Client Side 4D/5D BIM
Releasing Value through Digital Engineering

Practical approaches at portfolio level

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Agenda

01 What have we achieved so far? What is Digital Engineering?

02 Use Cases at Portfolio Level – i.e. across multiple contracts

03 Client 'Problems' and 'Approaches'

04 Take-Aways

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The Technology ‘Wild West’

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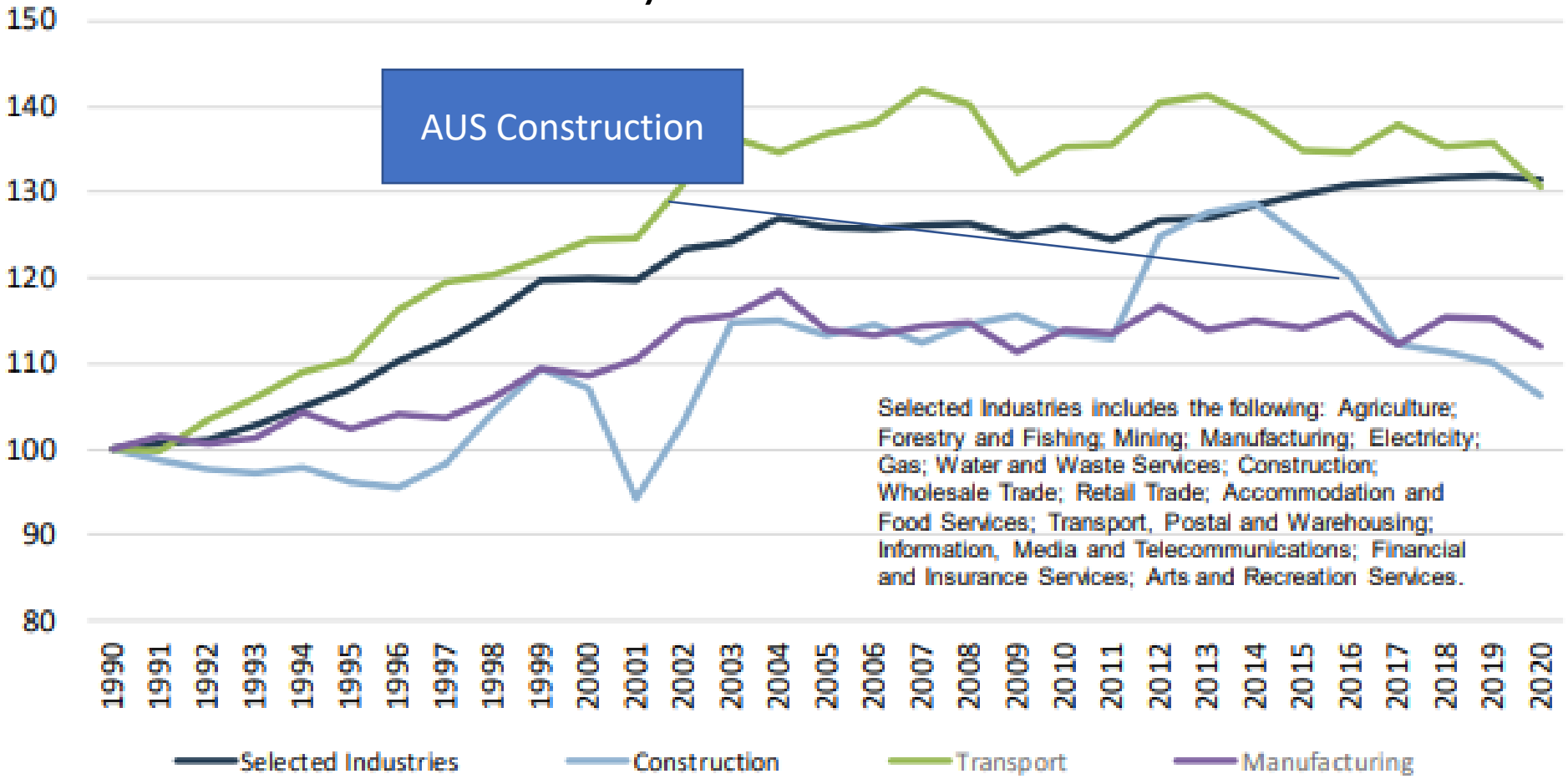
What have the technologies delivered – so far?

Productivity - How far have we come?



Year ended June

Source: ABS Data

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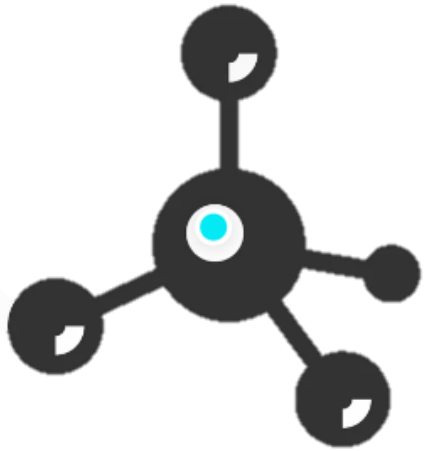
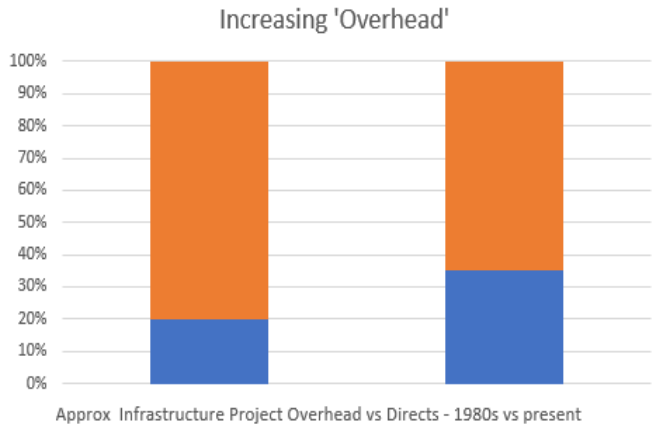
Why the Productivity Gap?





CARBON

POLITICS

PRAGMATISM

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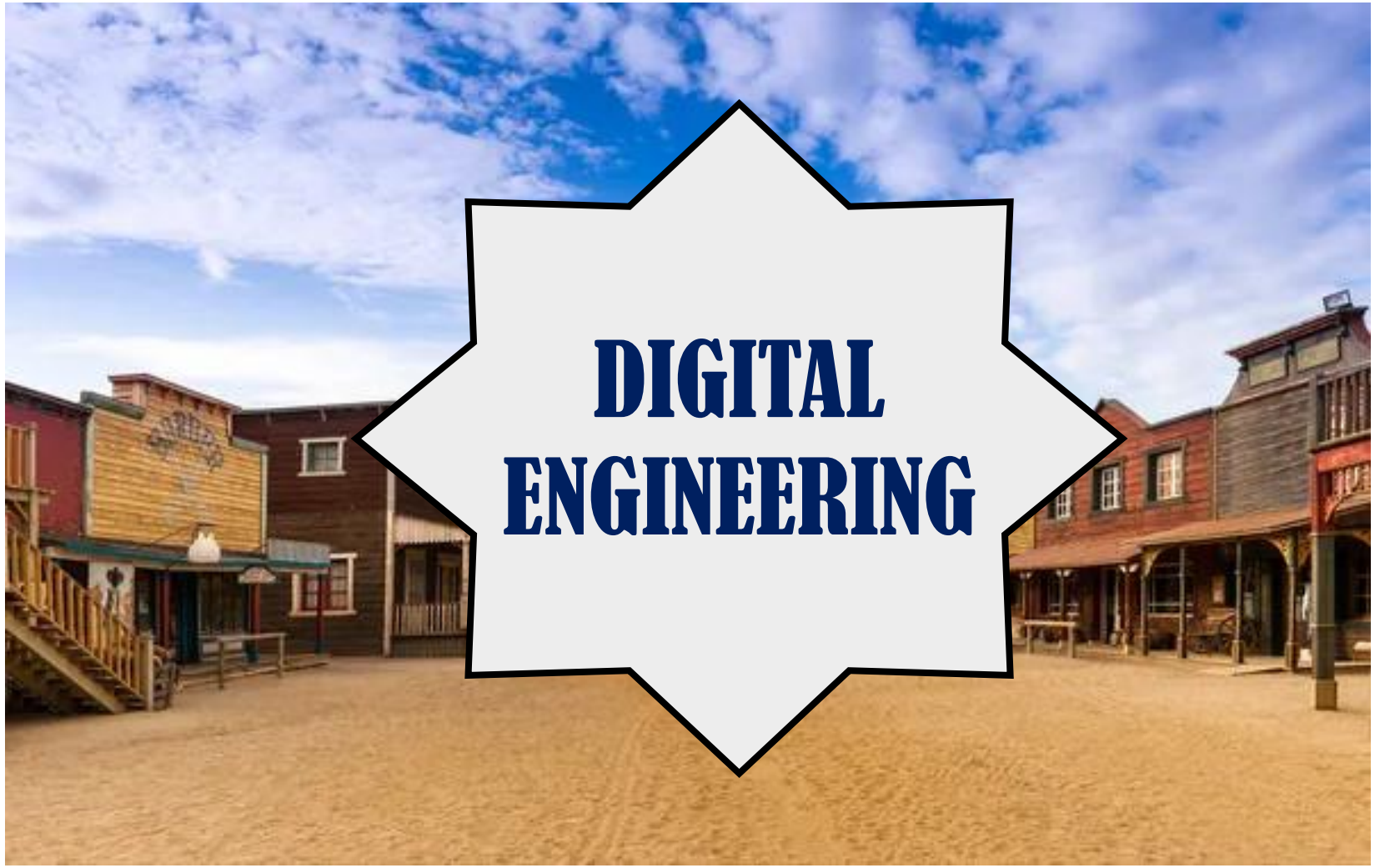
The Technology ‘Wild West’: Digital Engineering



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D.E. Benefits

1. Before Procurement of Asset

- Visualizing scope against programme to gain stakeholder consent

2. During Procurement of Asset

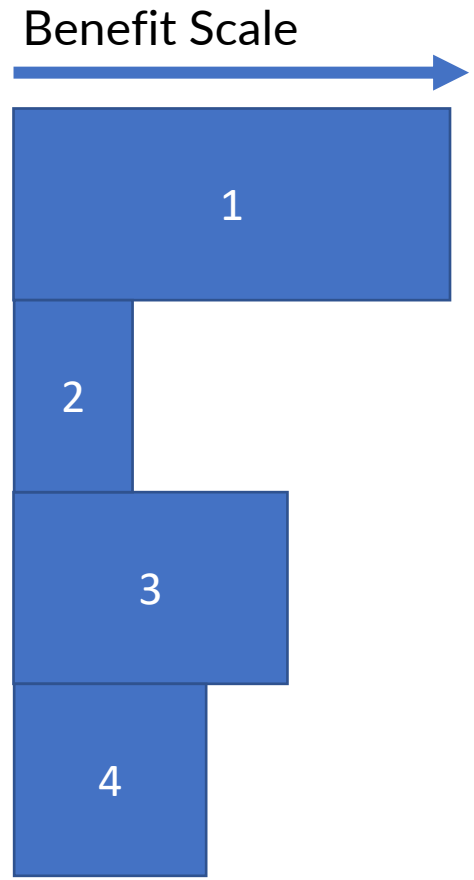
- Assessing variability of productivity and therefore risk
- Identifying appropriate management interventions

3. During Operation of Asset

- Visually linking O&M information to assets to lower cost of maintenance

4. Future Asset Development

- Retrieving historical information for insights to inform future business cases



Use Cases for Clients at Portfolio Level

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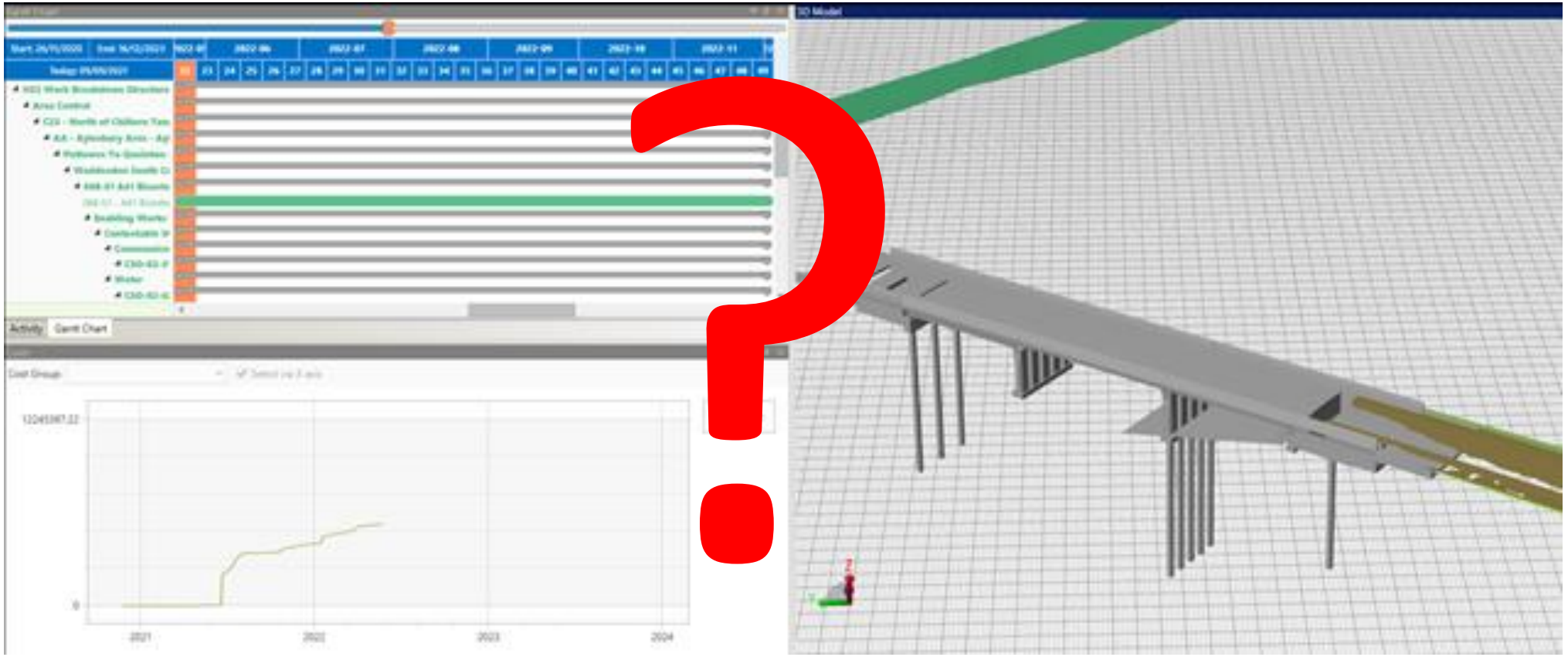
4/5D Use Cases – Portfolio Level – are there any?



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User Stories

I am an executive and I want to visualise and interrogate the state of delivery (using colour codes) against my concept design for this month, across multiple contracts. I also want to see visualise where we are ahead and behind schedule, and the areas of greatest schedule and cost risk. Oh… and I want to be able to simulate forecast progress to see what we say we will have completed and what we will have spent at the end of this Financial Year

I am an client side Engineering Manager and I need to know that the all our designs are co-ordinated and passed to our tenderers and contractor. I may want to share the results of that detailed design with other third parties…Oh.. and I want to be able to do this without document transmittals, in accordance with ISO 19650 (only using transmittals into a document management system as a record of design at any time, for final or interim published submissions)

I am one of the Principal's or Contractor's site superintendents and I need to visualise on site, on my mobile device, the to be constructed design, and raise a site query against a particular element. I want to see the history of all my and other users' queries too – so I can keep the contractor or my subcontractors on point – and while I am on site I want records of progress to be recorded from my wearable device

Implementing Digital Engineering at Portfolio Level

What is needed?

- A determined Principal + **Vision** of the benefits
- A **Digital Engineering Framework** common to programme, BIM (and Cost Control Accounts) – but including other D.E. domains too e.g. GIS, doc mgt
- Agreed **submission timescale** and quality standards for each deliverable
- Strong **Data Management** & validation of deliverables + exception routines
- Learning **support** internally and for the supply chain
- **Pragmatism** about what amount of detail is useful at portfolio level
- A ***'Digital Twin'*** allowing integration of time, 3D (& other) data and ***feedback***

‘Digital Twin’? End use of Digital Engineering

A ***digital twin*** is a virtual representation of ***physical systems*** and existing and future assets, that is updated in ***right time*** as the physical assets develop

DALL-E 2: ‘A photo realistic digital image of a railway track with platform and signals’

A **digital asset** that accurately represents the existing or future physical asset

Each element **uniquely identified** and **classified** to assist with filtering, locating etc

Has associated information to represent the physical assets or systems as they change over time

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What are the practical ‘problems’ a client faces?

DATA MANAGEMENT

- Data Definition (what type of information)
- Data Structures, Environments (integration)
- Data Governance & Modelling (process)
- Data Capture (internally and supply chain)
- Data Validation (is the data consistent?)
- Data Interpretation and Active Use (financiers)

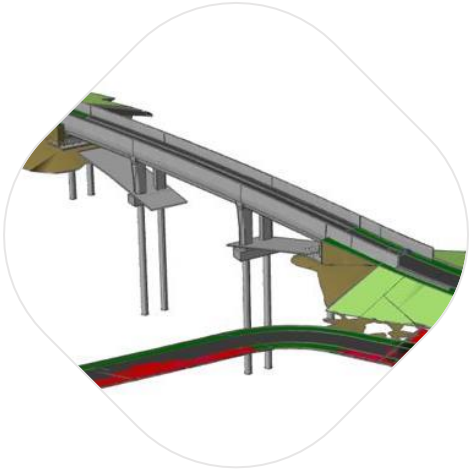
Data Integration Strategy - Association

Model Attributes – selection set filters based on e.g. Work Package and Key Quantity

Selection set with ID

Programme Coding – apply selection set filters e.g. Work Package

'5D' activity in a summary plan with ID = selection



C2-C-083S1-S-200(	Piling (Piling & Crane mat, Piling, Curing)	18/08/2021
C2-C-083S1-S-201(	Substructure (5w Piling test, Abutments, Piers)	14/09/2021
C2-C-083S1-S-202(	Wingwalls	18/11/2021
C2-C-083S1-S-203(	Deck (Bridge bearings, Diaphragms, Precast concrete Y Beams, De	17/12/2021

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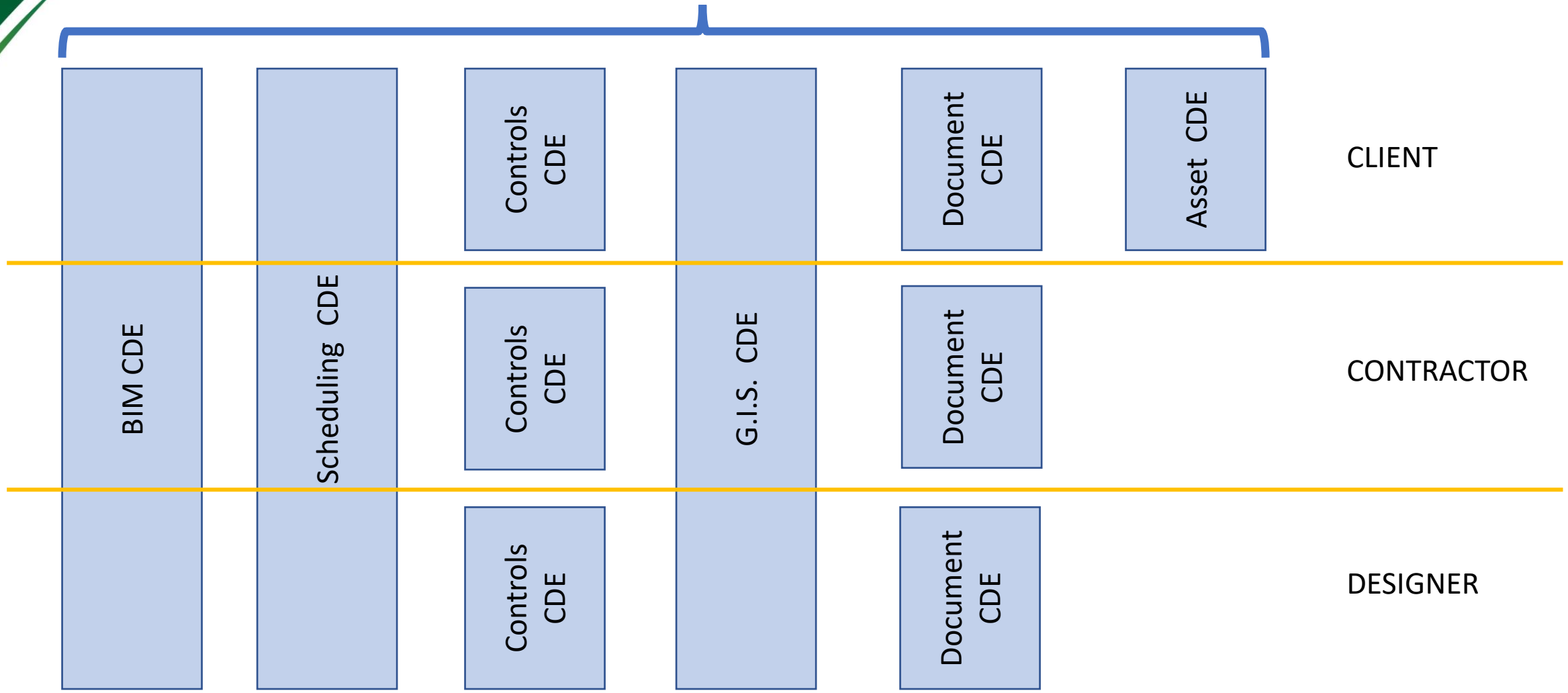
Selected objects (e.g. piles) colour coded with delivery phase associated with selected activities' timescale

Data Integration – uncommon Data Environments?

DIGITAL TWIN = Data *on* **Platforms** *exposed by* **Applications** *updated by* **Sensors** *consumed by* **Customers**



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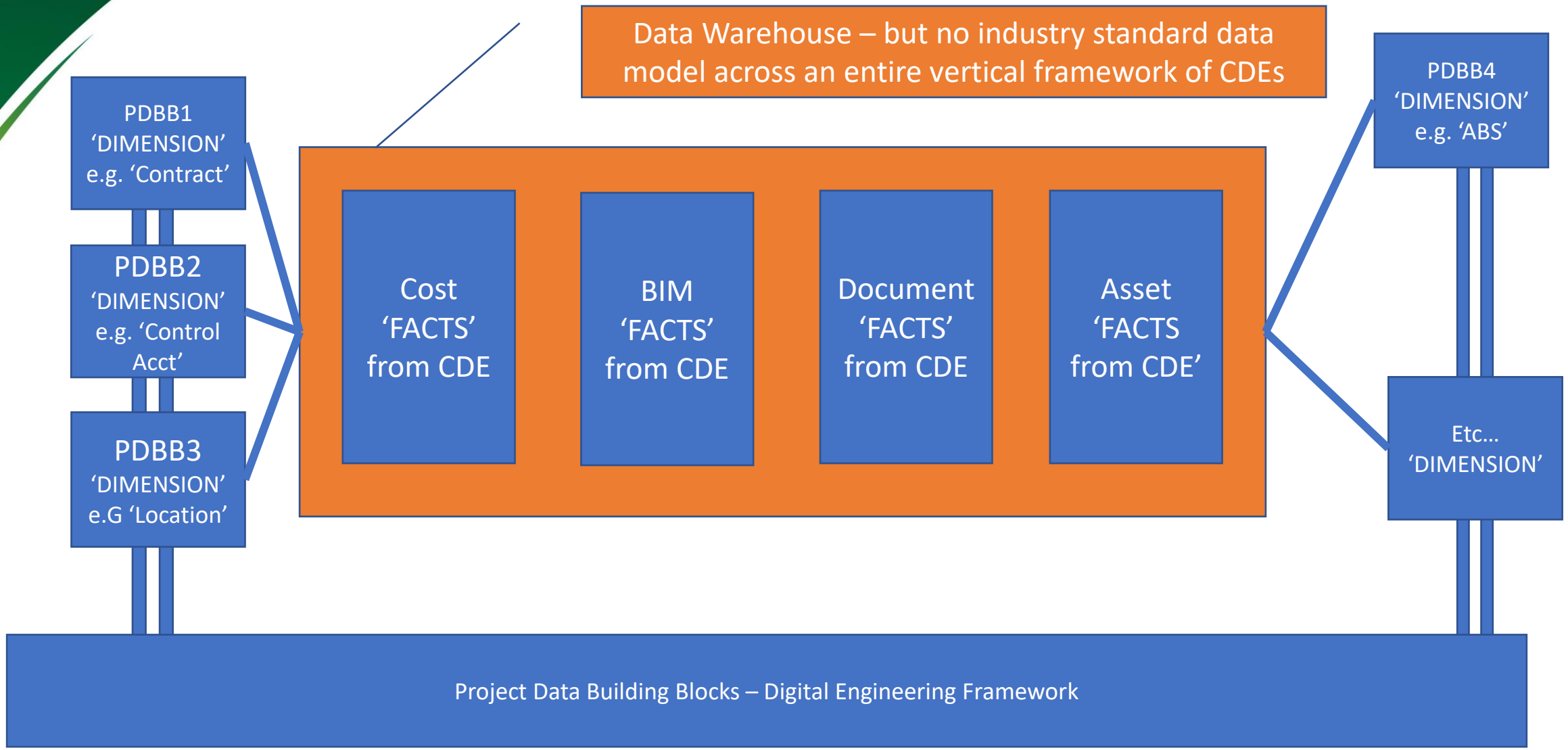
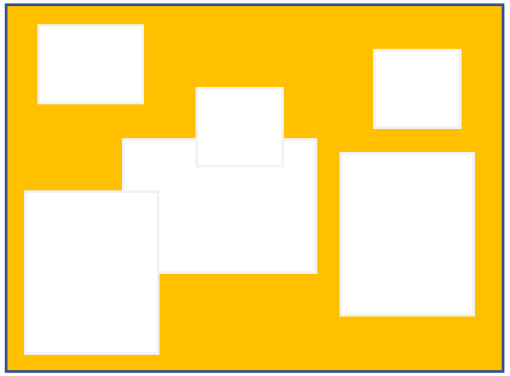
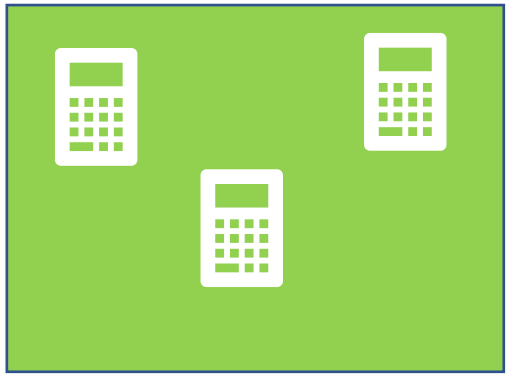
Data Structures, Governance & Modelling

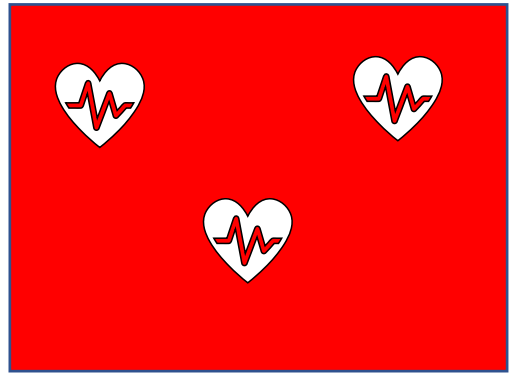


Possible Trends…

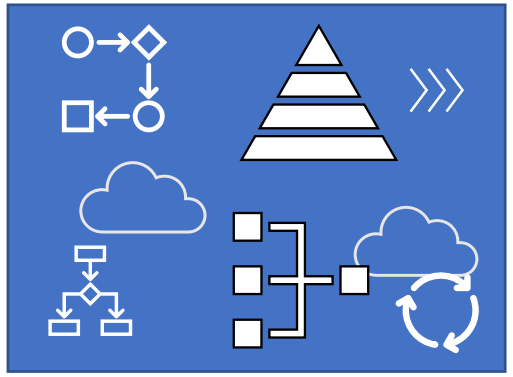
Data *on* Platforms *exposed by* Applications *updated by* Sensors



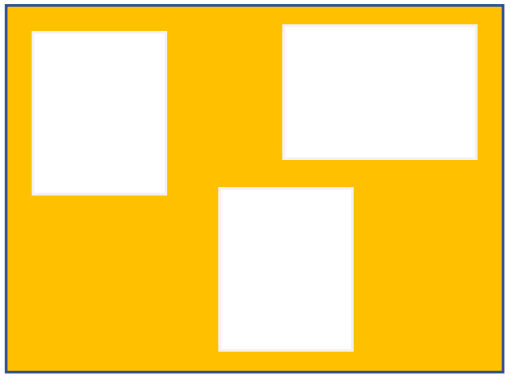




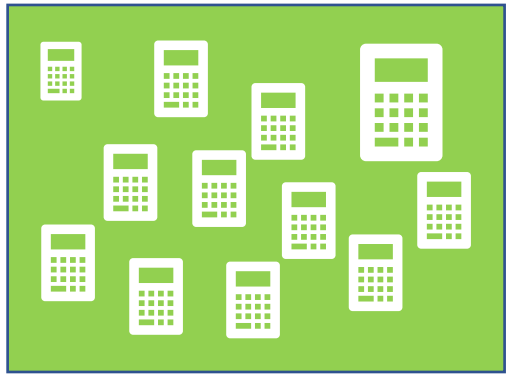
Portfolio Data Structure



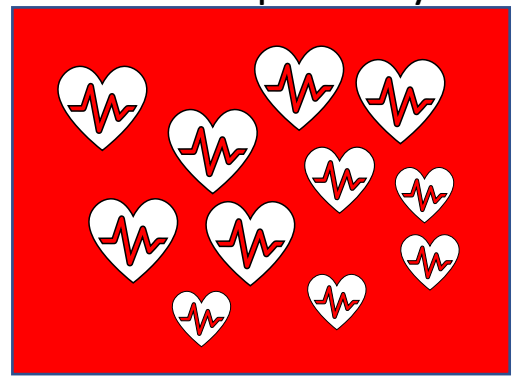
Platform Consolidation



Application Proliferation



Sensor Specificity



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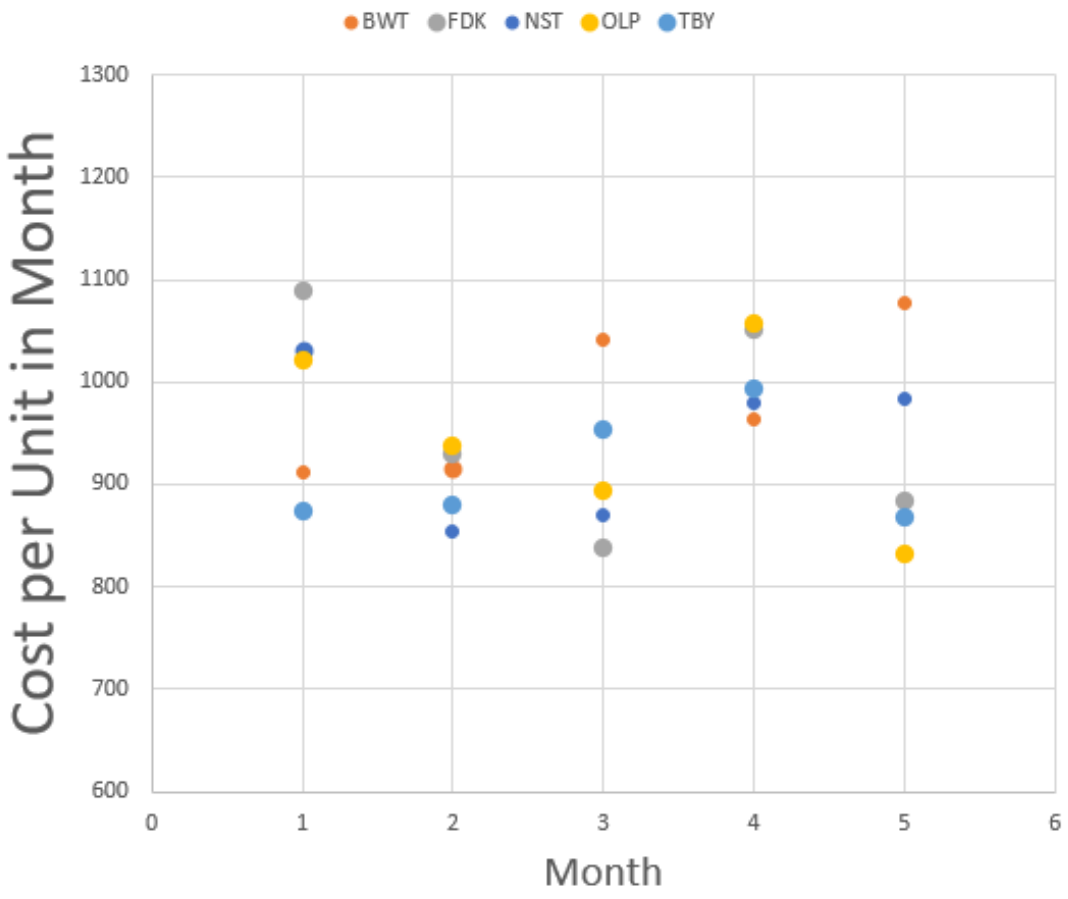
Practical applications at portfolio level

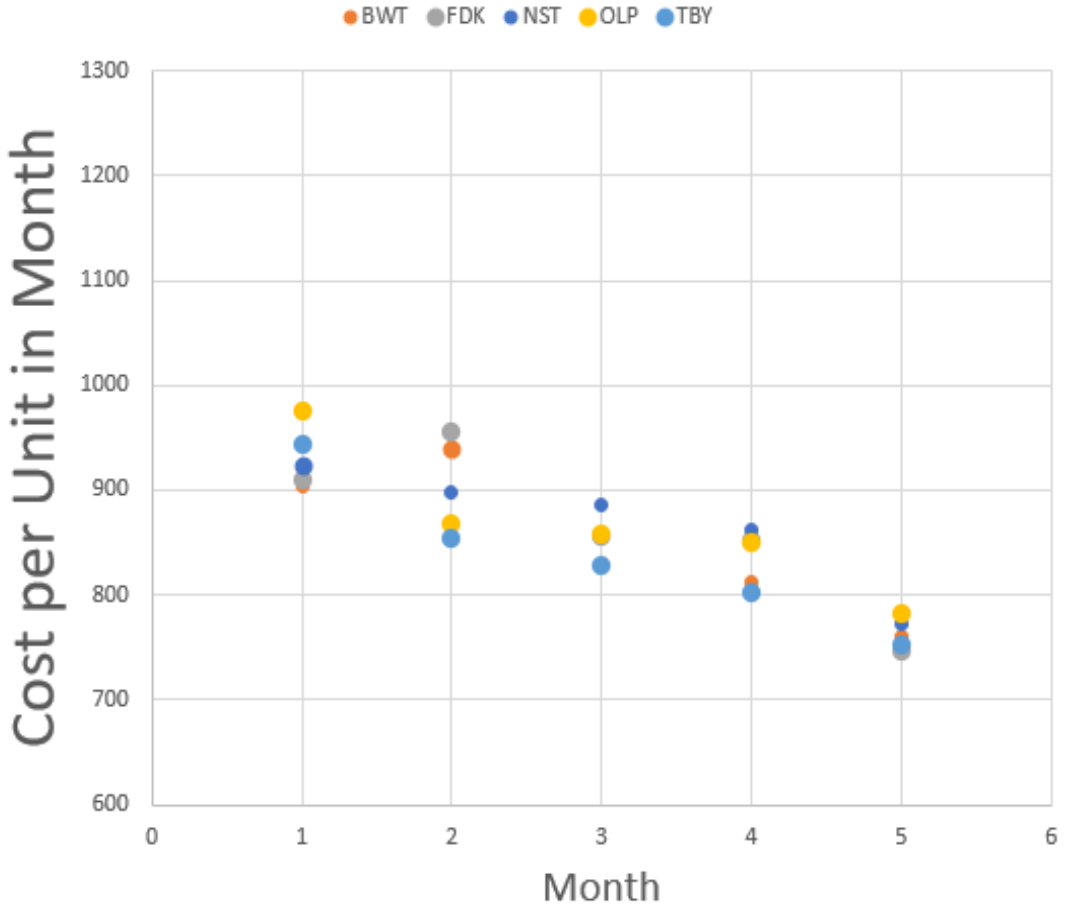
GETTING ASSETS INTO SERVICE

- With Better Productivity
- With More Transparency

Example for productivity



High variability + low learning rate



Lower variability + higher learning rate

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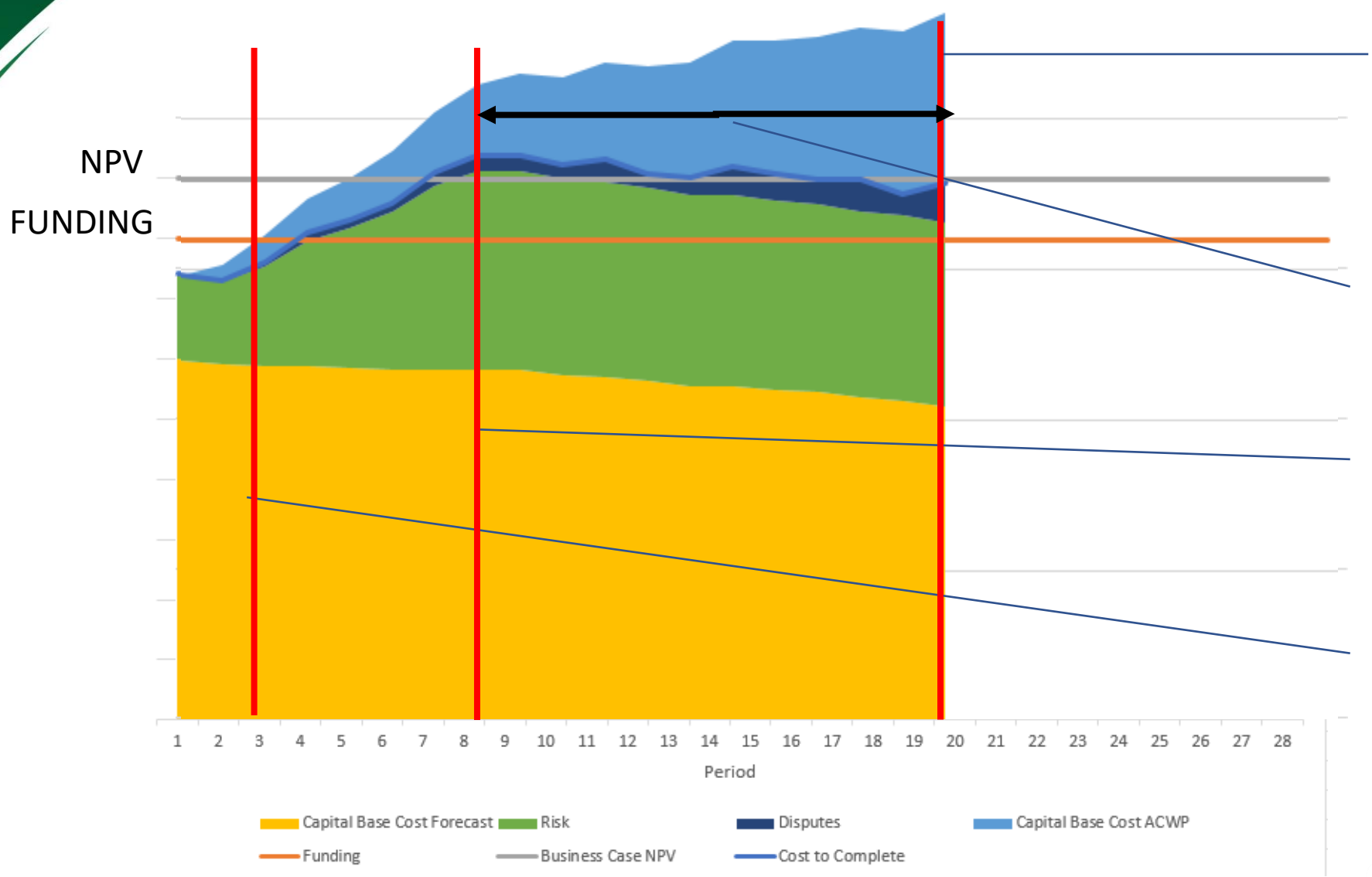
Example of Strategic Misrepresentation



Remaining Cost < NPV: Funding Increase Request raised here

Strategic Misrepresentation Here

Project Theoretically 'Bust' here

Strong probability of Funding Limit Needing Raising

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Take-aways

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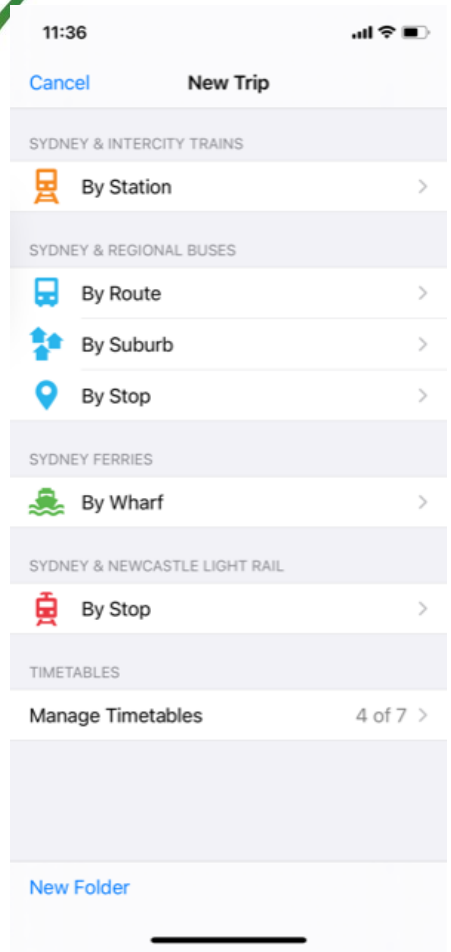
Digital Twin – Show of Hands?

Is an Infrastructure Digital Twin:

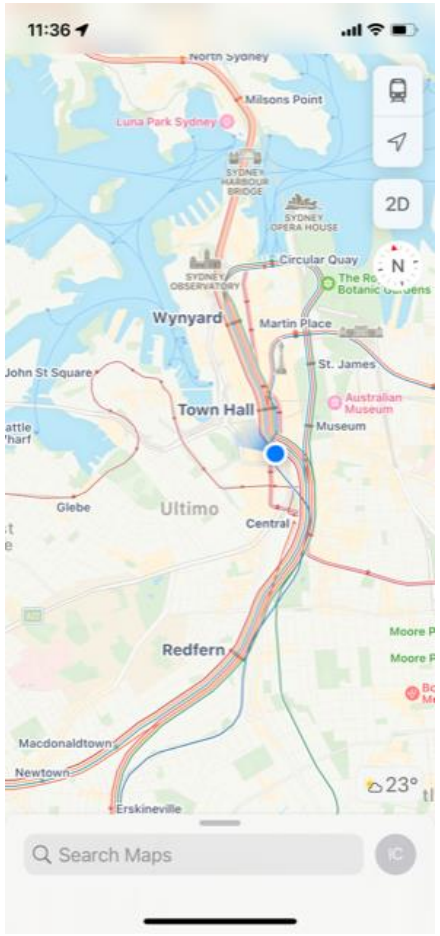
- ‘Wholly Bogus’ - unachievable and worthless?
- ‘Holy Grail’ – possibly mythical but possibly findable, and what we should seek?

Digital Twin – Holy Grail or Wholly Bogus?

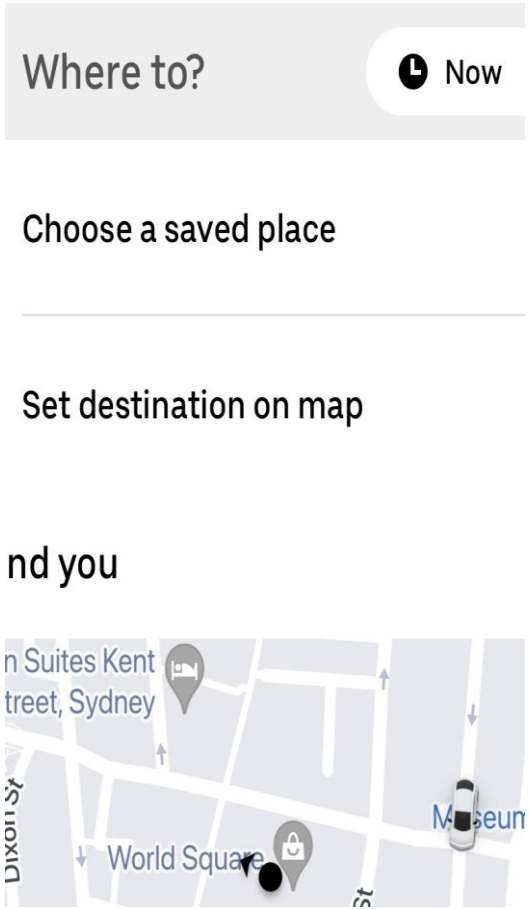
TRIPVIEW



MAPS



UBER



A ***digital twin*** is a virtual representation of physical systems and existing and future assets, that is updated in ***right time*** as the physical assets develop

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Digital Twin – Holy Grail or Wholly Bogus?

DALL-E 2: ‘A digital twin for infrastructure’

- The ‘Digital Twin’ can be considered the ‘user layer’ of data, supported by a platform, exposed by apps and updated by sensors
- Productivity gap may be growing due to inappropriate or non-existent use of DATA
- [illegible] professionals can help close the productivity gap by governing data standards and processes
- Consider your User Stories carefully and get them validated to help establish Vision and Objectives
- Strong record of historic data to inform current and future costs possible – to avoid ‘strategic misrepresentation’

BE MORE DE

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Q&A

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If you have any questions, please get in touch with our consultants who are happy to assist you.

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