The National Digital Twin

An ecosystem of connected digital twins enabling better decisions faster across the built environment





This is Digital Built Britain



Design

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

Build

Exploit new and emerging digital construction, information management, and manufacturing technologies and techniques to improve safety, quality and productivity during construction.

Operate

Use effective information management to transform the performance of the built environment and the services it delivers.

Integrate

Understand how the built environment can improve citizens' quality of life and use that information to drive the design and build of our economic and social infrastructure and the operation and integration of the services they deliver.





Aligned government messages

100

Infrastructure



and Projects Authority Transforming Infrastructure Performance December 201







Data for the public good



Recommendations:

- 1. A National Digital Twin to enable better outcomes from our built environment
- 2. An Information Management Framework – to enable secure data sharing and effective information management
- **3. A Digital Framework Task Group** to provide coordination of key players









Gemini Principles

Roadmap

Digital Twin Hub

The CDBB is establishing the Digital Twin Hub (DT Hub), a collaborative web-enabled community for those who own, or who are developing, digital twins within the built environment.

The DT Hub will give members a safe space where they can learn from, and share with, others who are on the same journey. Members will be able to participate in events that will not only develop their own capabilities, but also advance the state of the art in digital twins.



The DT Hub will be steered by a group of experts from the academia, government and industry and it will be chaired by **Sam Chorlton** ∠, project lead for DAFNI ∠.

Blog: Samuel Chorlton, Chair of the Steering Group - sets out some of the challenges and opportunities.

DT Hub





Gemini Principles







Digital twins







Connected digital twins











Benefits of the National Digital Twin

Better outcomes for the public per whole-life pound

- **Benefits to society:** Improved stakeholder engagement. Better outcomes for the ultimate customers (the public taxpayers/bill payers/fare payers/voters). Improved customer satisfaction and experience through higher-performing infrastructure and the services it provides.
- **Benefits to the economy:** Improved national productivity from higher-performing and resilient infrastructure operating as a system. Improved measurement of outcomes. Better outcomes per whole-life pound. Improved information security and thereby personnel, physical and cyber security.
- **Benefits to business:** New markets, new services, new business models, new entrants. Improved business efficiency from higher-performing infrastructure. Improved delivery efficiency, benefiting the whole construction value chain – investors, owners, asset managers, contractors, consultants, suppliers. Reduced uncertainty and better risk management.
- **Benefits to the environment:** Less disruption and waste. More reuse and greater resource efficiency a key enabler of the circular economy in the built environment.





Reimagining infrastructure...

...as a system of systems ...as a system of services ...as a cyber-physical system ...as a sustainable system





Infrastructure as a system of systems







Infrastructure as a system of services





Infrastructure as a cyber physical system



Smart





Infrastructure as a sustainable system









Connectable digital twins











The Information Management Framework

- The Framework includes all the building blocks that are necessary to enable effective information management across the built environment.
- It is a coherent structure within which the key building blocks (governance, standards, enablers etc) logically fit
- At its heart, is the Commons a national resource that provides the necessary standards to enable effective information management and secure, resilient data sharing

The Framework enables:

- the CDBB vision
- effective information management "putting the right information in the right hands at the right time to make the right decision"
- secure, resilient data sharing between organisations and across sectors
- the National Digital Twin an ecosystem of connected twins
- better decisions, based on better data, leading to better outcomes per whole-life pound





The background to the approach

Top down (Authoritarian)

Bottom up (Darwinian)





The emerging approach



A national resource, held in common, that unlocks effective information management across the industry; the minimum necessary open standards/methodologies; expert led – the "ministry of all the talents"

Collaborative, web-enabled, learning community that learns by doing; captures and shares emerging best practice; turns experience into guidance and guidance into standards; practitioner led – those who own or are developing digital twins.





The objectives of the DT Hub



Progress



- National reference data library
- Foundation data model
- Integration architectures

- Steering Group
- Curator
- Founder members







The core streams of the Roadmap

Approach	To define the overall approach for delivering the Framework and to establish the strategies for each of the other streams
Governance	To establish the structures, processes and metrics for managing the development, adoption and ongoing oversight of the Framework
Commons	To develop and make available the necessary support for effective information management via guidance, specifications and standards
DT Hub	To bring together those who own or who are developing digital twins; to identify and share emerging best practice
Enablers	To identify and address the relevant potential blockers
Change	To facilitate adoption of the Framework across the whole ecosystem of the built environment, in each sector and place





The Roadmap









Stream strategies

Approach Coordination and alignment, not control; guided evolution

Governance Existing structures where appropriate; three key phases; sector view

Commons 'minimum viable' approach; national-level resource

DT Hub The 'forge' for developing/testing/sharing best practice

Enablers Prioritised and proactive; not solving everything

Change Focussed effort on the early adopters and early majority











Outline logic model















Governance



Ultimate customers









Ultimate customers









Ultimate customers











Governance







Digital twin categorisation

How best to define the work on digital twins so that others can easily understand it?

- Position within the matrix map (lifecycle vs scale)
- Relationship to the purposes that the DTWG has defined
- Owners/key players
- Success criteria















Matrix mapping for DTs

	Use	Operation	Maintenance	Planning	Design	Delivery	Re-use	Disposal
Asset/ Building								
Network/ Neighbourhood								
System/City/ Region								
National				DAFNI				
International								



