Construction Innovation Hub

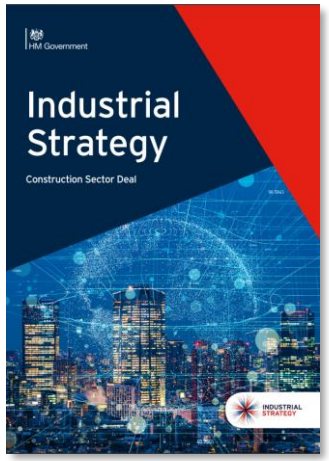
A platform construction approach for sustainable infrastructure delivery

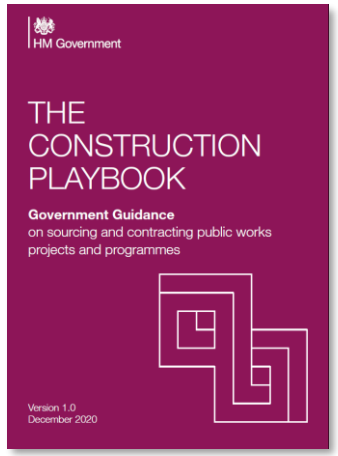
04 November 2021

Ben Carlisle

Construction Innovation Hub

The Journey





2017

The Industrial Strategy

- 4 Grand Challenges
- A multi-billion Challenge Fund from government and matched by industry.
- Transforming Construction specifically identified under ‘clean growth’

Transforming Infrastructure Performance

Government’s long-term plan to change the way infrastructure is planned, procured, delivered and operated.

- Value message loud and clear
- Presumption in favour of offsite

July 2018

Construction Sector Deal

A partnership between the industry and the government that aims to transform the sector’s productivity.

Transforming Construction Challenge:

- 4 year programme
- £250m industry funding
- £170m government funding

Nov 2018

Construction Innovation Hub

- Competition run by UKRI
- Consortium of 3 centres – MTC; CDBB; BRE
- Now with 200+ industry partners

Supporting Policy and Direction

National Infrastructure Strategy (Nov 2020)

The Construction Playbook (Dec 2020)

TIP – Roadmap to 2030 (Sep 2021)

It starts with a vision…

The Construction Innovation Hub's vision is for a world-leading construction and infrastructure sector, future-proofed through collective innovation, that delivers long-term environmental, economic and social benefits for the UK.

And a commitment…

The Hub's mission is to create better outcomes for current and future generations by driving the adoption of manufacturing and digital approaches that improve the delivery, resilience and performance of infrastructure.

Routes to deliver impact and benefits

Policy, regulation and standards:

Shape the policy environment and understand client needs to build appetite and a clear evidence base for adoption of our outputs

Pipeline targeting:

Development of new market-ready tools, products and processes that can be used on live projects and programmes in support of the Sector Deal ambitions

Enabling the Market:

Work with both clients and industry to ensure that there is capability and capacity in the market to deliver these new, productive solutions at scale and pace

3 Integrated Projects

Value Toolkit

- A process and suite of tools which will empower clients and policy makers to make smarter, more informed, value-based decisions.
- Value-based decisions will in turn ensure that our buildings and infrastructure are delivering better outcomes for the economy, society and the environment.

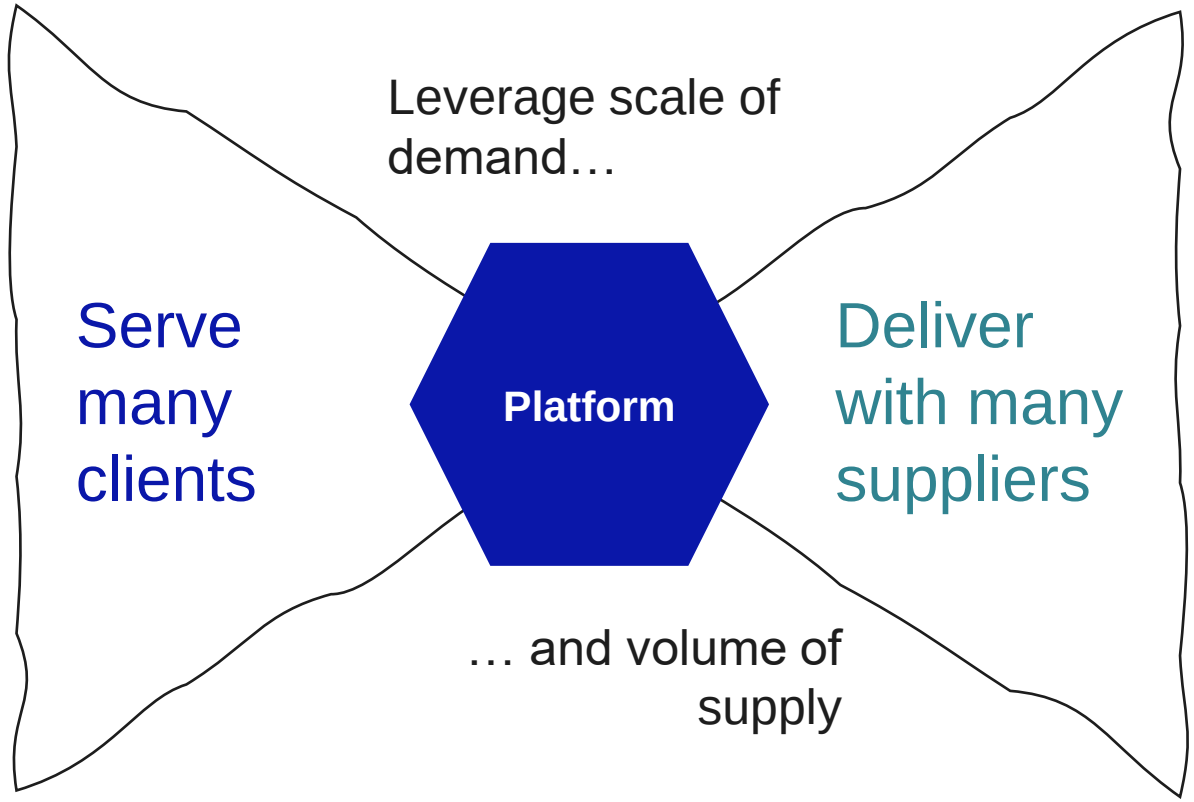
Information Management

- Digital information that provides assurance through all lifecycle stages to ensure solutions comply with standards, regulations and meets performance criteria.
- The right information is digitally available to the right people at the right time to support the right decisions.

Platform

- To enable a sustainable UK manufacturing solutions market to grow and prosper in response to government's policy objectives for the built environment and meet the ambitions of the Construction Sector Deal

What's a platform?



A Platform

Repeatable core assets
+
Stable interface
+
Complementary, variable assets

Assets = parts + knowledge + processes + people & relationships

Platforms are everywhere

Platforms

Low variety core assets

+

Stable interface

+

Complementary peripheral assets

Ecosystem

A hub of value exchanges, coordinating buyers and sellers

Market intermediary

A link between two or more markets or groups of producers and users.

Organisational

An organisational structure which enables rapid adaptation to suit dynamic market conditions.

Product

A stable core set of components which are configured and combined with complementary components to create mass customised solutions.

Open

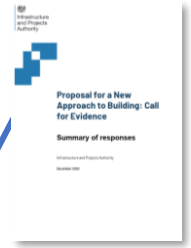
Made available for others to adopt, improve and complement using an ecosystem approach.

Semi-open

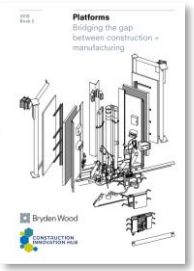
Supply-chain based approach with limited access and information available on interfaces.

Closed

Interface details and access are closed and tightly controlled.



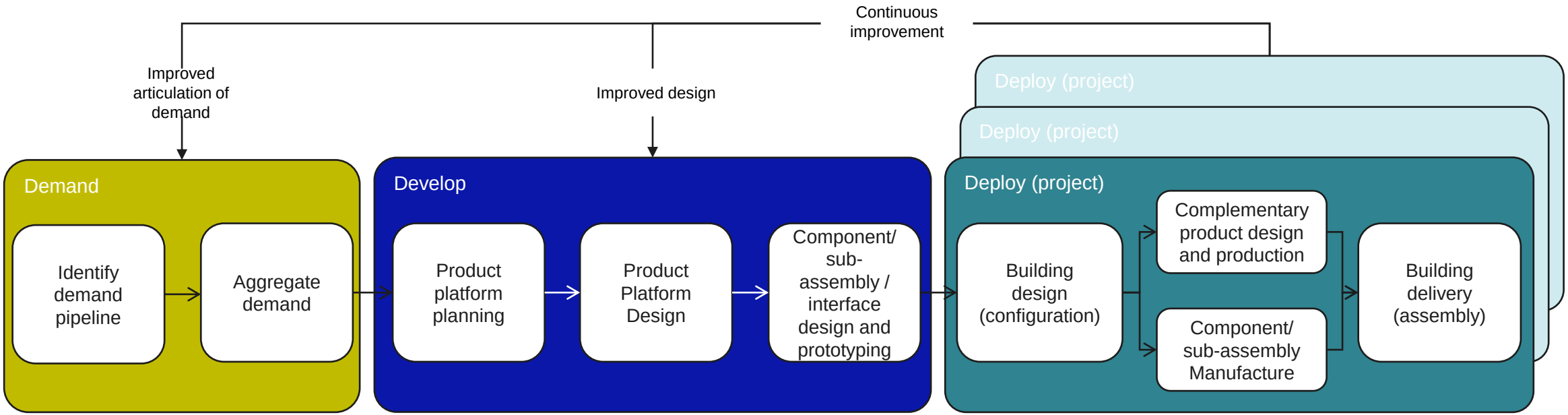
P-DfMA as an approach which creates a market for digitally-designed, manufactured, interoperable components. These can be designed, manufactured, procured and used from as broad a supply chain as possible, and be applied wherever possible.



Platforms are sets of components that interact in very well defined ways to allow a range of products and services to be produced.

Sources: Mosca, L., et al., 2020 Platform Thinking for Construction, Transforming Construction. Network Plus, Digest Series, No.2
Proposal for a New Approach to Building Call for Evidence, IPA, 2018; Platforms: Bridging the gap between construction + manufacturing, Bryden Wood, Construction Innovation Hub, 2018

Platform development framework



The use of product platforms requires aggregation of demand across a range of asset types, and an ability to rationalise design requirements.

This is done away from the project environment and needs to provide confidence to the supply chain that the solutions they develop will have a market.

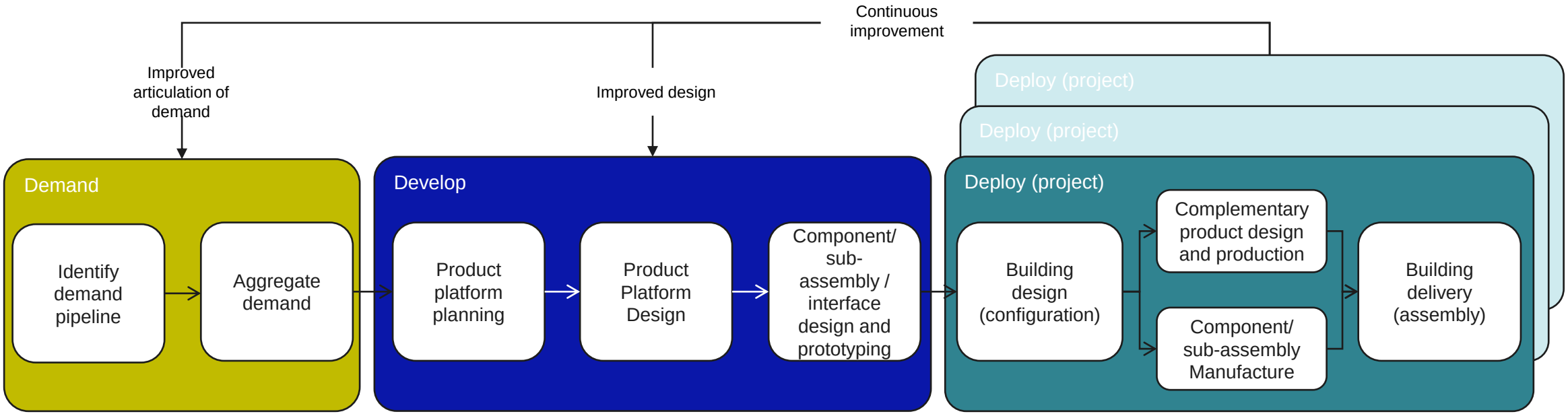
It is expected that there will be multiple Product Platforms in the market, and that each will serve different market segments (and hence deliver different performance and value). The process through which Product Platforms is not well understood in construction and is being developed, tested and published by the Hub to enable industry to develop their own Product Platforms.

The Hub is also working with existing Product Platform providers to identify early opportunities for standardisation and interoperability across Product Platforms.

The aggregation of demand and development of Product Platforms takes place away from the project environment and as such are not tailored to the requirements of one particular project or asset.

The deployment of Product Platforms depends on how well requirements and the design reflect the specific need of a project. A significant proportion of design is replaced by ‘configuration’ of standardised components and subassemblies, although an element of tailoring and bespoke design is always likely to be required.

Platform development framework



Identifying future planned procurements (projects, programmes) and forecast needs including financial value and characterisation of procurement/need.

Bringing together the demand pipeline from multiple clients with associated technical requirements and value drivers so details can be segmented and analysed.

Analysing the aggregated demand and segmenting the market. Setting a platform strategy based on target segment(s) and approach to expansion. Route to market.

Ensuring voice of the customer is captured. Developing plans for what will be common and what needs to vary. Defining the system architecture and key high level design decisions, including commonality and principles at a system level, in response to the planning.

Detailed design of the kit of parts, detailed interfaces, production and installation processes. Prototyping of process and products to improve the design. Prepare for deployment (digital objects, supply chain and sourcing, configuration rules, guidance on use). Incorporate lessons learnt from prototyping and projects.

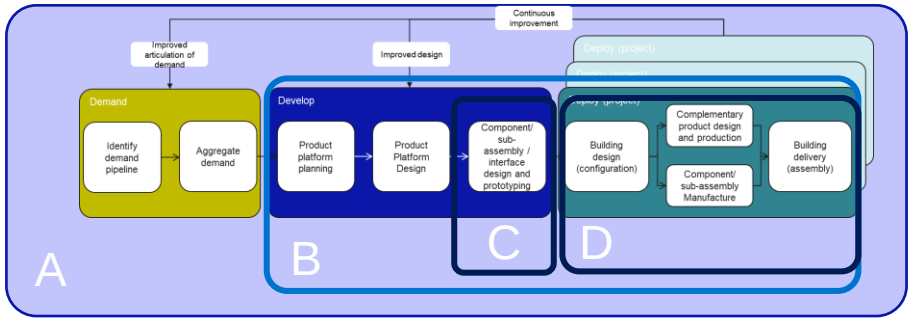
The process of briefing and designing individual projects through the deployment and configuration of pre-existing kits of parts and the specification of additional, complementary project-specific systems and components.

Design and production of project-specific systems and components to complement core, repeatable platform components.

Production of core, repeatable platform components.

Logistics and assembly of offsite-manufactured components and systems together with on site activities needed to construct, deliver and handover the built asset.

Platforms and Rulebooks



A

Product Platform Rulebook

- Rules governing product platforms
- Principles and “how to” guide
- Case studies

- **First iteration this year**

B

Product Platform System Definition

- Applying the How to guide to develop a system definition.
- System-specific and defining key drivers, requirements and architecture.

C

Product Platform Specification

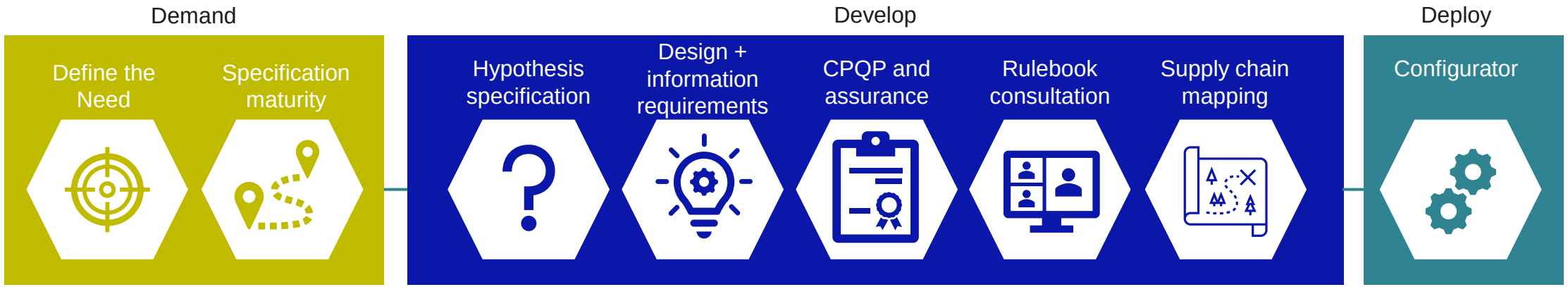
- Applying the System Definition to develop component and production specifications.
- Includes key details on technical performance, interfaces, production.

D

Product Platform Deployment Manual

- How a specific system is deployed in a project setting, including configuration, ordering, supply chain management.

(parts of) The journey so far



What's to come…

- Completion of routemaps and assessments.
- Improvements to pipeline visibility.
- Relationship to Value Toolkit.

- Component and subassembly development
- Sandpits and prototyping (health and education)
- Information requirements development
- Rulebook development and publication
- Validation with other systems
- Relationship to Value Toolkit and Information Management
- CPQP and assurance development

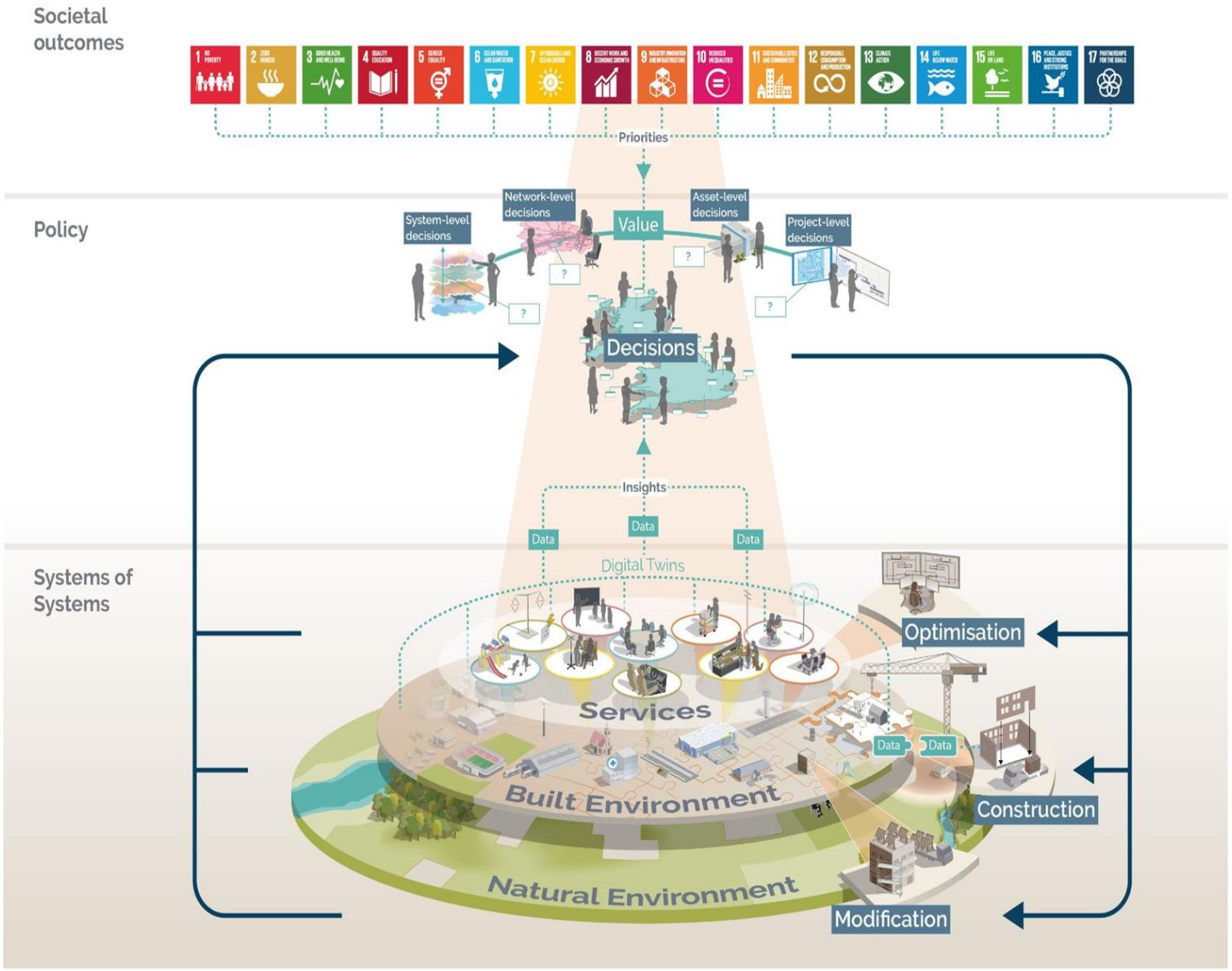
Prototype and demonstration

Infrastructure and Projects Authority

Reporting to Cabinet Office and HM Treasury

Transforming Infrastructure Performance: Roadmap to 2030

The Built Environment Model



The Built Environment Model has been **developed in partnership with government, industry and academia.** It describes a new approach to decision making, founded on an understanding of the **interlinked nature of our infrastructure systems**, which are rooted in the **natural environment** and encompass the **built environment and the services** on which we all depend.

In this new approach:

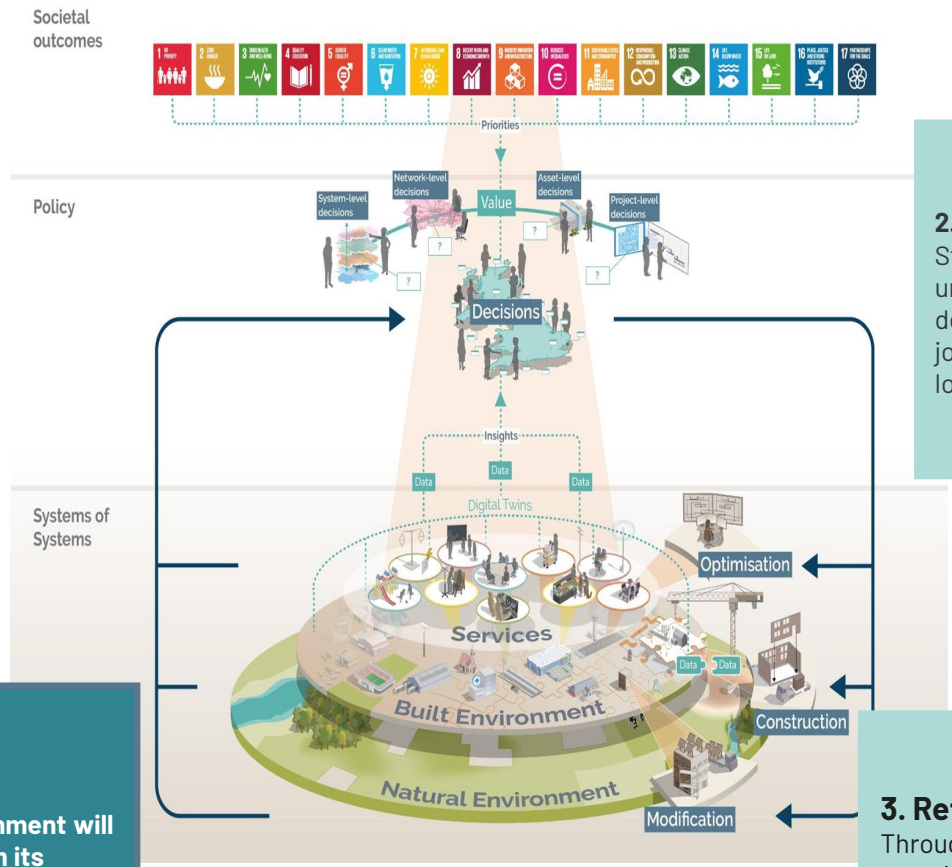
- We must understand the **societal outcomes** that are needed in the context of this system
- Outcomes must be translated into **delivery strategies**, balancing the addition of new assets and the need to intervene in existing ones
- The success of our strategies in delivering the desired outcomes **must be tracked and fed back into decision making**

Focus areas

There are five focus areas which represent the most significant transformations required in how we intervene in our built environment.

1. Outcomes

The starting point for all of our interventions in the built environment should be defining and incorporating strategic outcomes (that address a range of societal challenges – from changing patterns of use to the need for adaptation and resilience) into longer term collaborative delivery models in which industry partners are incentivised to deliver them



2. Place based decision making

Strategic outcomes should be rooted in an understanding of local context and enabled by data and decision making structures so that interventions can be joined-up across departmental, national, regional, and local silos

3. Retrofitting

Through public-private collaboration, enabling a self-sustaining retrofit market, the government will create the means to adapt our buildings to address sustainability imperatives and a market for green jobs appropriate for varying regional adaptation needs

4. Platform approaches

Through platform approaches the government will generate greater societal outcomes from its pipeline, by enabling a disaggregated manufacturing industry that creates stable and inclusive employment across all regions of the UK

5. Optimisation

Given finite resources, adding to the built environment can't be our main way of improving the outcomes we derive from it. Insight into a dynamic system must underpin the interventions we make. The effectiveness of the interventions in achieving desired strategic outcomes must be monitored, with relevant stakeholders incentivised to adapt accordingly.

Our Collaborative Industry Team

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INDUSTRIAL STRATEGY

UK Research and Innovation