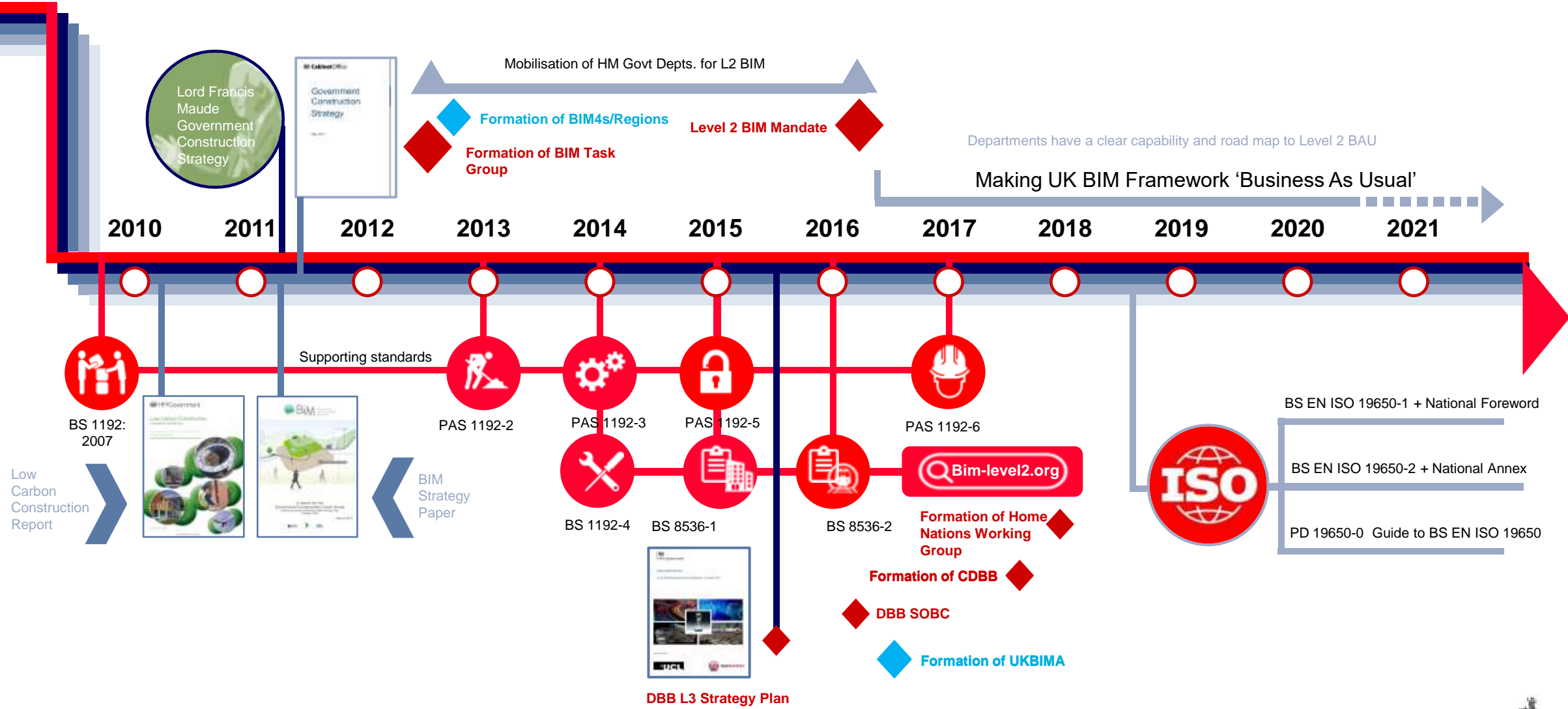
The screenshot shows the homepage of the BIM Task Group website. At the top left is the BIM logo, which consists of three overlapping squares in blue, green, and orange, followed by the letters 'BiM' in a grey sans-serif font. To the right of the logo is the text 'Building Information Modelling (BIM) Task Group' in a green sans-serif font. In the top right corner, there is a search bar with the placeholder text 'Search this site' and a magnifying glass icon.

Below the header is a dark grey navigation bar with the following links: 'Welcome', 'About', 'Resources', 'Articles', 'BIM Partners', 'Links', and 'Contact'. On the right side of this bar are links for 'Terms Of Use', 'Privacy', and 'Accessibility'.

The main content area features a large black box with white text. The text reads: **"This Government's four year strategy for BIM implementation will change the dynamics and behaviours of the construction supply chain, unlocking new, more efficient and collaborative ways of working. This whole sector adoption of BIM will put us at the vanguard of a new digital construction era and position the UK to become the world leaders in BIM."**

Below the quote, the name 'Francis Maude' is displayed in white, followed by his title 'Minister for the Cabinet Office' in a smaller font. To the right of the text is a photograph of Francis Maude, a man with white hair wearing a dark suit and a patterned tie, gesturing with his hands as if speaking.

At the bottom of the page, there is a yellow banner with the text 'Welcome to the BIM Task Group Website' in a dark font.



2019

# UK BIM FRAMEWORK

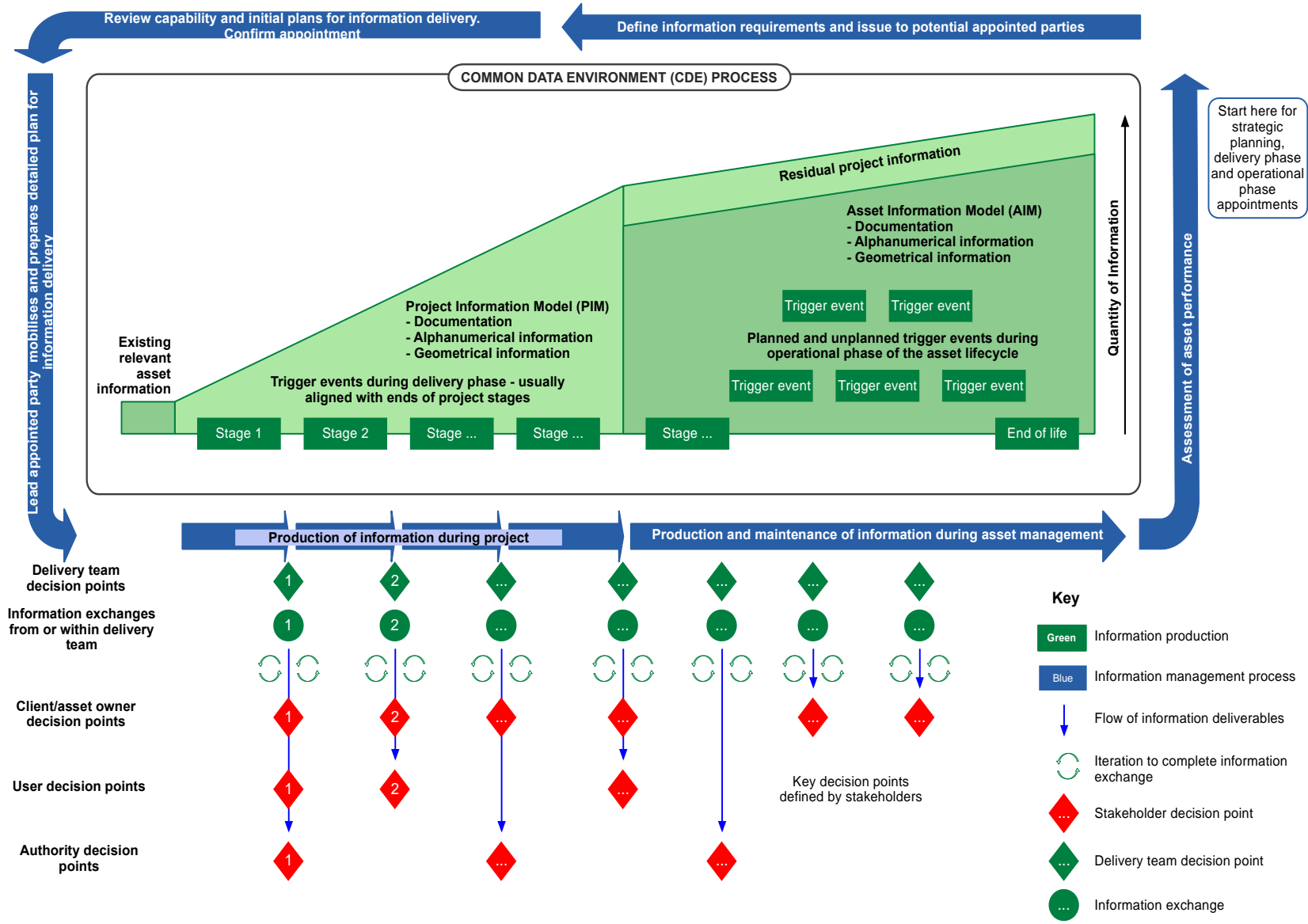
bsi.

cdbb  
Centre for Digital Built Britain

UKBIM  
ALLIANCE  
Enabling Digital Transformation



2020



**The direction is digital**





## Lower costs

33%

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

## Lower emissions

50%

reduction in greenhouse gas emissions in the built environment

## Faster delivery

50%

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

## Improvement in exports

50%

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

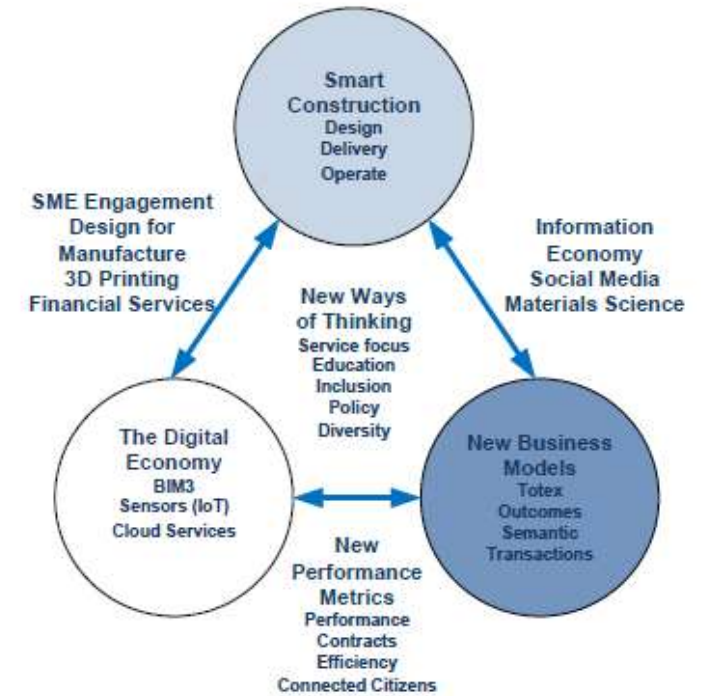
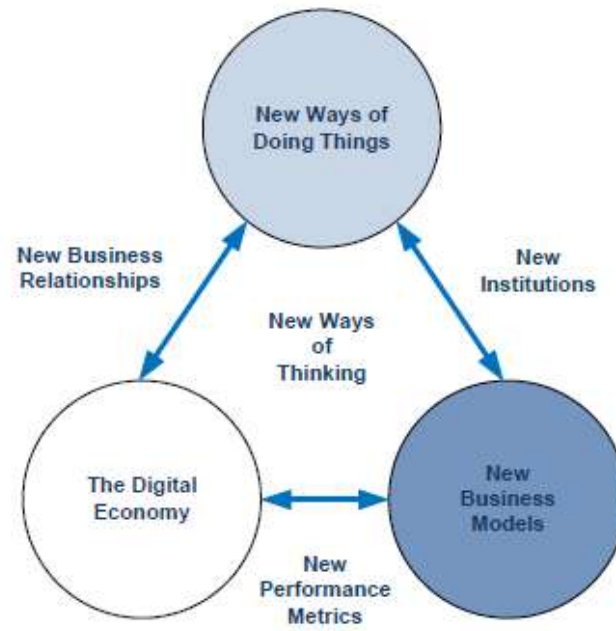
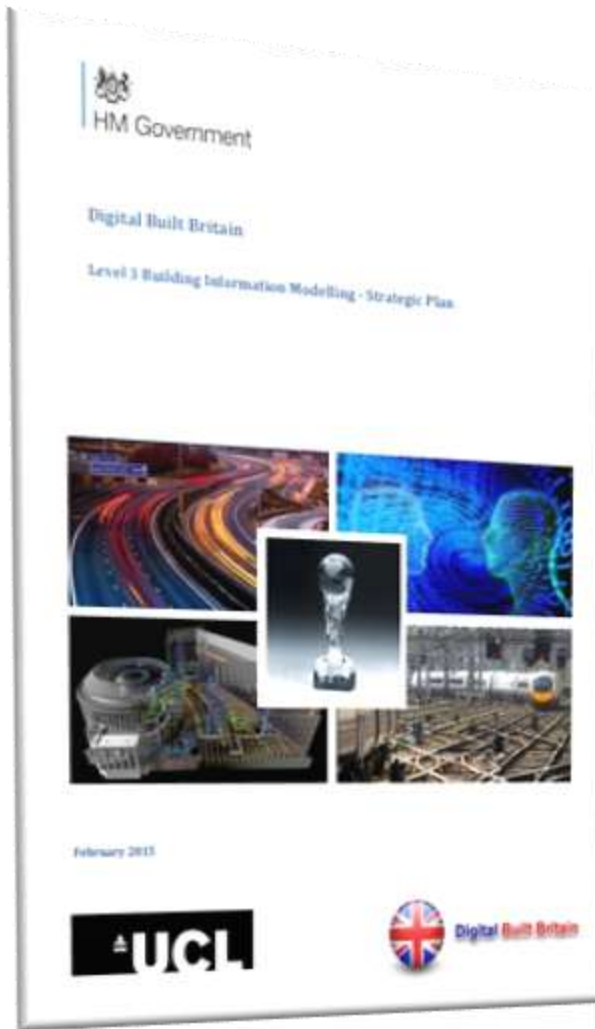
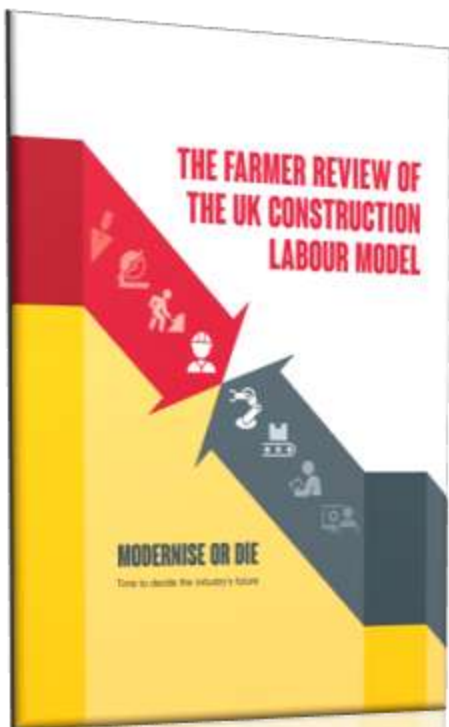
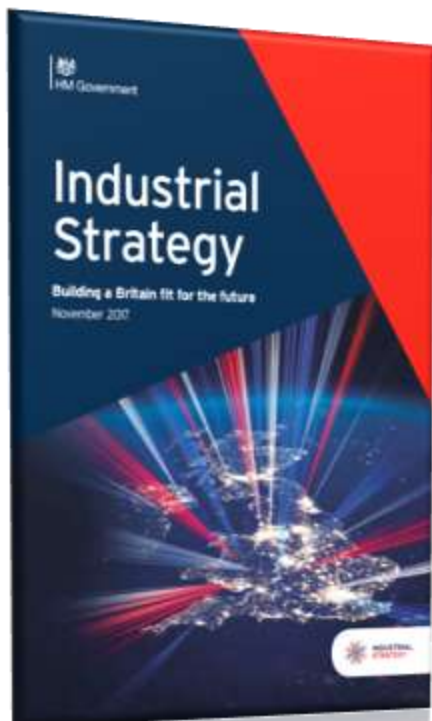


Figure 2 – Business Change Model





Q4 2016



Q4 2017



Q4 2017



Q4 2017



July 2018



## Three main strategic areas:

- **Digital techniques**
- **Offsite manufacturing technologies**
- **Whole life asset performance**





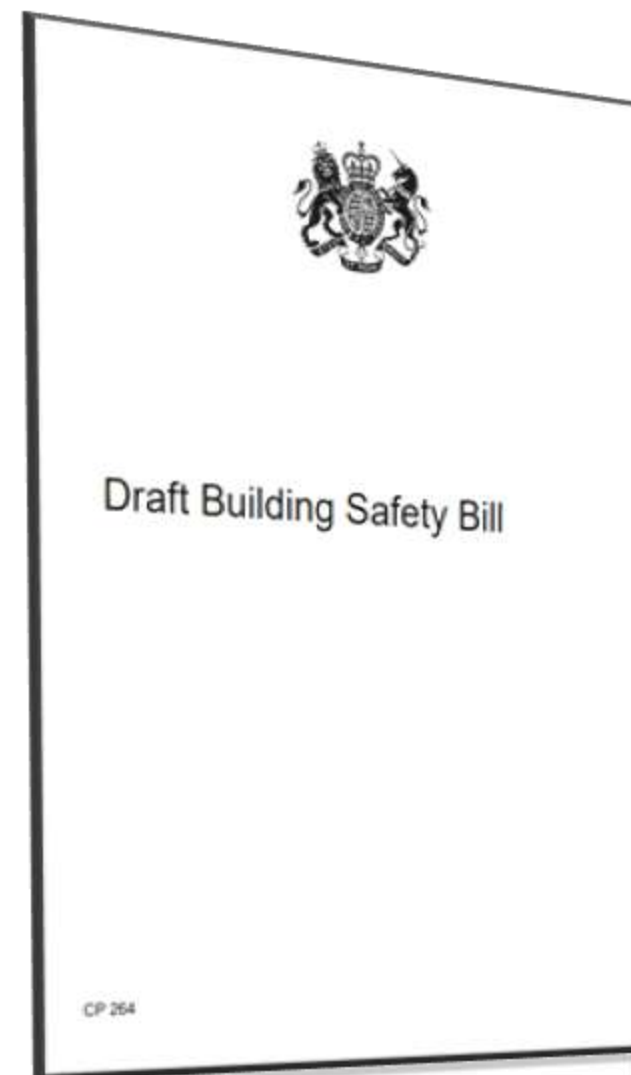
May 2018



## Chapter 8 Golden thread of building information

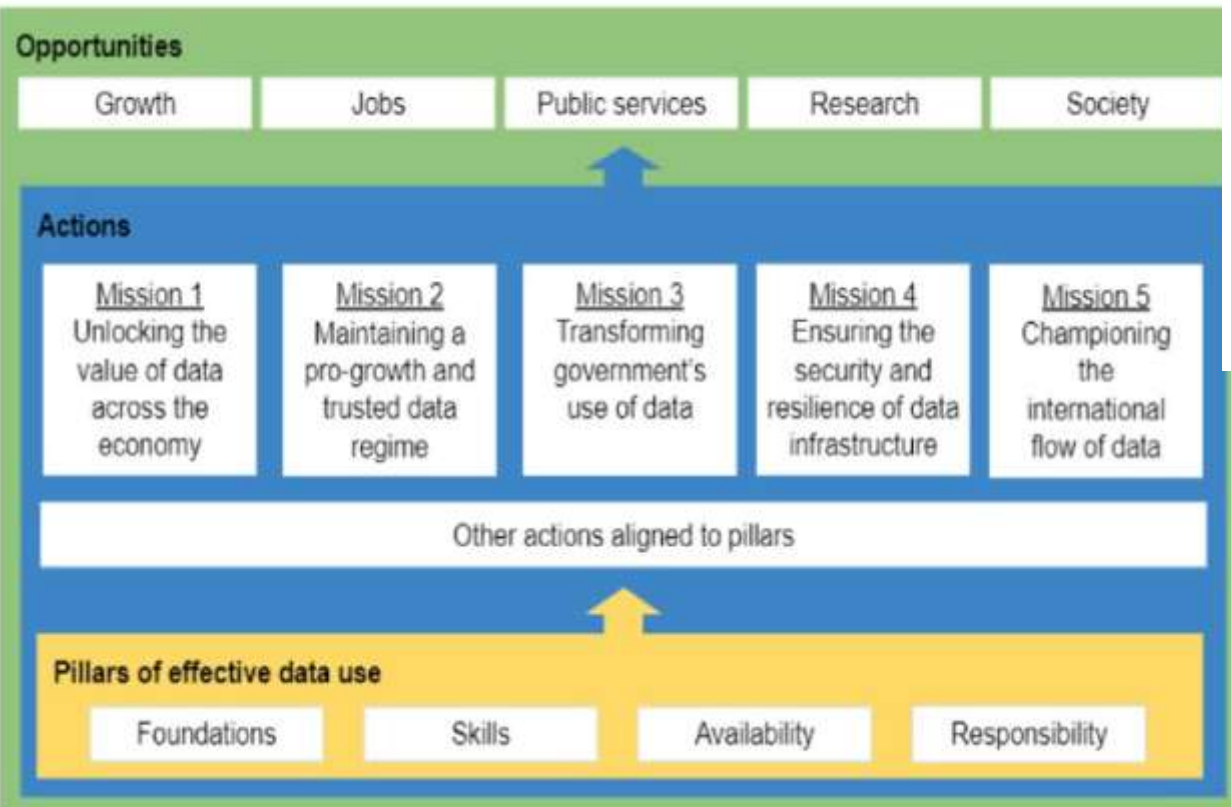
### Recommendation 8.1

- a. Government should mandate a digital (by default) standard of record-keeping for the design, construction and during the occupation of new HRRBs. This is to include any subsequent refurbishments within those buildings.
- b. Digital records are to be in a format which is appropriately open and non-proprietary with proportionate security controls.



20 July 2020

# National Data Strategy



September 2020



# DIGITAL TRANSFORMATION IN CONSTRUCTION

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Editor, *Extranet Evolution* — MD, pwcom.co.uk Ltd  
+ chair of UK BIM Alliance technology group

September 2020