BIM: The unexpected Road

From premise to prediction

Dave Philp – Chief Value Officer (EMEA)

20th September 2023

Future wise – what we thought the digital journey would look like!

Deterministic

Real-time

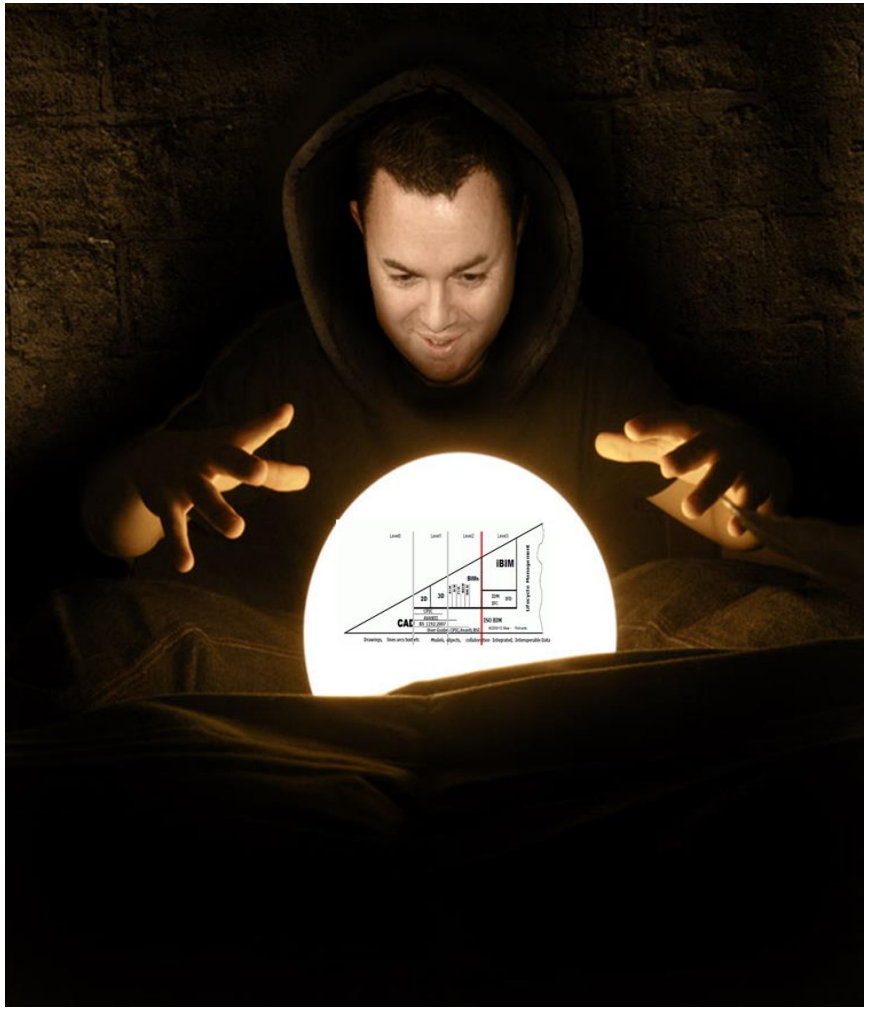
Probabilistic

Waves: the first wave shows how the current lag of information exchange gives us only one chance to exchange between formal transactions. As we move in to wave 2 the lag is less and we can fit more iterations of simulation in to our transactions. Moving through to wave 4, transactions are almost instantaneous and computing power enables vast simulation options.

Feedback Cycle Wave

Wave 1	Wave 2	Wave 3	Wave 4
Analogue Decisions	Digital Decisions	Predictive Digital	Artificial Intelligence
At key stages Capex/Opex	Converging Information Performance / Operation	Emerging Information Social Outcomes	Adaptive & Agile

Philp / Thompson



#1

Wave 2 – The Wonder Years!

Who remembers 2010?

Treasury Liam Byrne
Note left in Treasury desk for his successor

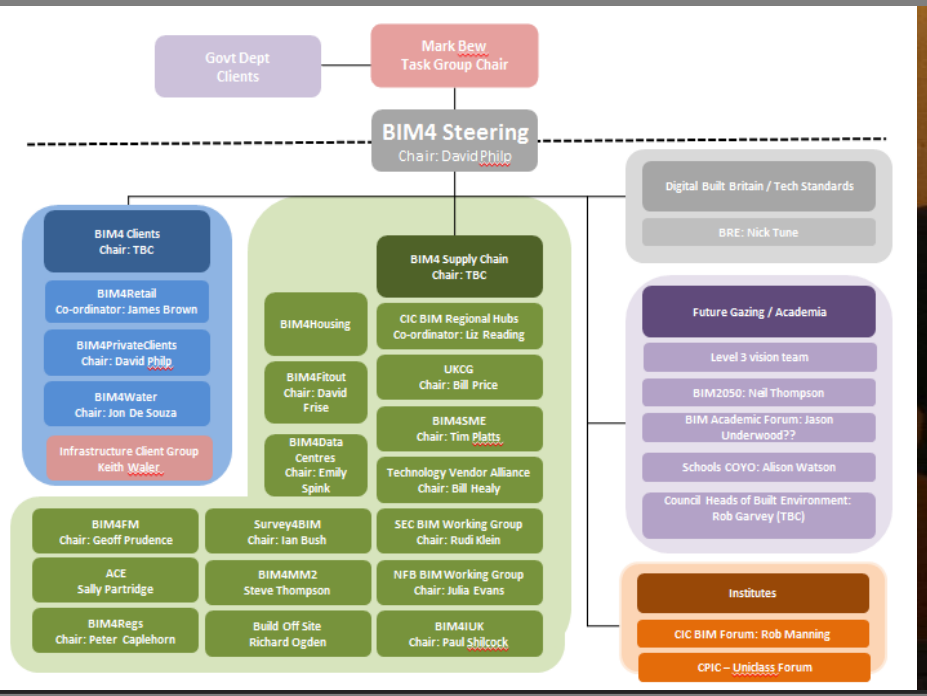

£


CO2

But – we had a unified strategy and a plan!

A well framed value proposition

A partnership between government and industry



PUSH (SUPPLY CHAIN) AND PULL (CLIENT)

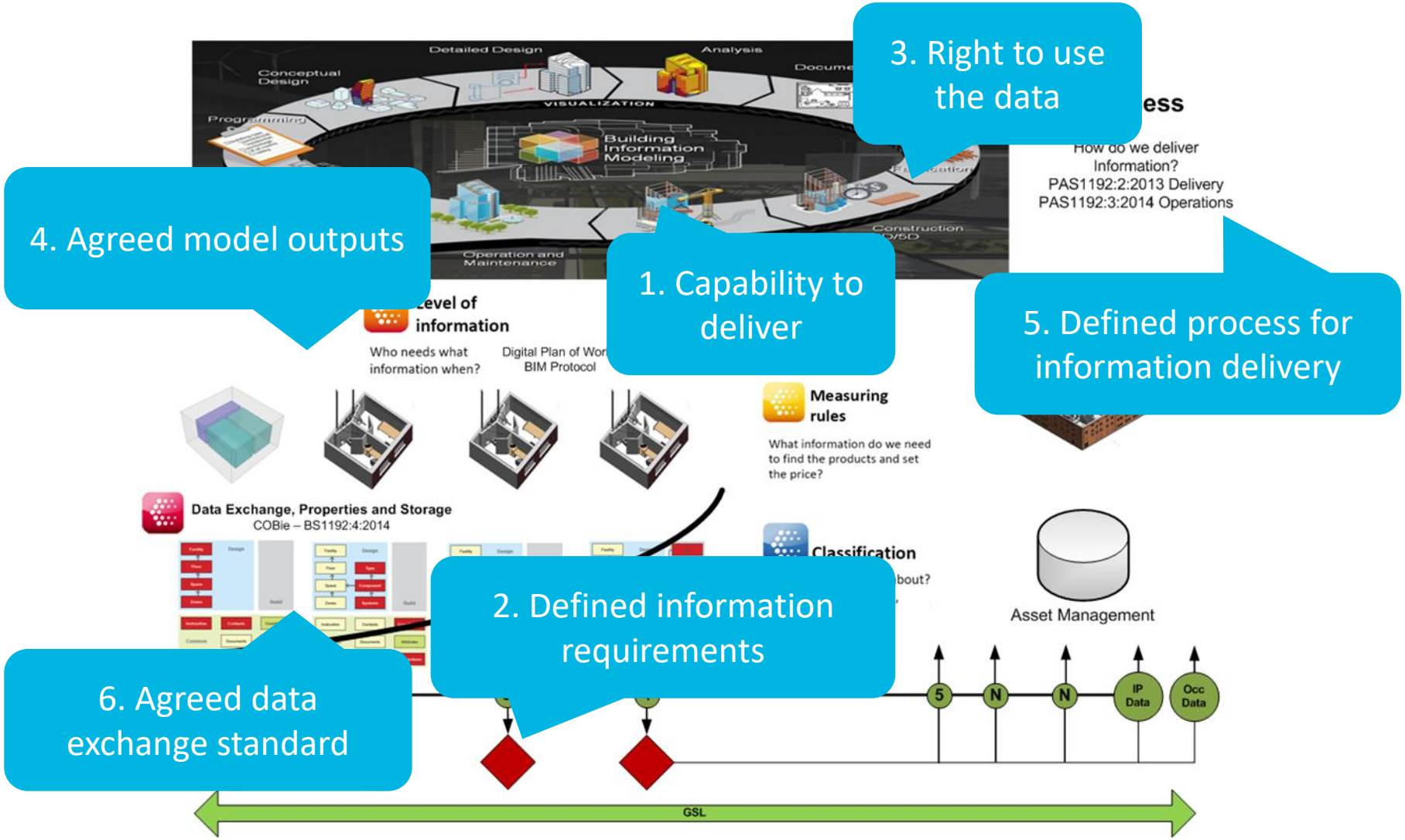
Don’t get stuck in the weeds, let the supply chain innovate

Plus, a hypothesis we could test

"Government as a client can drive significant improvements in cost, value and carbon performance through the use of open sharable asset information."

A Report for the Government Construction Client Group
March 2011

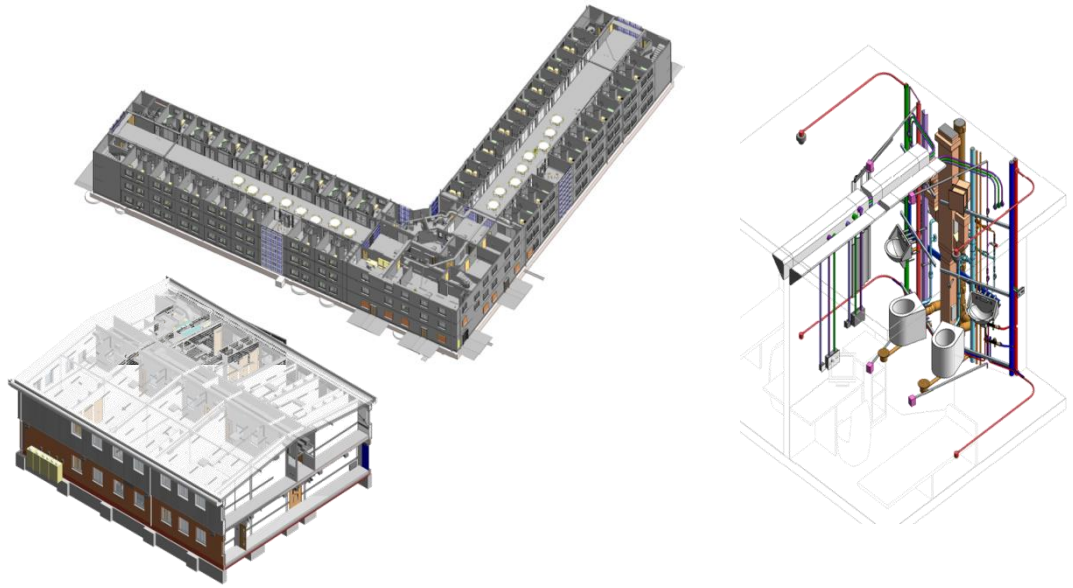
It was elegantly simple



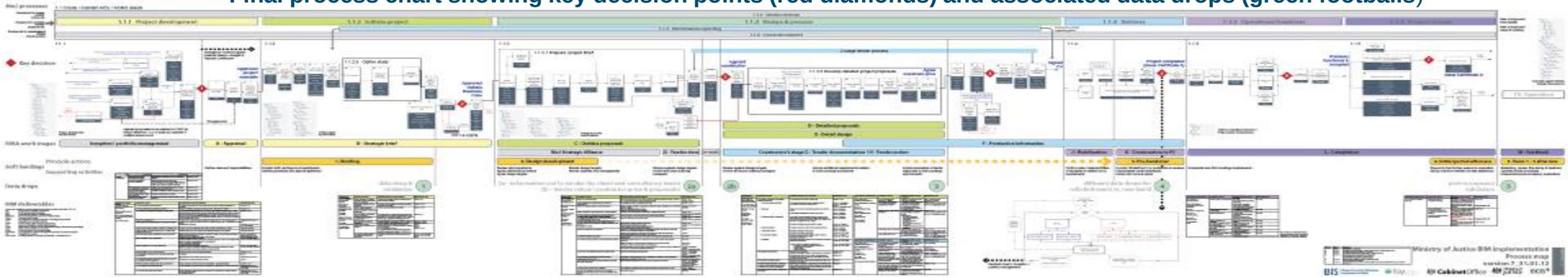
become good at buying & using data

It was a catalyst for change management

Ministry of JUSTICE



Final process chart showing key decision points (red diamonds) and associated data drops (green footballs)



Government Soft Landings BIM

Construction Industry Council

CabinetOffice BIS | Department for Business Innovation & Skills

Scottish Procurement

Scottish Procurement Policy Note

SPPN 01/2017

9 March 2017

Scottish Government
Riaghaltas na h-Alba
gov.scot

Implementation of Building Information Modelling within Construction Projects

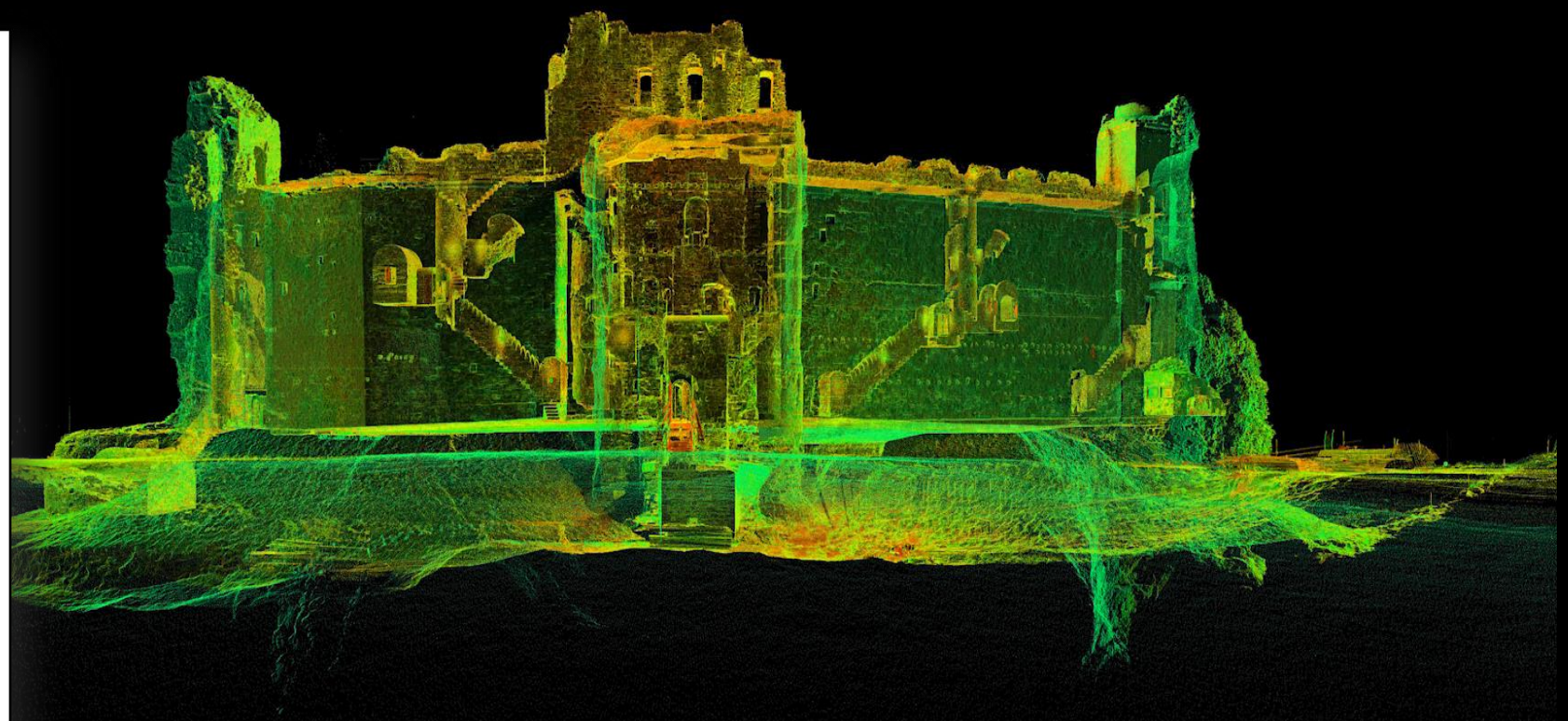
Purpose

1. The purpose of this policy note is to advise that guidance on the provisions for adopting Building Information Modelling (BIM) has been published.

Key Messages

- Scottish Government and relevant bodies in scope of the Scottish Public Finance Manual[1] must assess their projects for BIM via the BIM Grading Tool[2] for projects above £2,000,000. The public body will then comply with the results of the BIM Grading Tool and should adopt the BIM Guidance for public works contracts commencing procurement procedures[3] from 6th April 2017.
- Scottish Government and relevant bodies in scope of the Scottish Public Finance Manual with projects below £2,000,000, are asked to assess their projects for BIM (via BIM Grading Tool) and where applicable adopt the BIM Guidance into their procedures.
- Other bodies that can award public contracts, and other organisations providing delivery mechanisms for the construction of public buildings and infrastructure, are asked to assess their projects for BIM (via BIM Grading Tool) and where applicable adopt the BIM Guidance into their procedures.

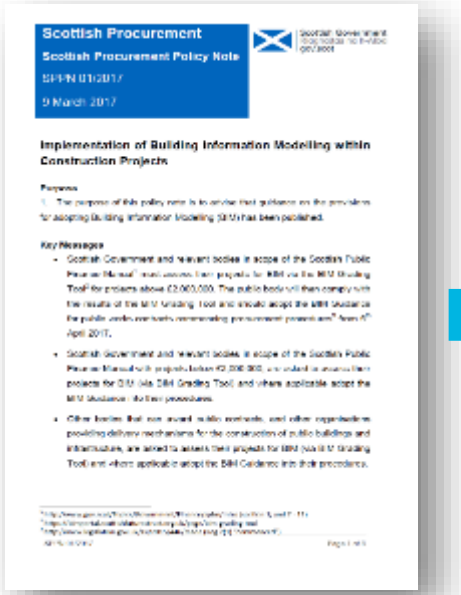
[1] http://www.gov.scot/Topics/Government/Finance/spfm/Intro (section 1; and 7 - 11)
[2] https://bimportal.scottishfuturestrust.org.uk/page/bim-grading-tool
[3] http://www.legislation.gov.uk/ssi/2015/446/made (Reg 2(1) "commenced")



HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

Appropriate and proportionate

Scottish Government BIM policy	Relevant Projects	Assessment Tool Bim Level 1 or 2	Portal & Guidance


Scottish Procurement

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Project above £2m
Procurer within Scope

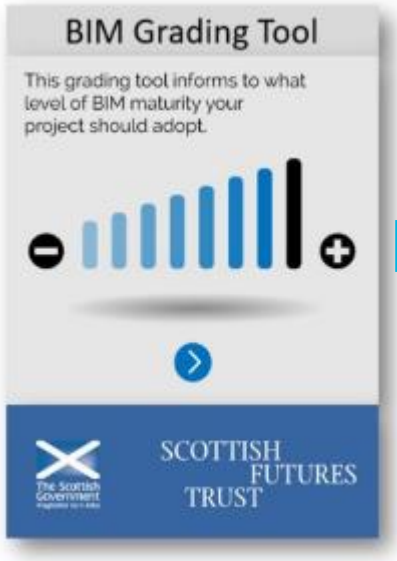
Project below £2m
Procurer within Scope

Procurer outwith Scope
(Councils/Universities)

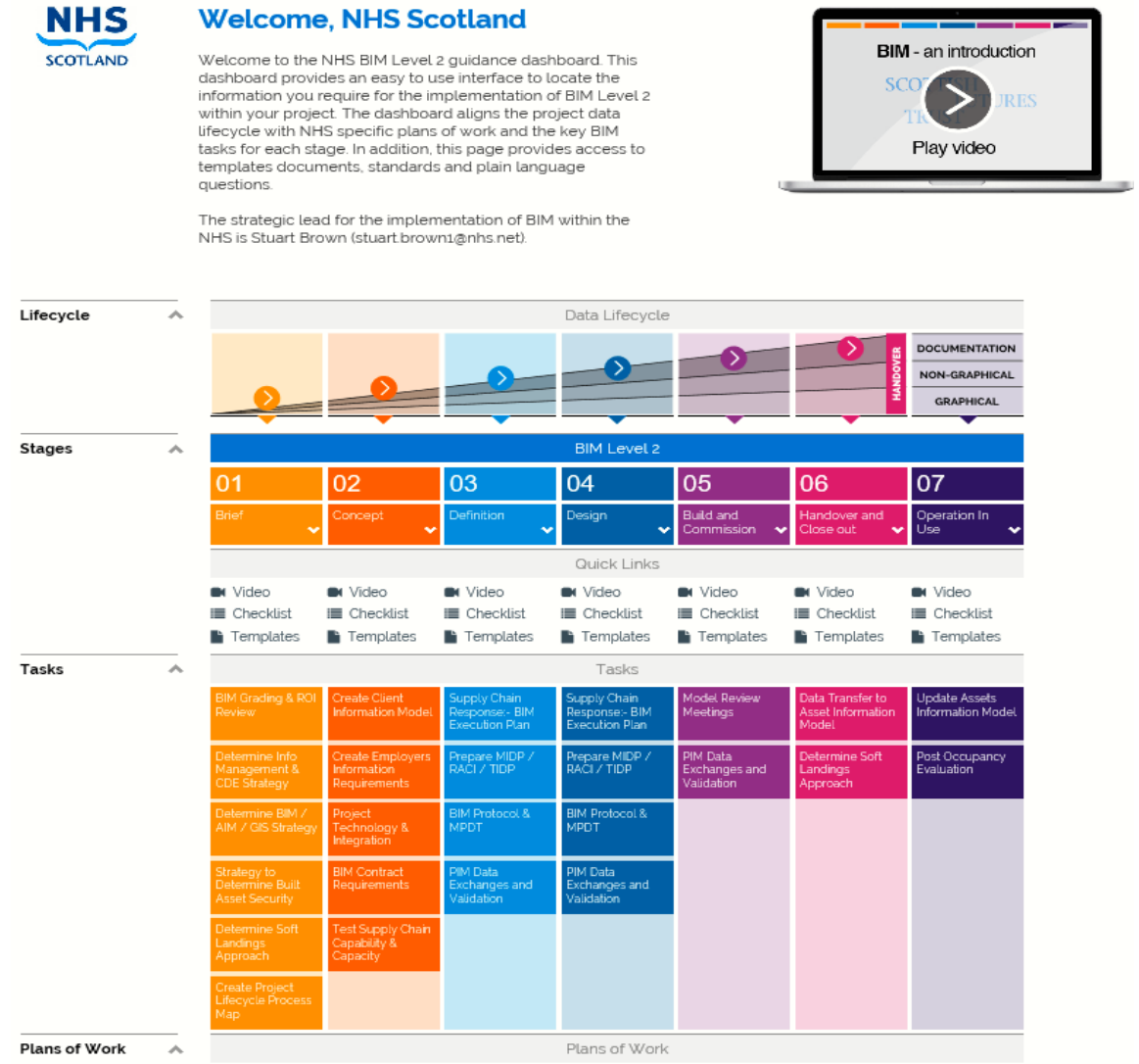
Required

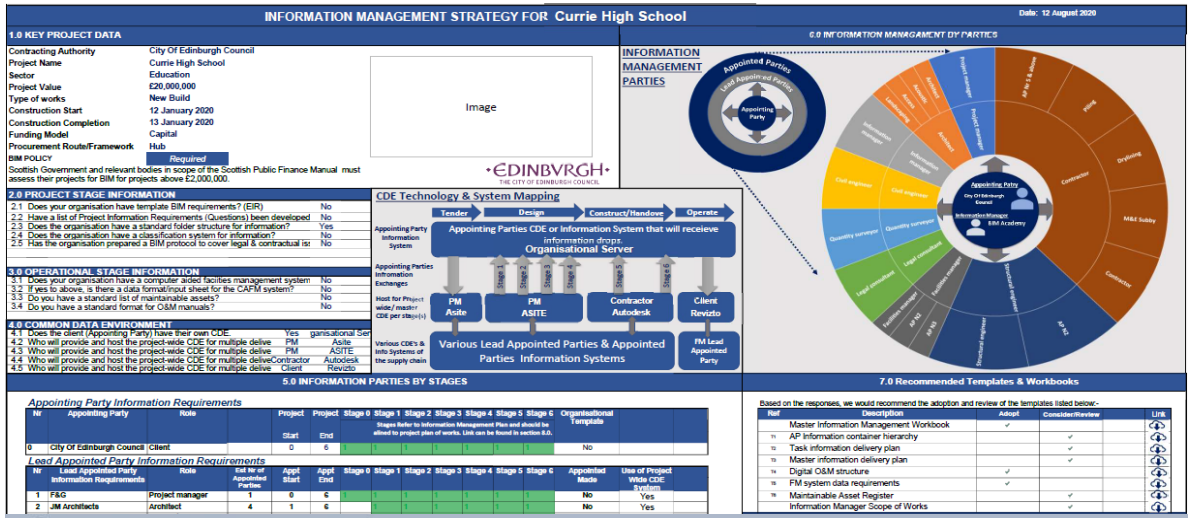
Encouraged

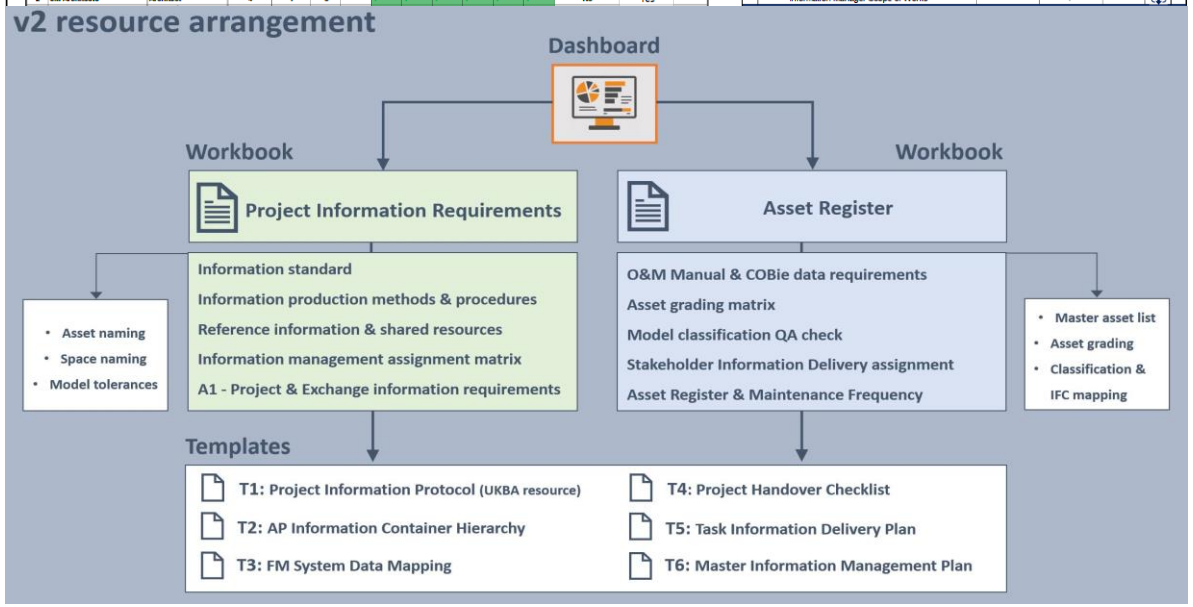
Encouraged



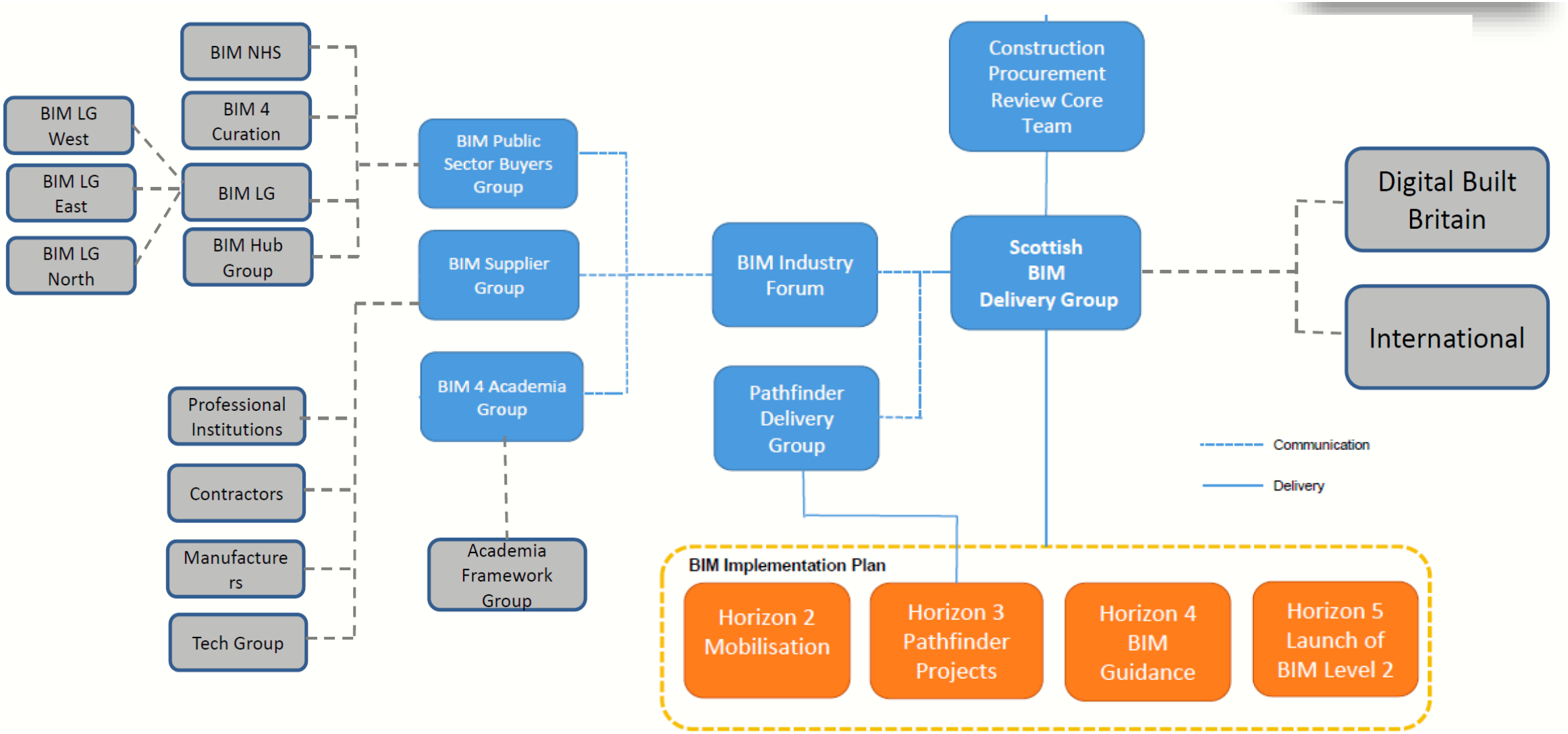
How, as well as the why



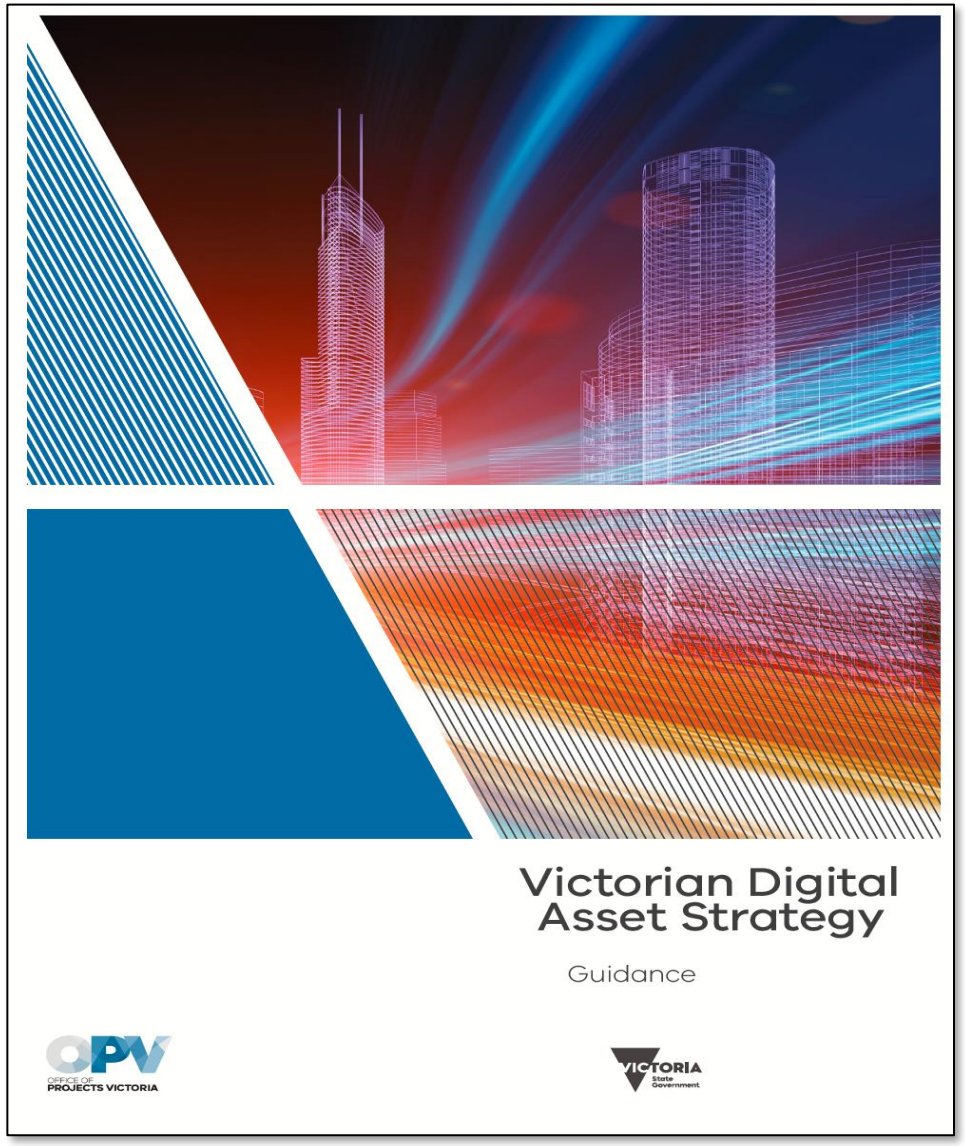




Governance and community



Harmonisation: BIM, Digital Engineering and Asset Mgt.



Clear Requirements
Clear data and information requirements to an appropriate level of need

Better Outcomes
Data to support the public good and enhance the lives of Victorians

Asset leveraging
Driving valuable outcomes to Victorians, asset users, and stakeholders

Transparent
Enable more important and transparent decisions to be made

Secure
A holistic approach to securely share data and information

De-risk/ risk sharing
Using DE and digital management to mitigate and minimise risk

Whole of life
Using DE and data feedback loops to visualise lifecycle solutions

Capability and capacity
Increasing capability and capacity for DE and digital asset management

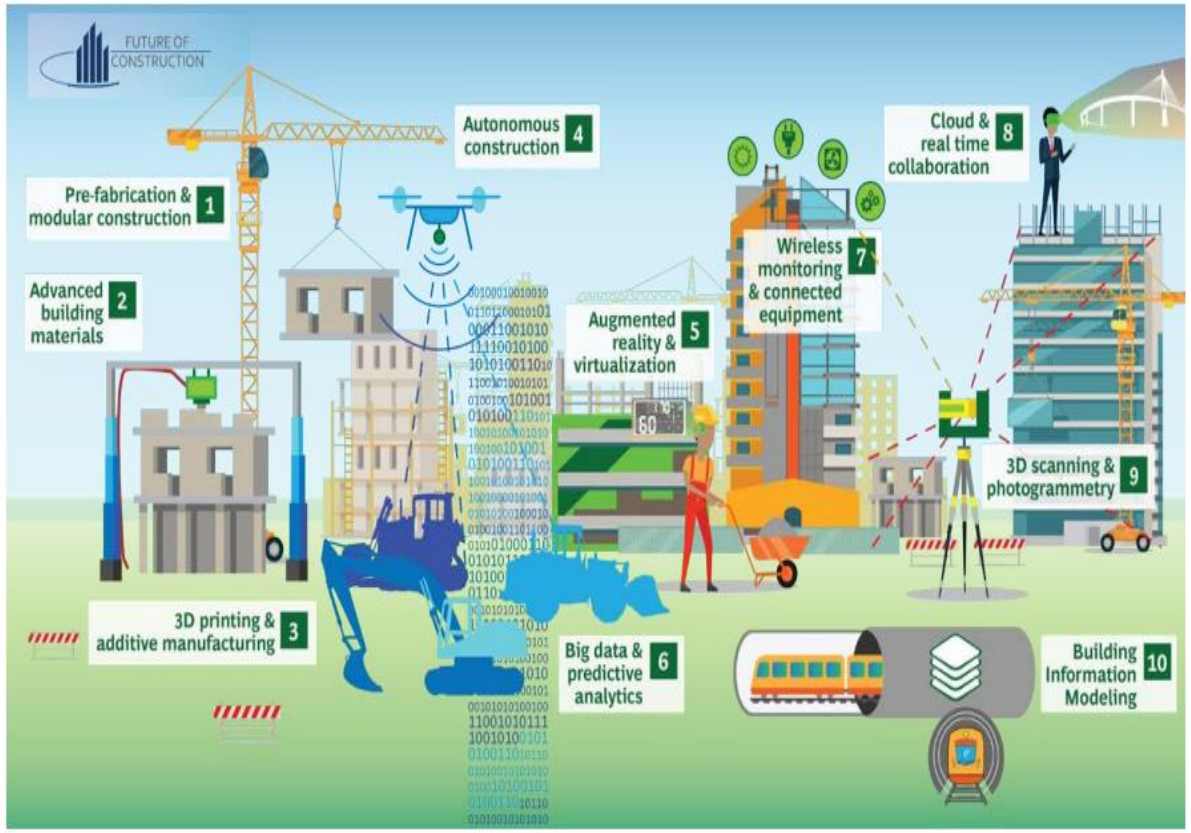
Open
An open and vendor-neutral approach

Integrated and repeatable
An integrated way of working aligning OPEX and CAPEX in a repeatable manner

Innovative approach
Implementation of DE, BIM and digital asset management methodologies

Future enabled
Data and information that supports a virtual Victoria

Motivate, collaborate, enable

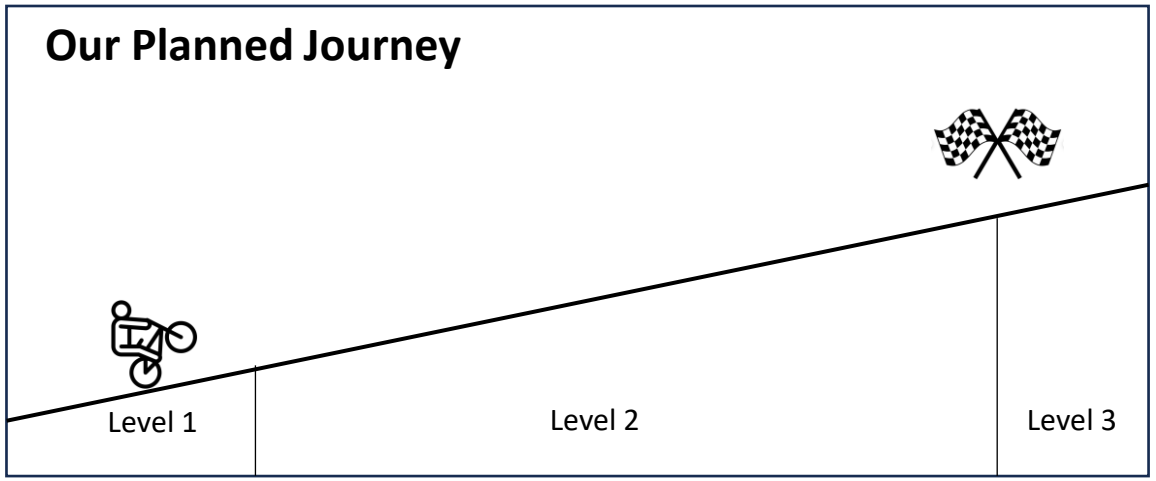


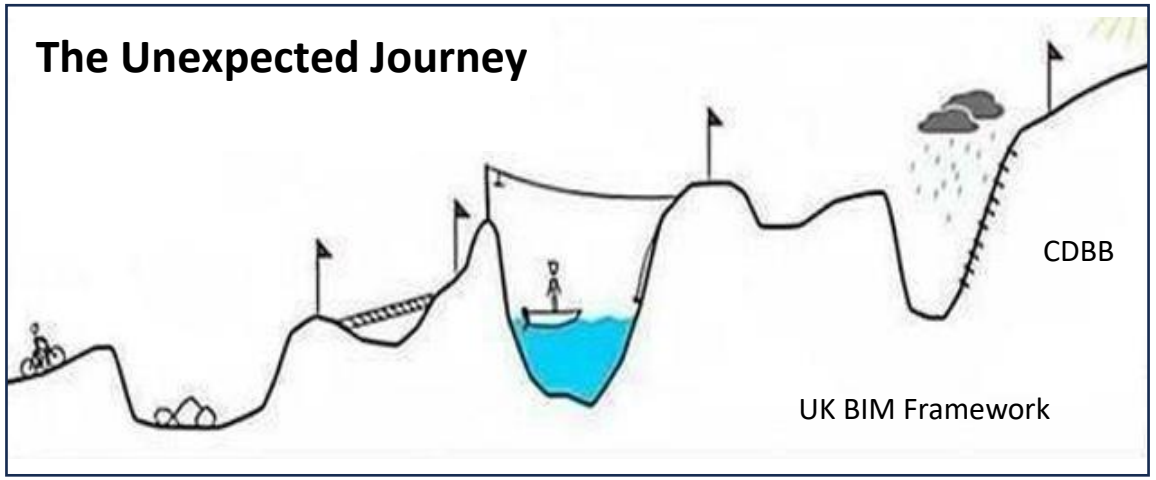
Source: World Economic Forum, The Boston Consulting Group

Table 1: Action Implementation Matrix

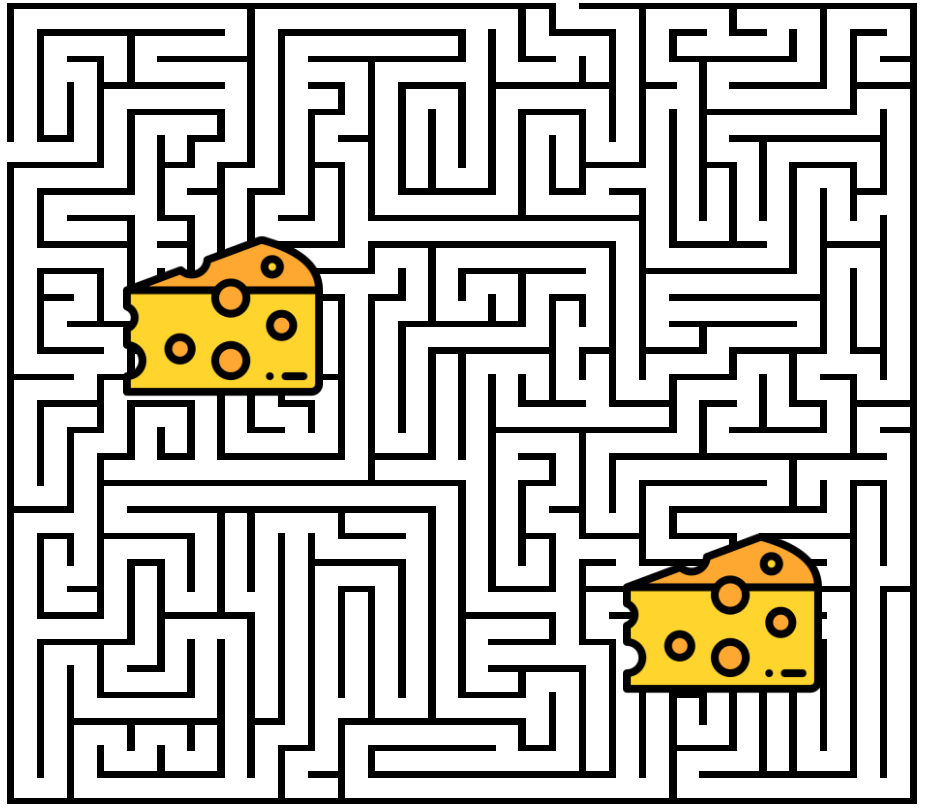
		Companies	Industry Groups	Government
Motivation	Articulate BIM's benefits across the entire lifecycle			
	A1) Develop and pilot use cases that include BIM 6D and 7D applications	X		
	A2) Leverage BIM data to optimize design regarding O&M costs	X		
	A3) Use BIM in O&M for public assets and demonstrate benefits in pilot projects			X
	Think of BIM as a value creator, not as a cost factor			
	A4) Develop benchmarks against which BIM costs and benefits can be measured	X	X	
	A5) Allocate BIM costs and savings separately from other financial data to increase transparency	X		
	A6) Develop an industry standard for calculating BIM ROI	X	X	
	A7) Publish BIM ROI assessments of pilot projects			X
	Approach BIM as the essential first step to IU digitalization			
	A8) Implement BIM as platform to store, manage and share data required by new technologies	X		
	A9) Develop BIM standards and specifications for digitized built environments			X
	A10) Build up digitized built environments and use them for financial planning			X
Collaboration	Use integrated contracts and redefine risk-return mechanisms			
	A11) Increase the share of projects that use integrated contracts			X
	Set up early collaboration and communication among stakeholders			
	A12) Revise corporate cultures, structures and processes for more comprehensive collaborations	X		
	A13) Develop BIM collaboration procedures (e.g. CIC BIM Protocol)			X
	Establish data-sharing standards and open systems			
	A14) Support developing global conventions for data generation	X	X	
	A15) Support bottom-up consortia to standardize BIM data exchange	X	X	
	A16) Support emerging data marketplaces	X		
	A17) Develop regulations to protect BIM IP and data ownership			X
Enablement	Establish BIM skills along the full value chain			
	A18) Integrate BIM into general design and engineering classes			X
	A19) Create upskilling courses with professional education providers	X	X	
	A20) Institute a broad set of upskilling programmes (e.g. job rotation, mentorships etc.)	X		
	A21) Develop simple BIM software that emphasizes usability	X		
	A22) Incorporate BIM skills training in public engineering, procurement and O&M organizations			X
	Change behaviours and processes, not just technology			
	A23) Adopt BIM as part of a comprehensive change management programme	X		
	A24) Streamline processes before adopting BIM	X		
	Make a long-term commitment and support innovative financing			
	A25) Make a long-term commitment to include BIM in projects			X
	A26) Create innovative BIM business and financing models (e.g. BIM-as-a-service, low budget BIM)	X		
	A27) Create a regulatory framework for private-investor BIM funding			X

What it really looked like





Why?



Because we moved the cheese

#2

Have we reached an inflection point? Waves 3 & 4

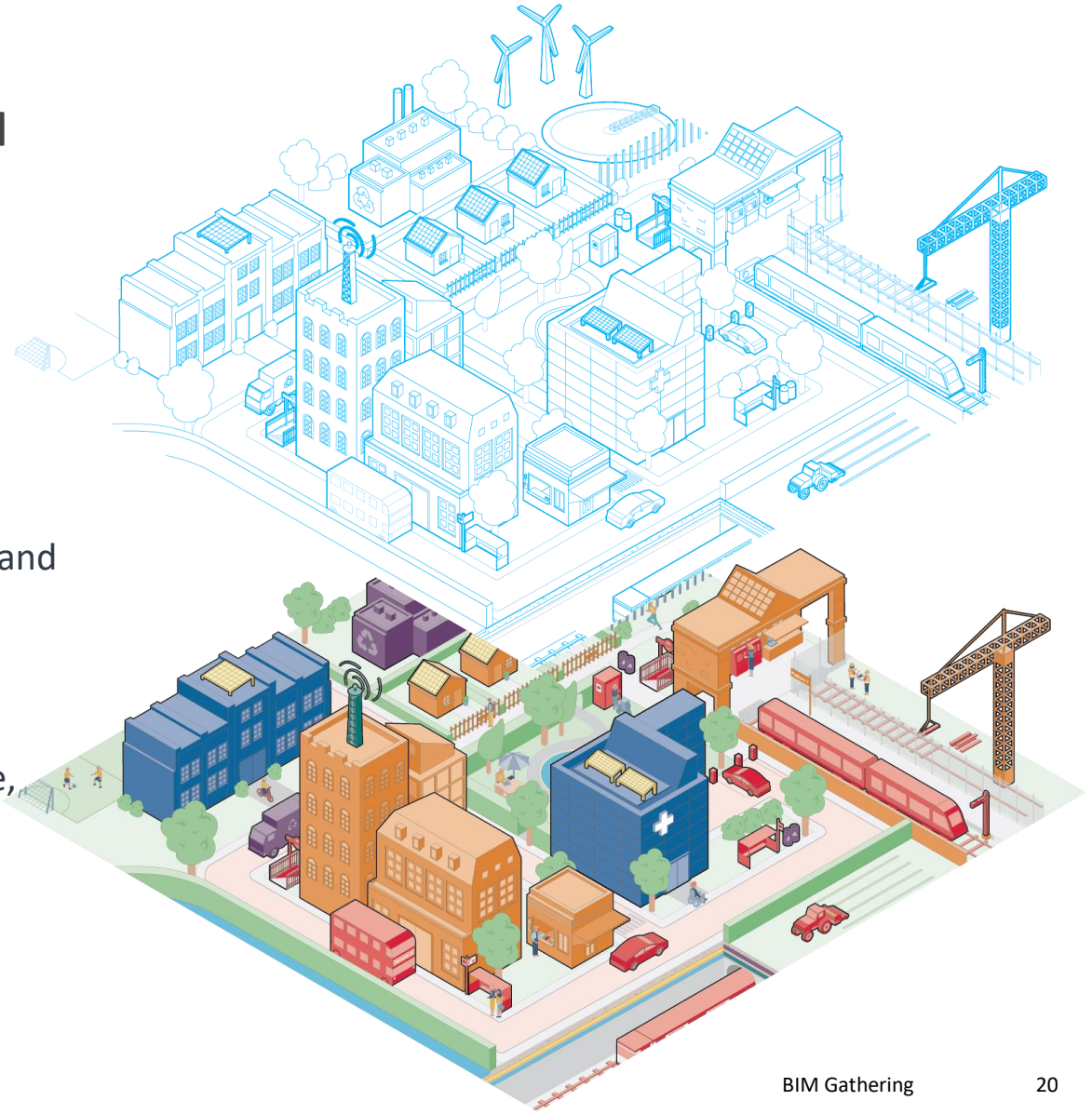
What is a Digital Twin? – the generic answer

- **A digital twin is a virtual representation of real-world entities and processes, synchronised at a specified frequency and fidelity.**

- Digital twin systems transform business by accelerating holistic understanding, optimal decision-making, and effective action.

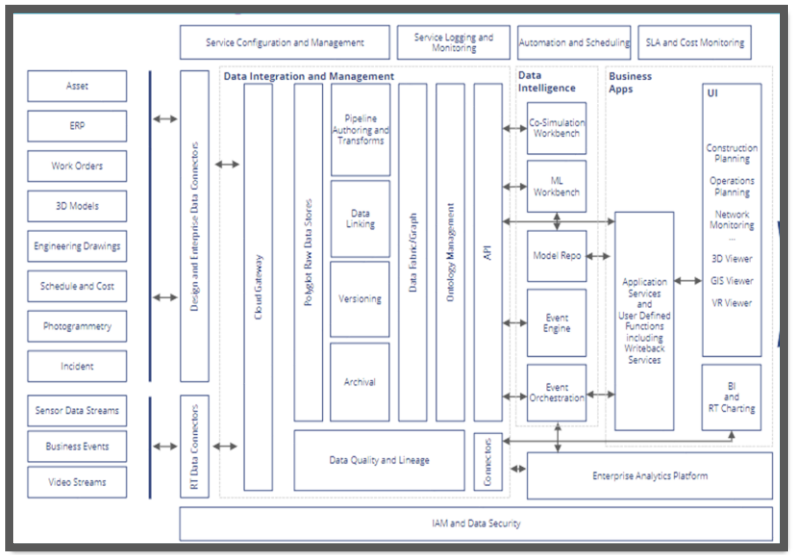
- Digital twins use real-time and historical data to represent the past and present and simulate predicted futures.

- Digital twins are motivated by outcomes, tailored to use cases, powered by integration, built on data, guided by domain knowledge, and implemented in IT/OT systems.

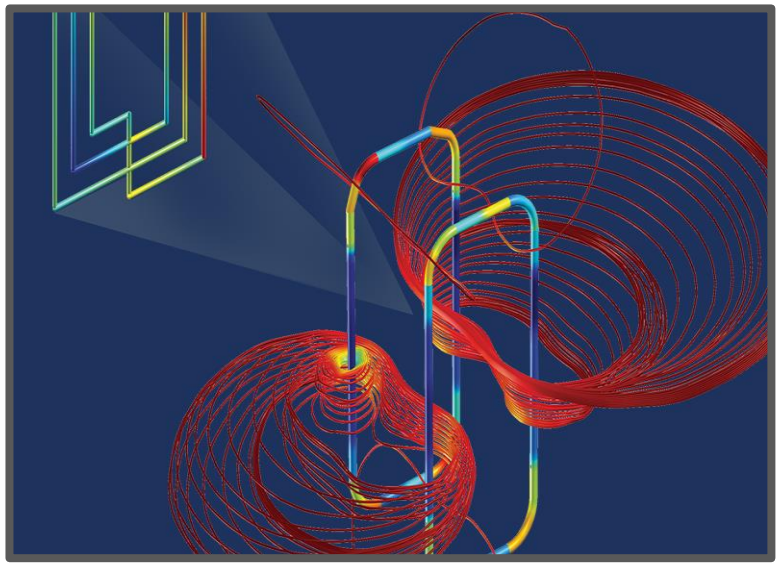


Do you actually need one and what's its purpose?

Nope? Just a digital representation



Nope? Just a technical architecture



Nope? Just a simulation

Asset Management ISO 55,000)	Safety Case Assurance	Enterprise Asset Management
ESG Scope 3 Reporting	Asset Health Monitoring	Regulatory Compliance
Asset Performance Management	Progressive Assurance	Capital Investment Planning

But new business capabilities, and there can be lots of them

=

Inform Digital Twin Use Cases

Cohesive

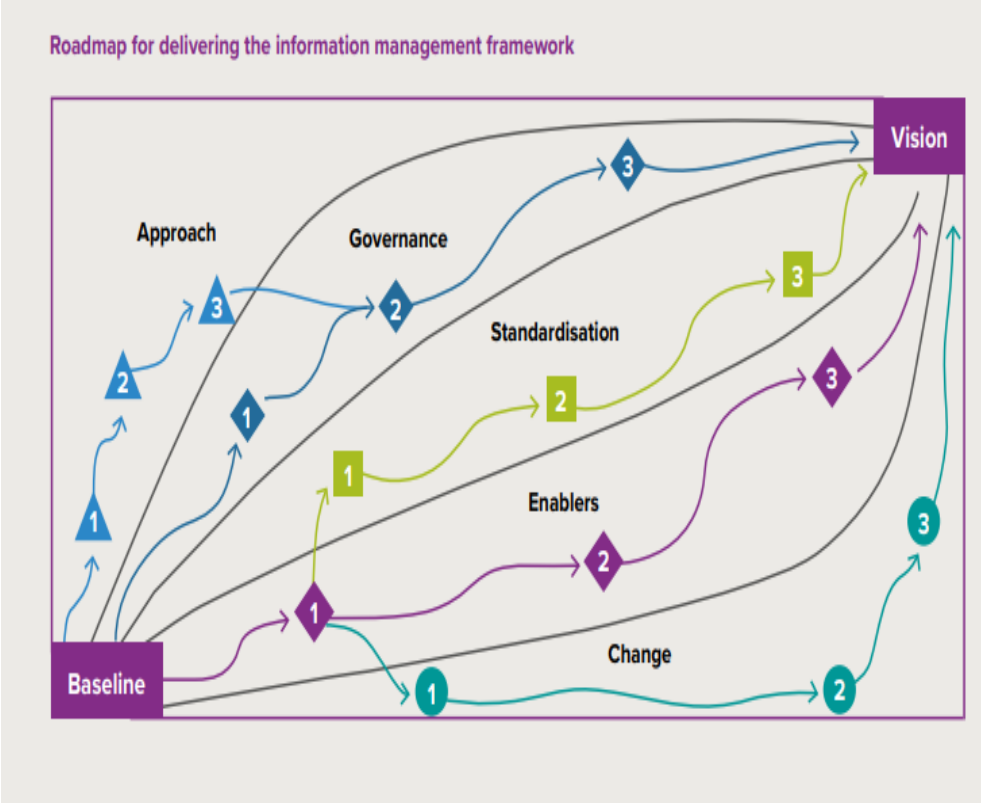
Need for a consensus framework

Purpose:
Must have clear purpose

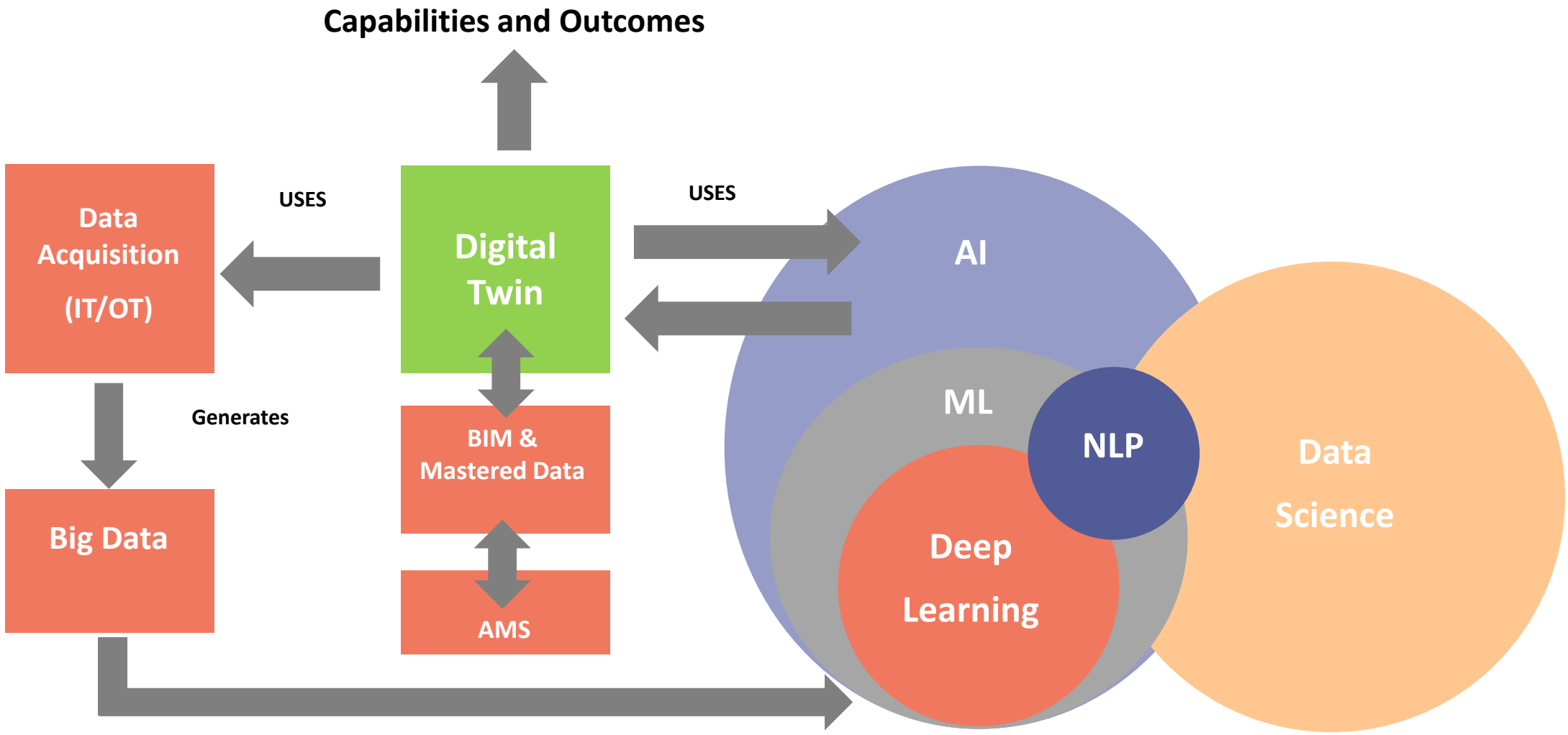
Trust:
Must be trustworthy

Function:
Must function effectively

Public good Must be used to deliver genuine public benefit in perpetuity	**Value creation** Must enable value creation and performance improvement	**Insight** Must provide determinable insight into the built environment
Security Must enable security and be secure itself	**Openness** Must be as open as possible	**Quality** Must be built on data of an appropriate quality
Federation Must be based on a standard connected environment	**Curation** Must have clear ownership, governance and regulation	**Evolution** Must be able to adapt as technology and society evolve

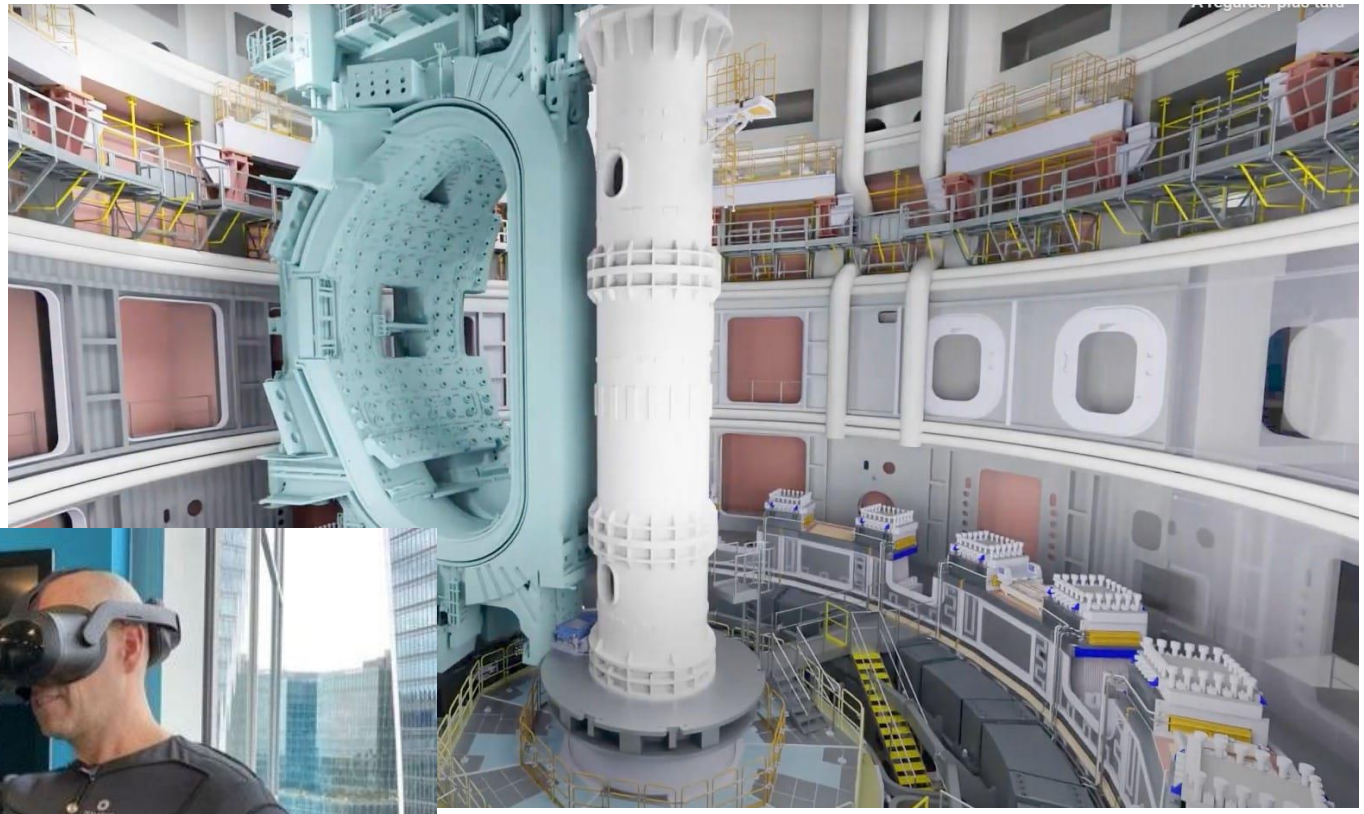


AI-ML-DL and its relationship with the BIM & Digital Twin



Infrastructure - Metaverse

- Interoperable and networked
- Real-time rendered 3D virtual engineering environments
- Unlimited number of users with individual sense of presence
- Continuity of data (identity, changesets, saved views, objects, issues, IoT, etc.)

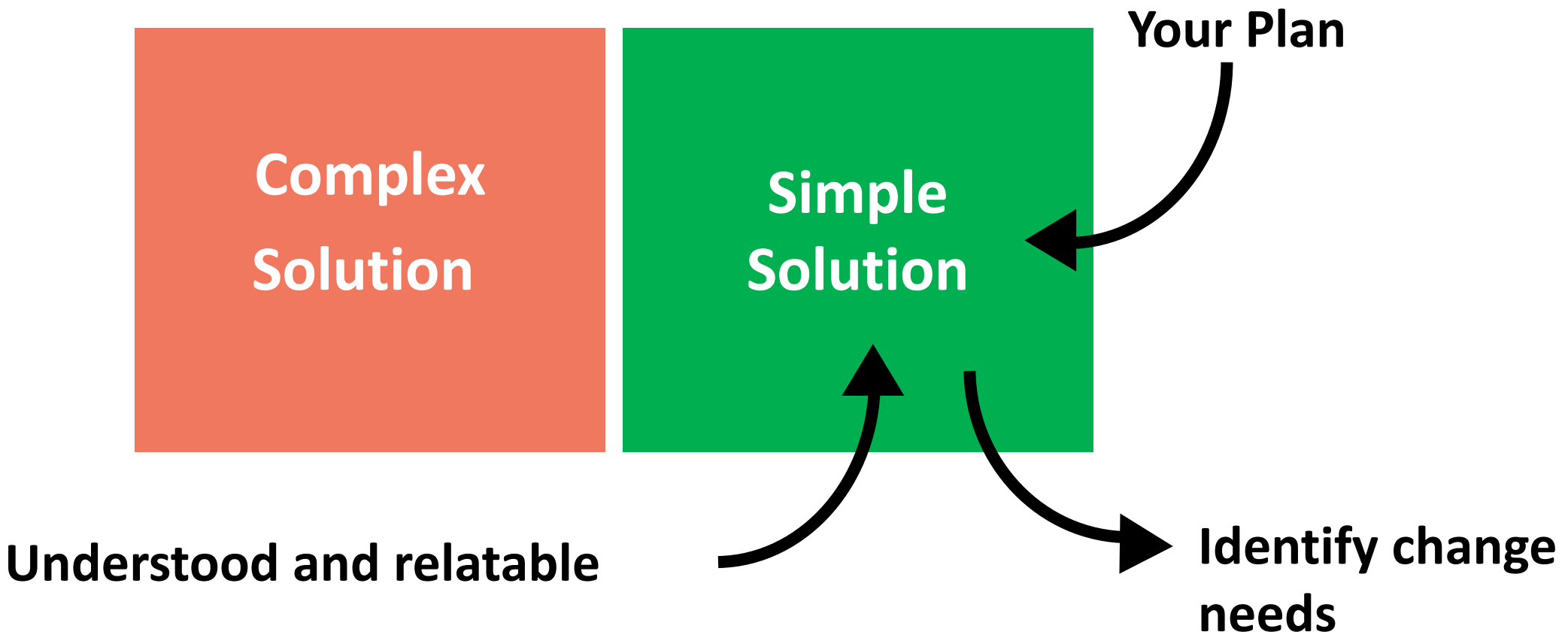


ENR: A visualization of the ITER tokamak created with LumenRT for NVIDIA Omniverse.
Rendering courtesy of ITER

#3

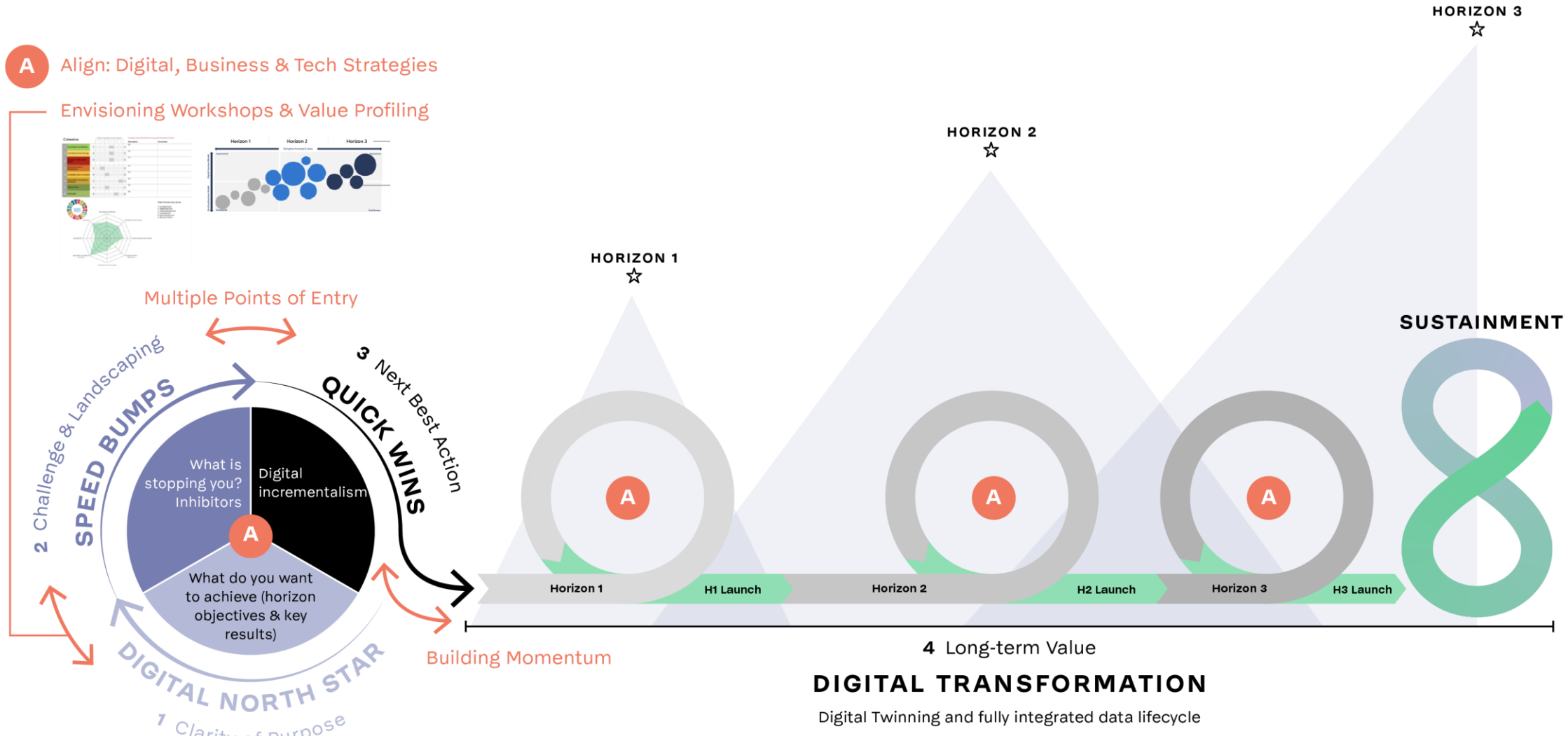
Lessons Learned

Occam’s Razor is a sound principle



Line of sight to the why

OCM: Line of sight to objectives



Don’t wait on Government!

Cohesive

Thank you

David.Philp@cohesivegroup.com