Digital Engineering

Roads Australia

16 November 2021

Tim Mumford

Who are you listening to? | Committed to continuous improvement

Role
Director, Digital and Innovation, Beca

Personal Objective
Continuous improvement of capitally-intensive industries through evidence-based decision-making, digital and innovation

Education/Quals
- Electrical Engineer (Eng.Exec)
- M.BA
- ISO 19650 Certified
- Revit Level 1 + 2

Experience
- Site/Field
- Power Generation
- Oil + Gas
- Consulting/Advisory
- Oil + Gas
- Mining
- Petrochem/Industrial
- Infrastructure
- Policy/Government
- State government (Treasury)
- Federal government (Infrastructure)

Beca | OPV Office of Projects Victoria | Schlumberger | IPA Independent Project Analysis | TRU energy

Australian Government | Infrastructure Australia

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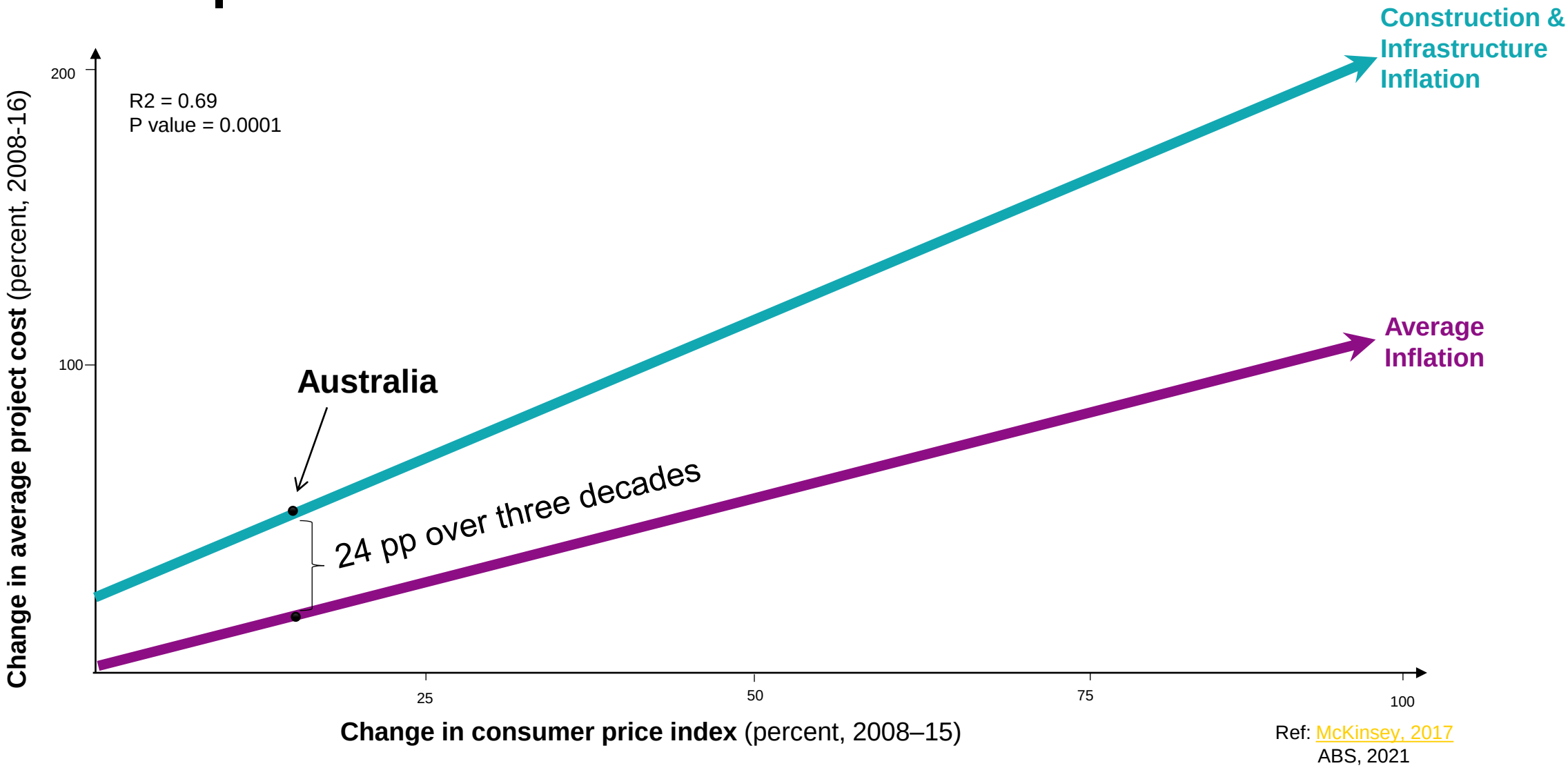
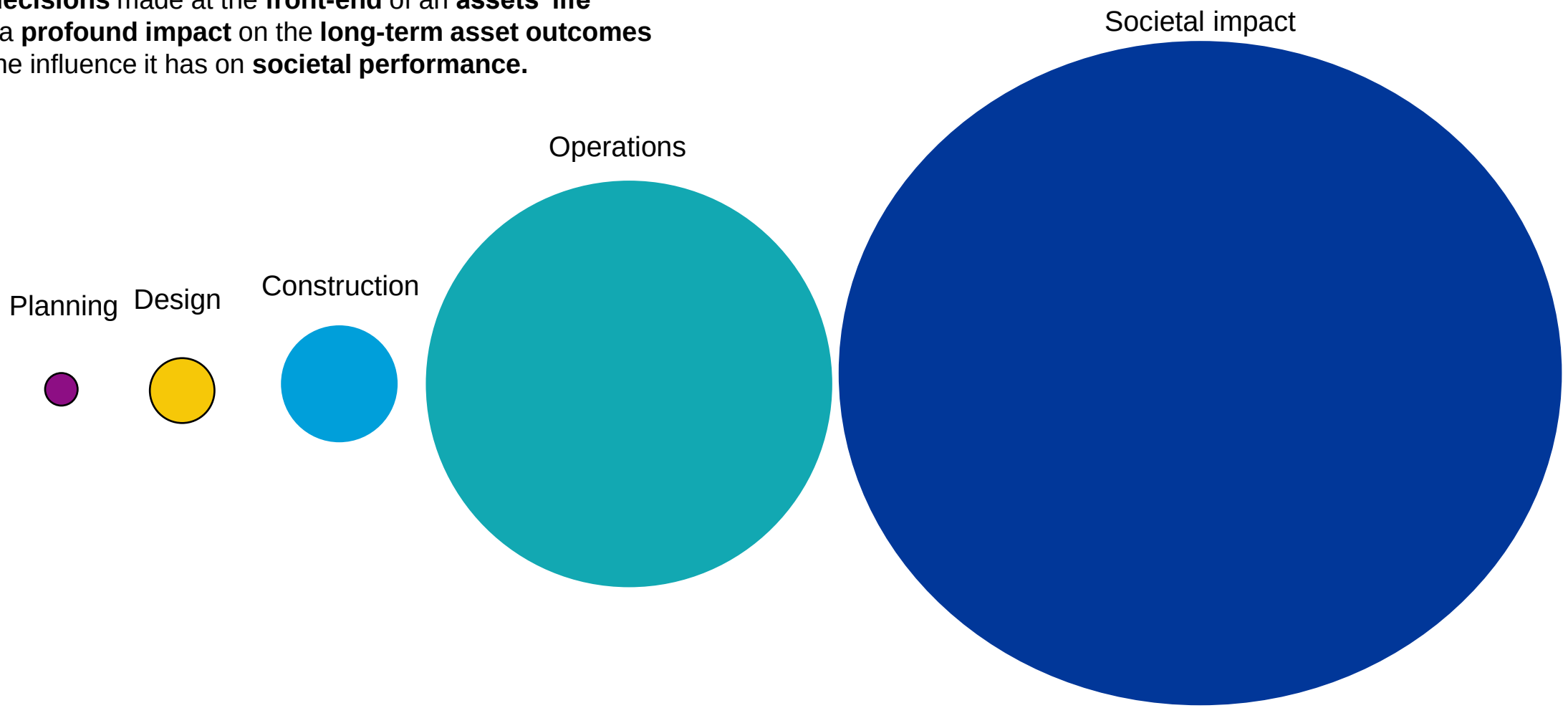
Why Care? | We can afford less and less infrastructure over time



Ref: McKinsey, 2017
ABS, 2021

Why Care? | Data is an asset for the public good

The **decisions** made at the **front-end** of an **assets' life** have a **profound impact** on the **long-term asset outcomes** and the influence it has on **societal performance.**



Key Message | Digital Engineering can address many industry challenges

Digital is about better information management across the lifecycle

Better financial, schedule, and quality project outcomes

Supports an effort to increase productivity

Digital isn’t going away; the cost of inaction is high

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DE Benefactors | Benefits many people over a long-period of time

Industry

- Increased clarity of scope
- Reduced design risk
- Reduced construction risk
- Ability to re-use existing designs
- Improved digital information handover

Government / Entity

- Reduced bid costs
- Lower project risk
- Fewer safety incidents
- Greater certainty at contract award
- Reduced data and information loss
- Less waste and improved productivity

Public

Assets/projects that are:

- More sustainable
- Better value for money
- Functionally better/user focussed
- More reliable/uptime
- Less disruptive

Industry & Research Findings

25% improvement of productivity over 10 years

12.7 BCR; 1.7% of cost savings from implementing DE

40% elimination of unbudgeted change

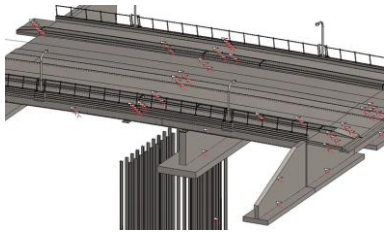
Cost estimation accuracy within 3%

80% reduction in time taken to generate a cost estimate

10% saving of the contract value through clash detections

Definitions | Important to understand; not critical to perfect

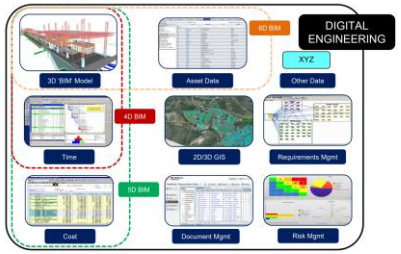
Building Information Modeling



A digital representation of physical and functional characteristics of an asset or object.

ENABLES

Digital Engineering



Federating and linking data and information sets across the lifecycle to object-based datasets to inform organisational, asset, and project-level use cases

ENABLES

Digital Delivery

High-efficiency delivery of information, data, decisions throughout the lifecycle

ENABLES

OUTCOMES **DECISION MAKING** **PRODUCTIVITY** **WASTE**

A technologically modern urban area utilising different types of digital methods, tools, and sensors. Information gained from that data are used to manage assets, resources and services efficiently; in return, that data is used to improve the operations across the area.

Smart Cities

ENABLES

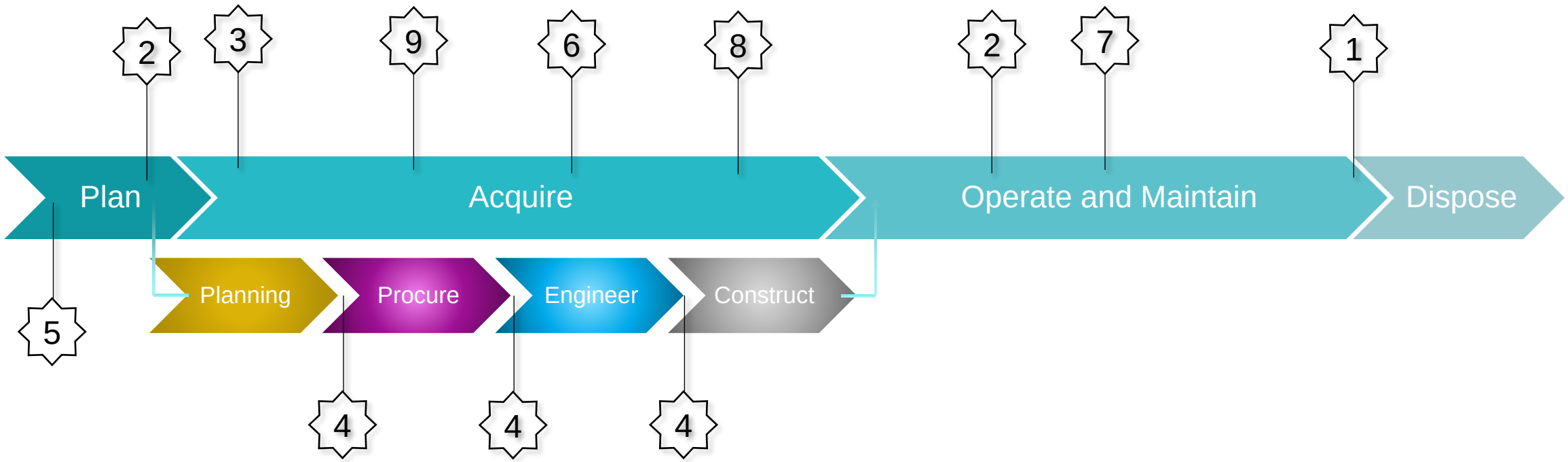
A dynamic digital representation of a real-world object or system. It must 'look like', 'behave like', and be 'connected to'.

Digital Twins

ENABLERS

- Ways of Working
- Contracts
- Standards
- Policy
- Guidance
- Technology
- Capability and Capacity

Infrastructure Challenges | Critical to solve today, for tomorrow



1 Duration of time
2 Preservation of information
3 The need for speed
4 The parties and the contracts joining them
5 Complexity of built environment
6 Capital cost
7 Operating costs
8 Capability/Capacity
9 Volume of information

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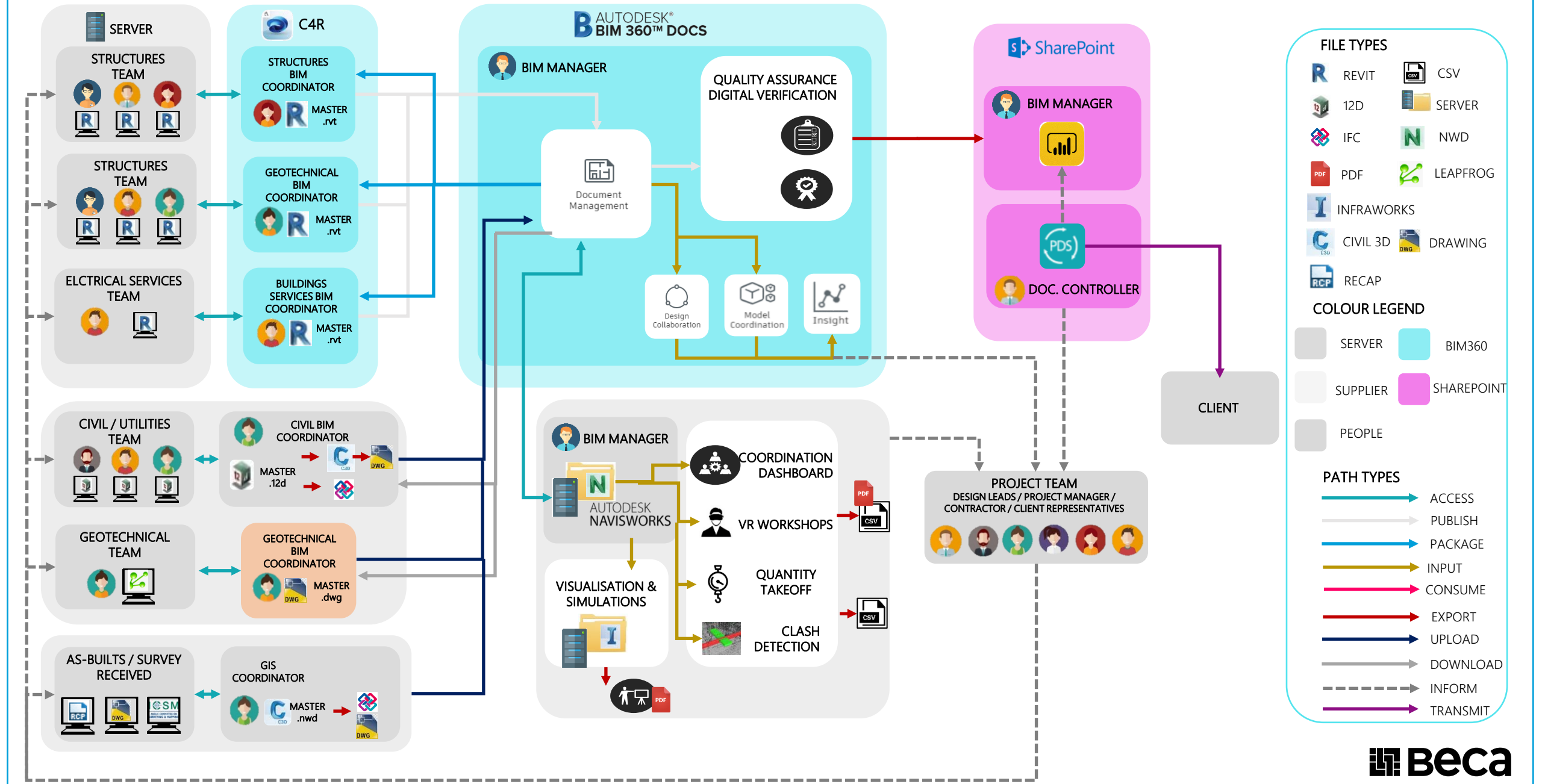
EXAMPLE PROJECT



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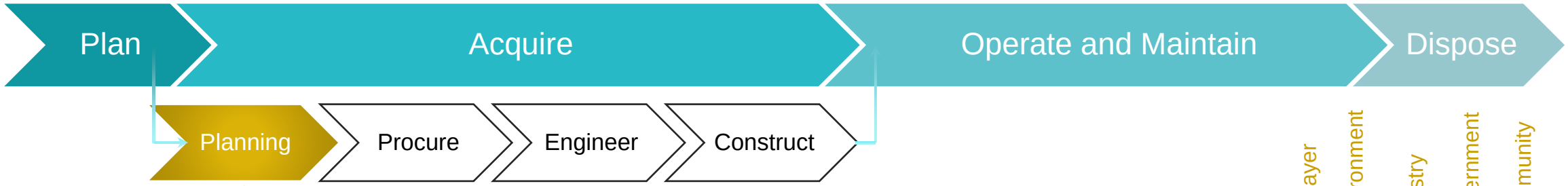
Use Cases | End to end value created by digital engineering



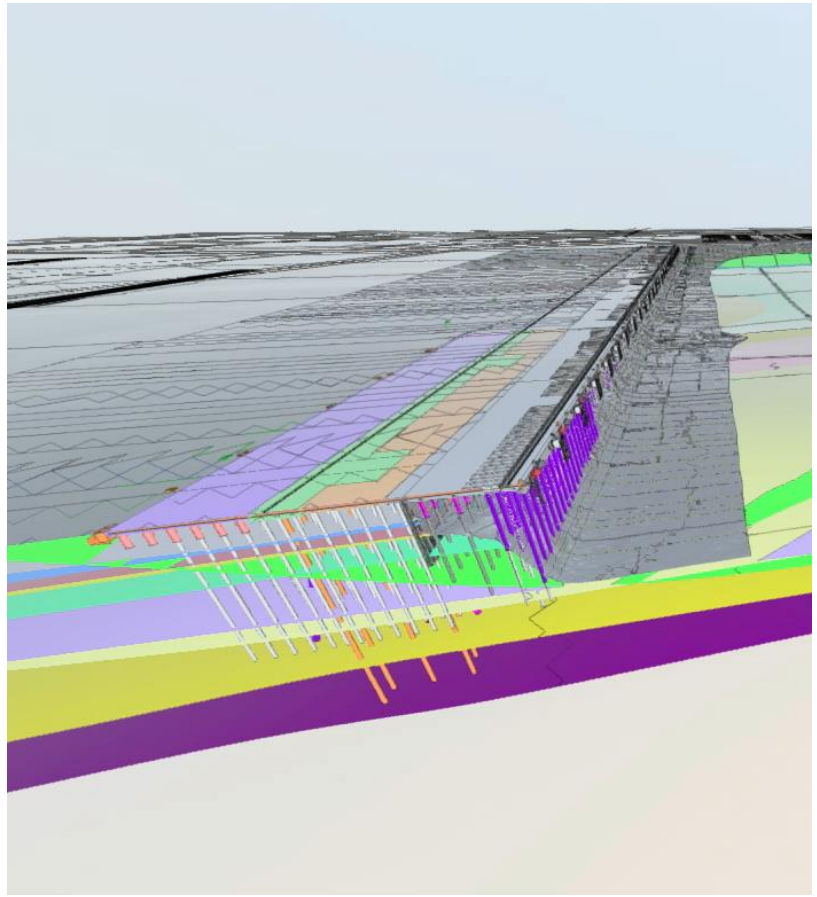
		Taxpayer	Environment	Industry	Government	Community
Rapid optioneering	Getting to the right solution, quickly	●	●		●	●
Information Validation	Rapidly and accurately validating existing information	●		●		
Site Validation	Resolving site challenges without risk	●		●	●	
Stakeholder Engagement	Increasing social licence and insight				●	●
Project Understanding	Increase project buy-in and alignment			●	●	●

Rapid optioneering | Getting to the right solution, quickly

CASE STUDY

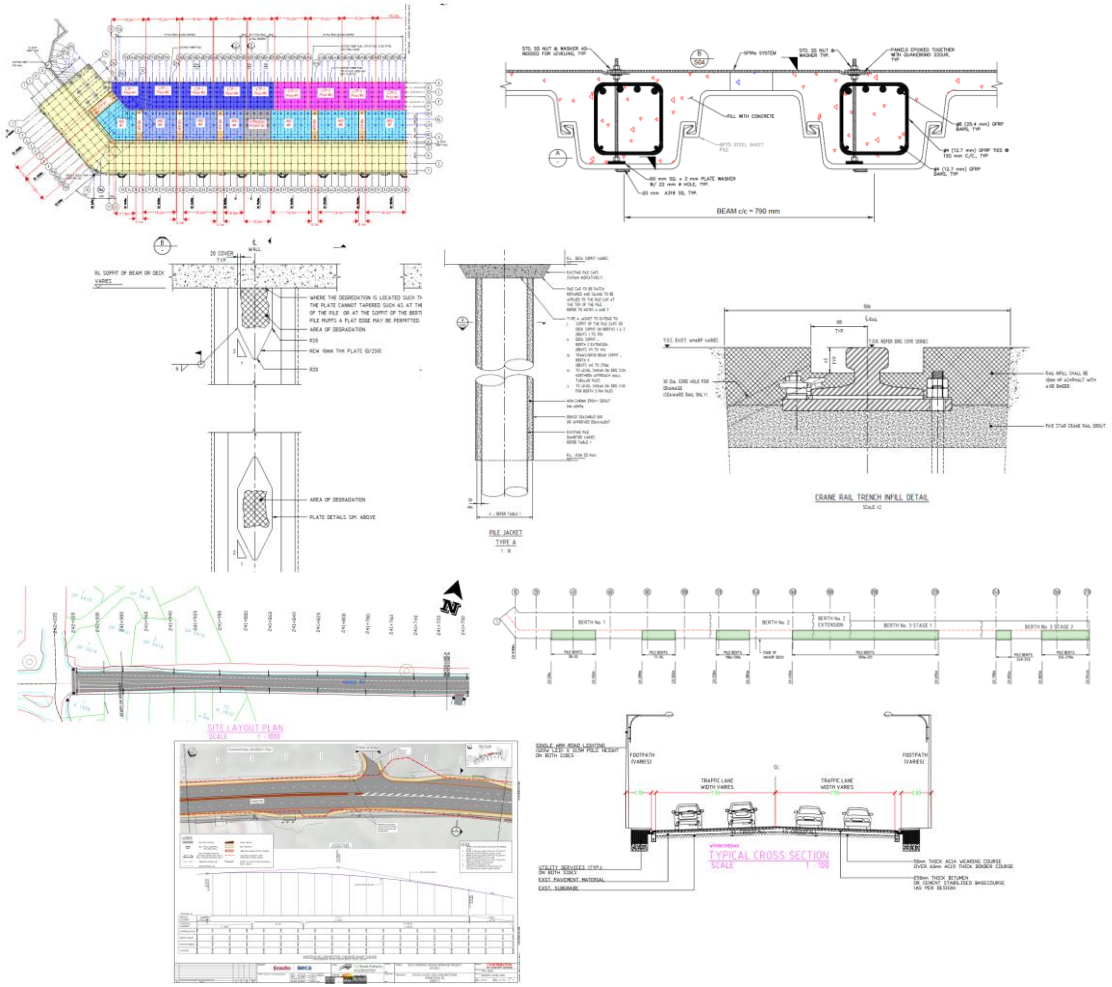
Project Understanding | Making sense of the complex

CASE STUDY



CENTRAL SOUCE OF TRUTH
COMPREHENSIVE + DETAILED
LINKED
COMMON + SHAREABLE

Vs



MULTIPLE VERSIONS
SINGLE DIMENSION +
VECTOR-BASED
NON LINKED

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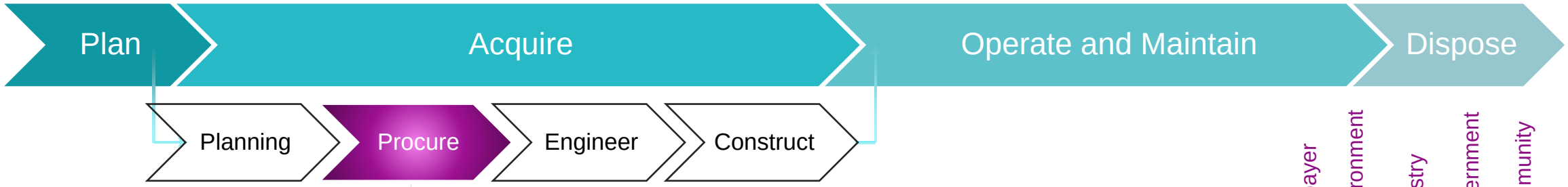
Use Cases | End to end value created by digital engineering



		Taxpayer	Environment	Industry	Government	Community
Stakeholder Engagement	Increasing social licence and insight				●	●
Assurance	Reducing risk and readiness	●		●	●	
Value for Money	Holistically validating bids	●			●	
Solution Optimisation	Ensuring scope is fit for purpose	●	●		●	●
Bid Costs	Reducing bid costs by re-using information	●		●	●	●

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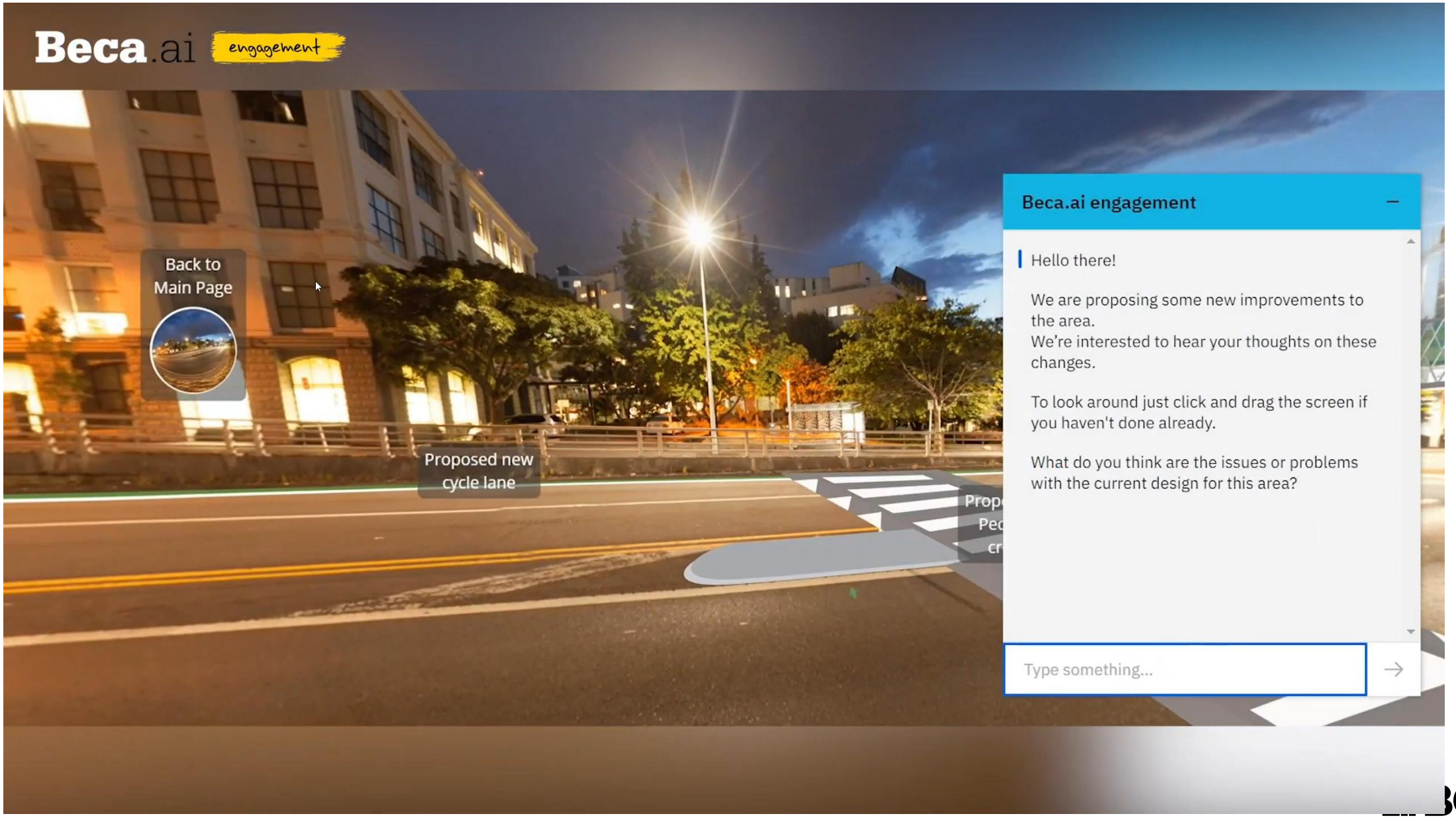
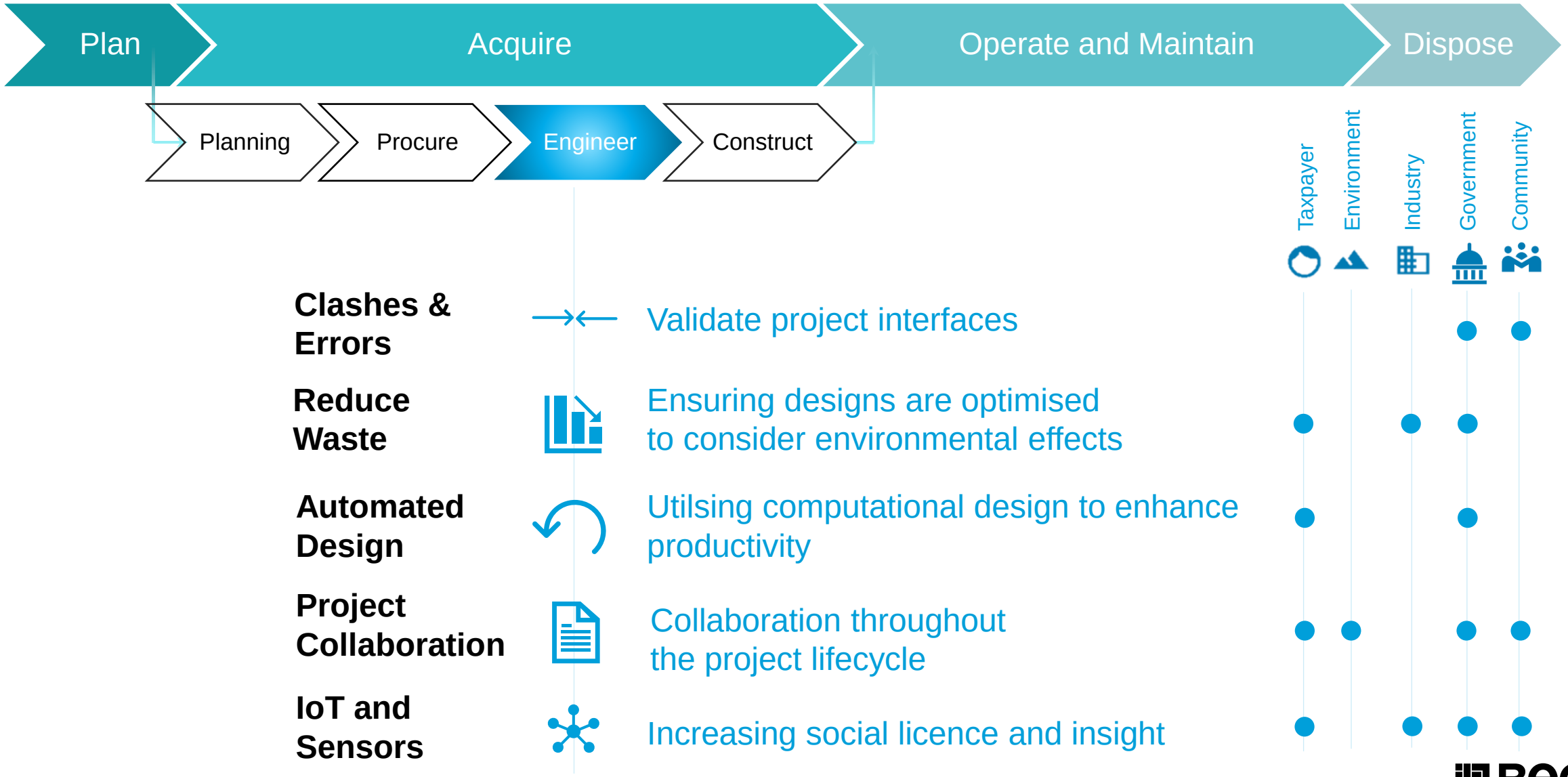
Stakeholder Engagement | Real and meaningful conversations using AI

CASE STUDY



Use Cases | End to end value created by digital engineering



Automated Design | Enhancing project productivity where it matters

CASE STUDY

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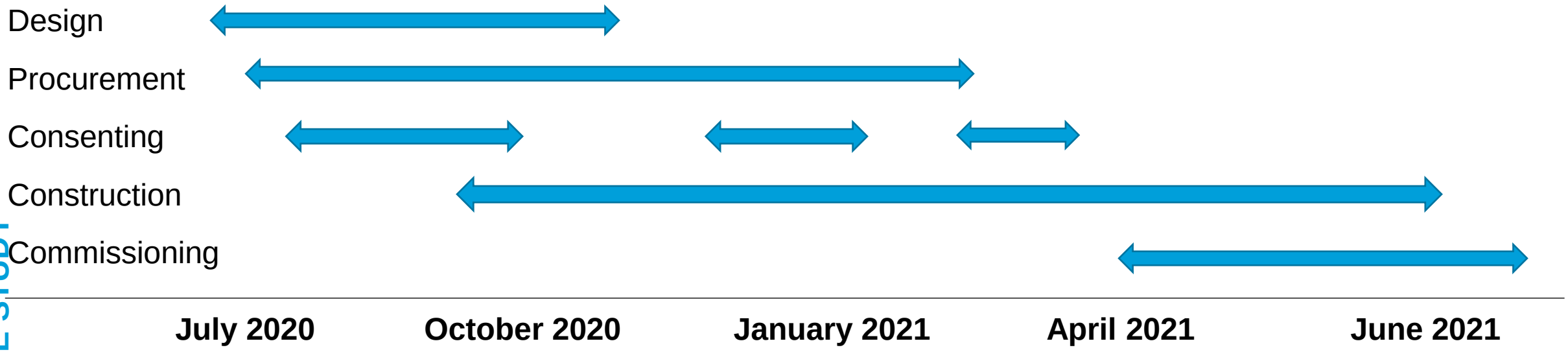
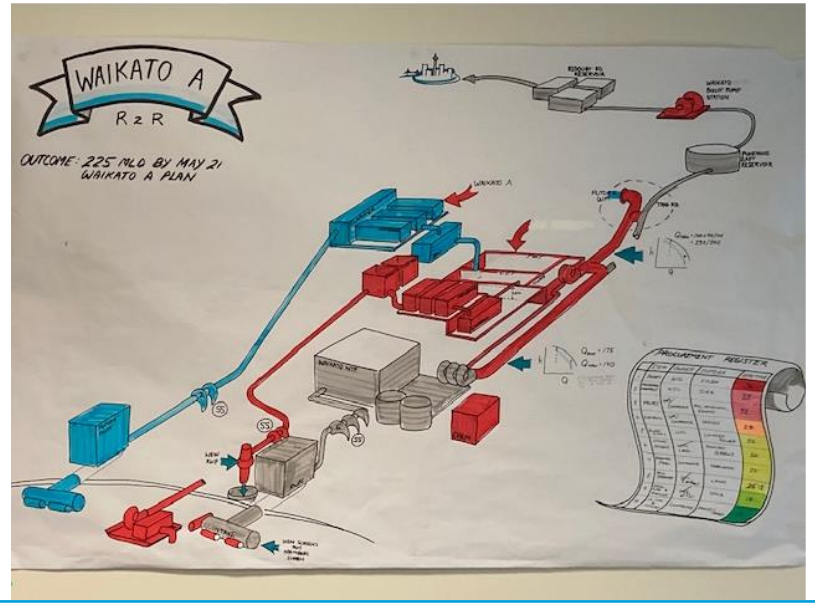
Project Collaboration | Getting to full-function quicker

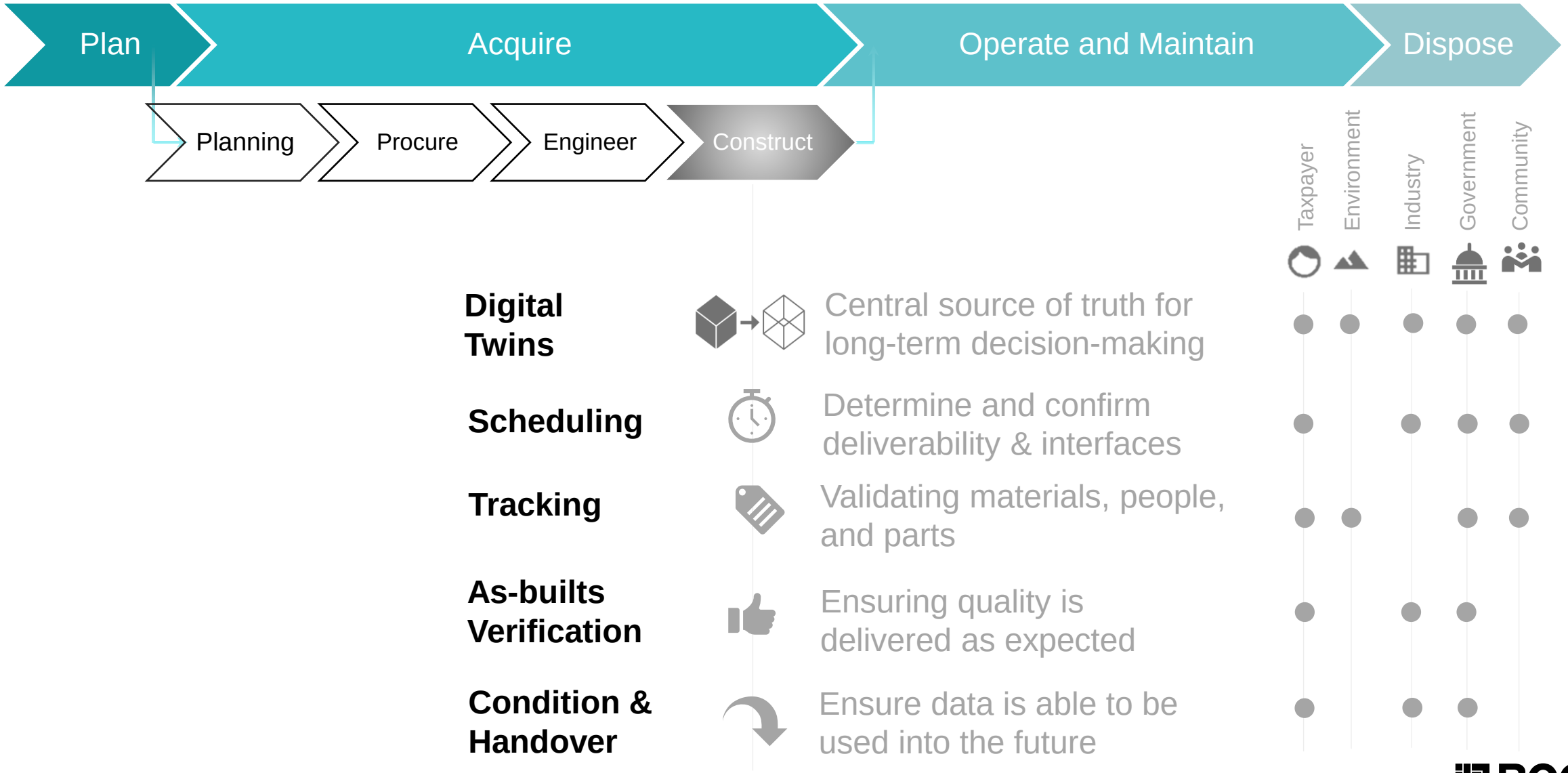


CASE STUDY



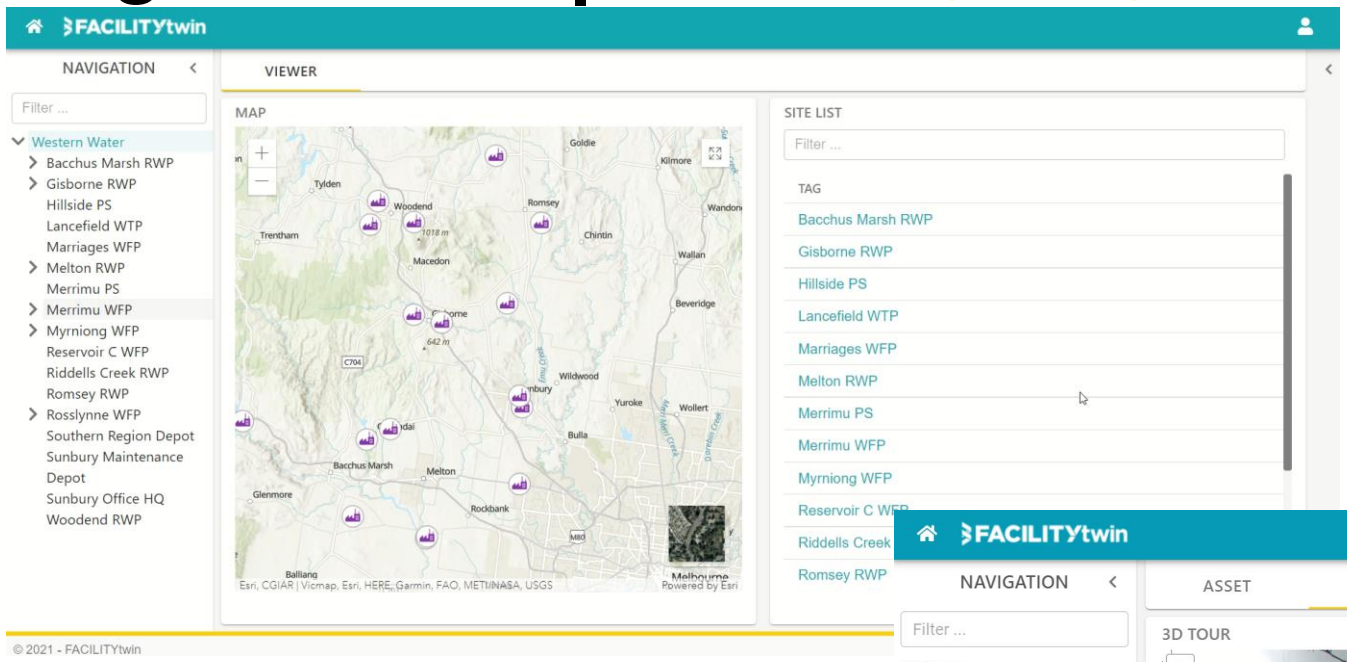
12 months

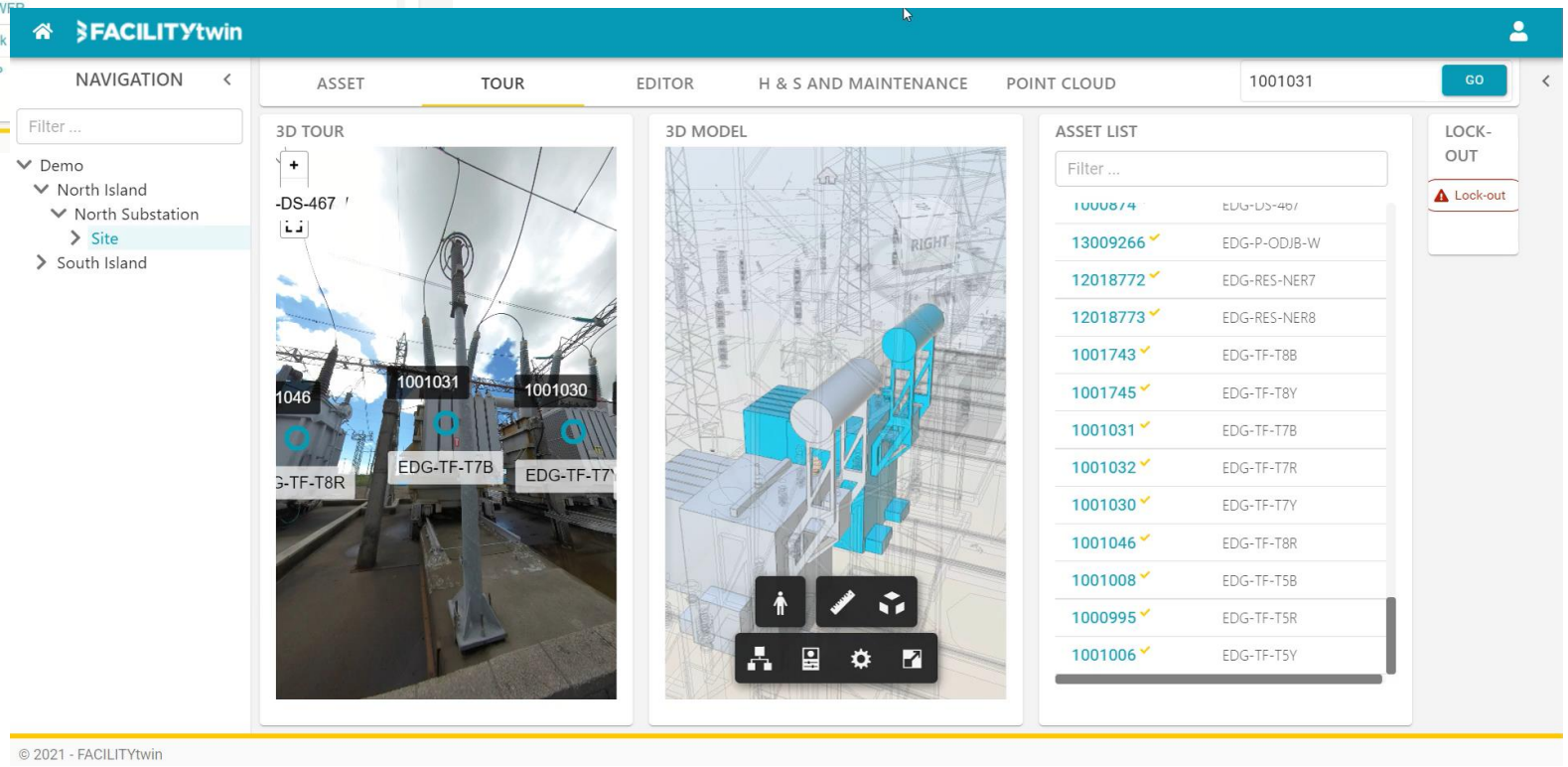
Use Cases | End to end value created by digital engineering



Digital Twins | BIM before you digital twin

CASE STUDY





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We're all responsible & the time to act was yesterday

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