



Practical Application
of 5D BIM to Capital
Project Controls



Agenda

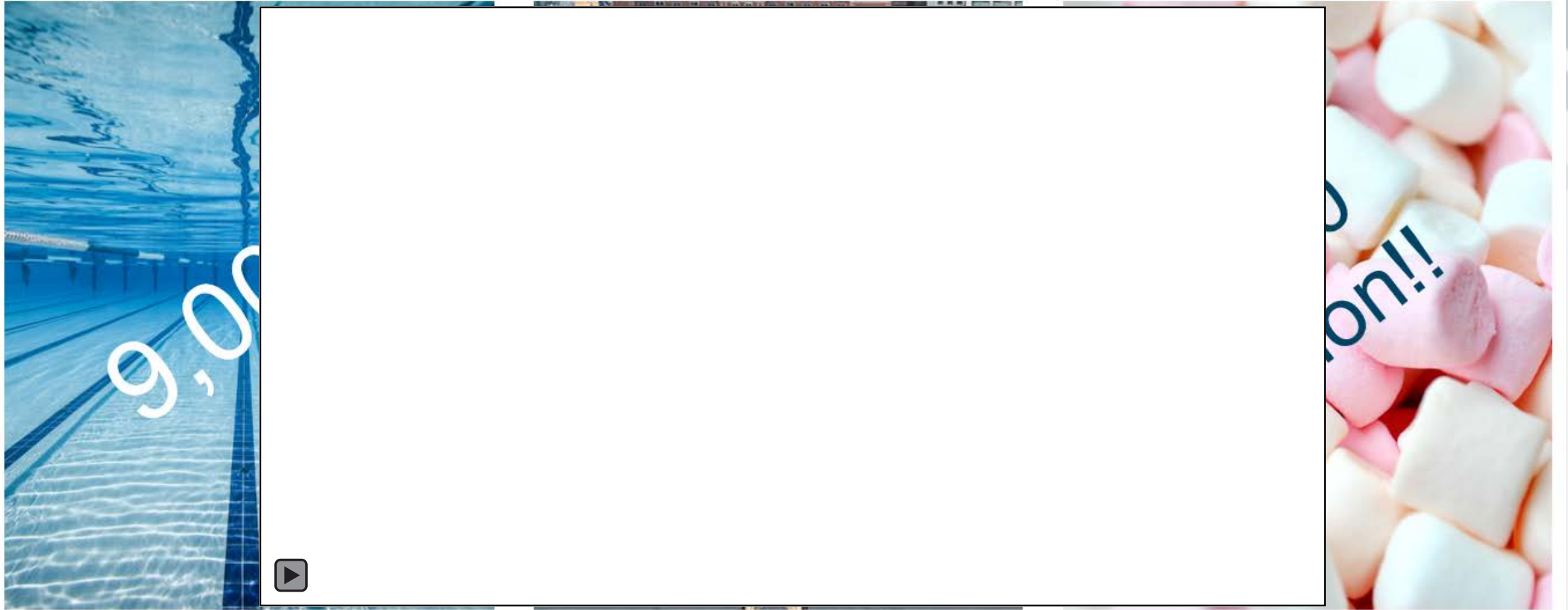
01 HS2 Contract C23 in pictures
...and WHY apply BIM/AI

02 Since I last spoke...
Progress since Expo 2018

03 BIM-controls integration
Challenges and methods used

04 Artificial Intelligence Application
So far and still to come

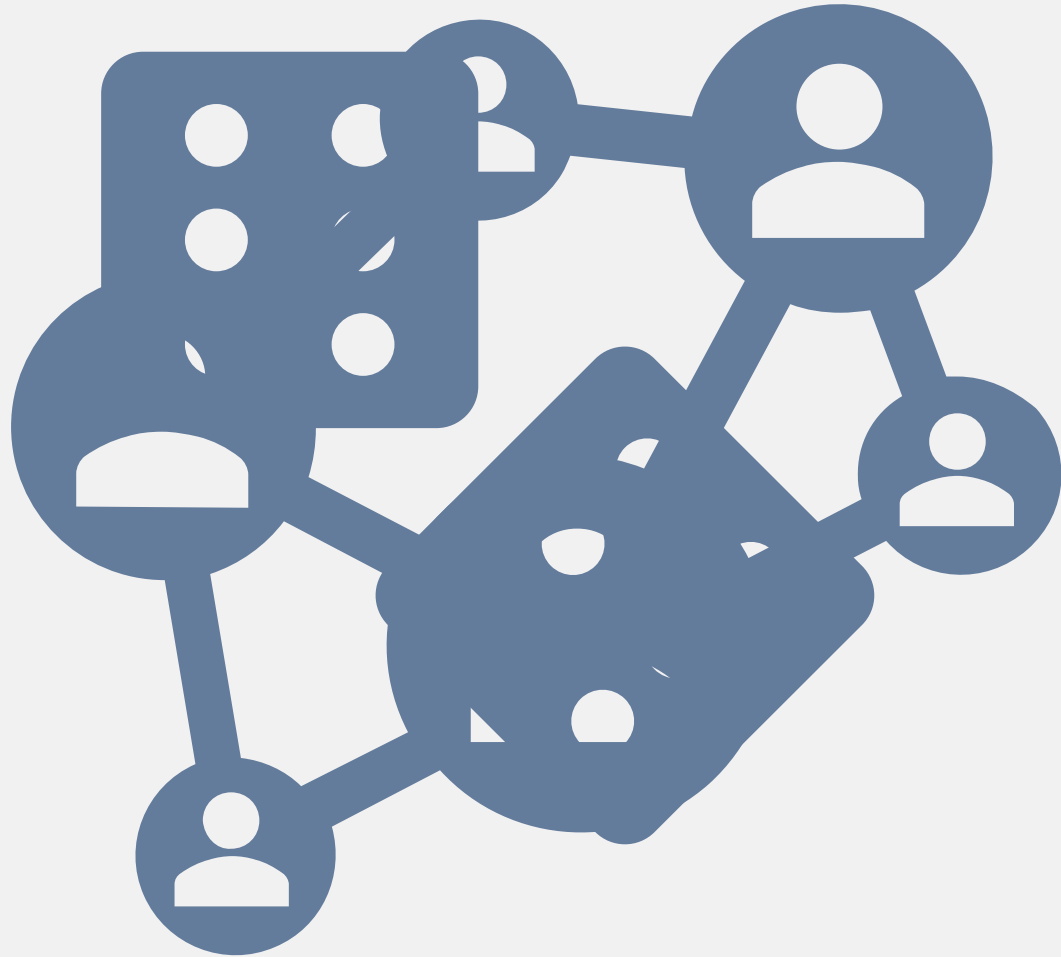
Scope in pictures



“To actively seek innovative opportunities to **achieve new standards** and practices in order to increase whole life value”

“Pushing the boundaries of conventional thinking to **improve on industry best practice** and position UK industry as a world leader. We want our supply chain to share innovations that **set new standards** in the way we design, build and operate our rail network, including sustainable solutions.”

Start with the 'Why'?

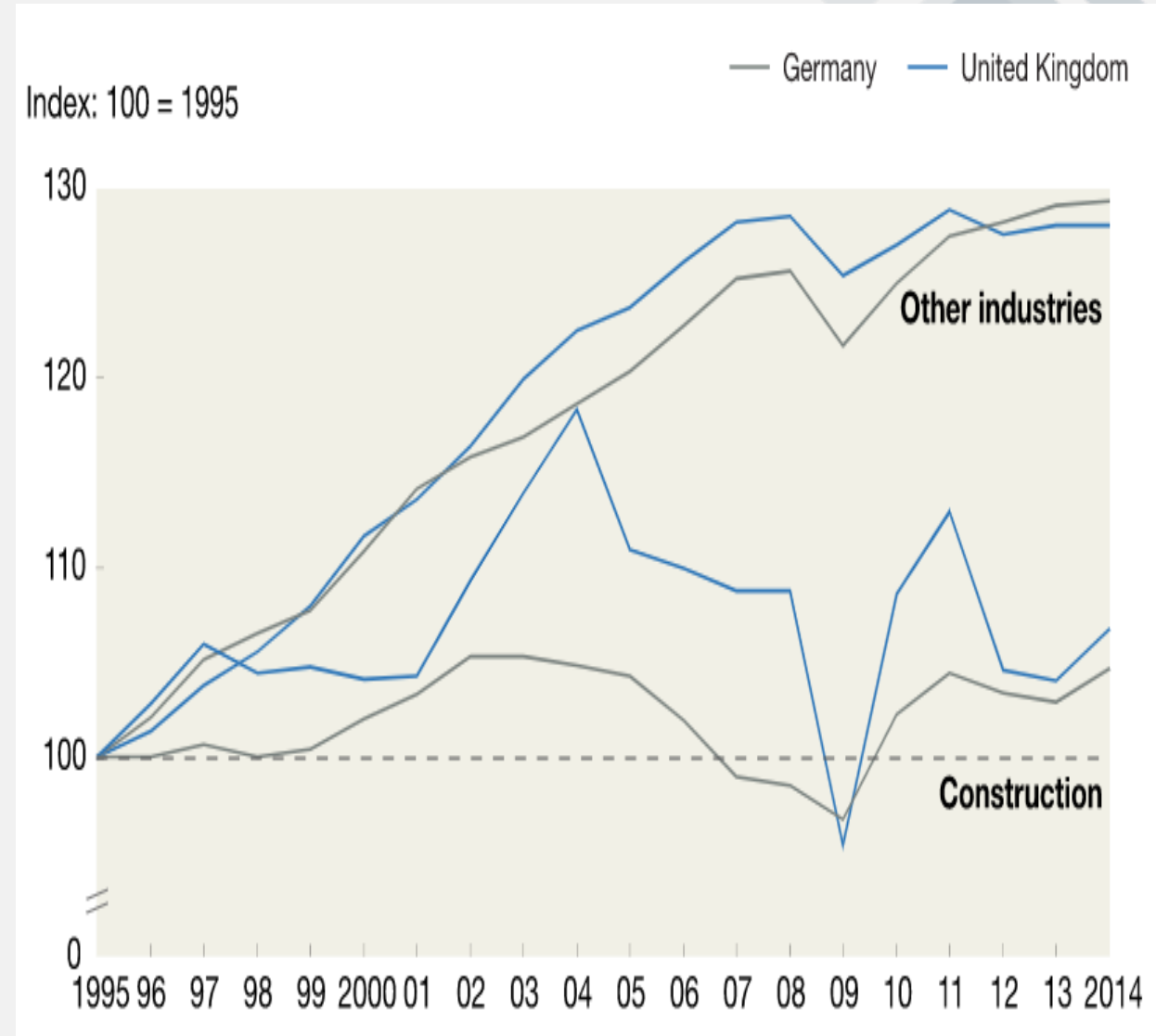
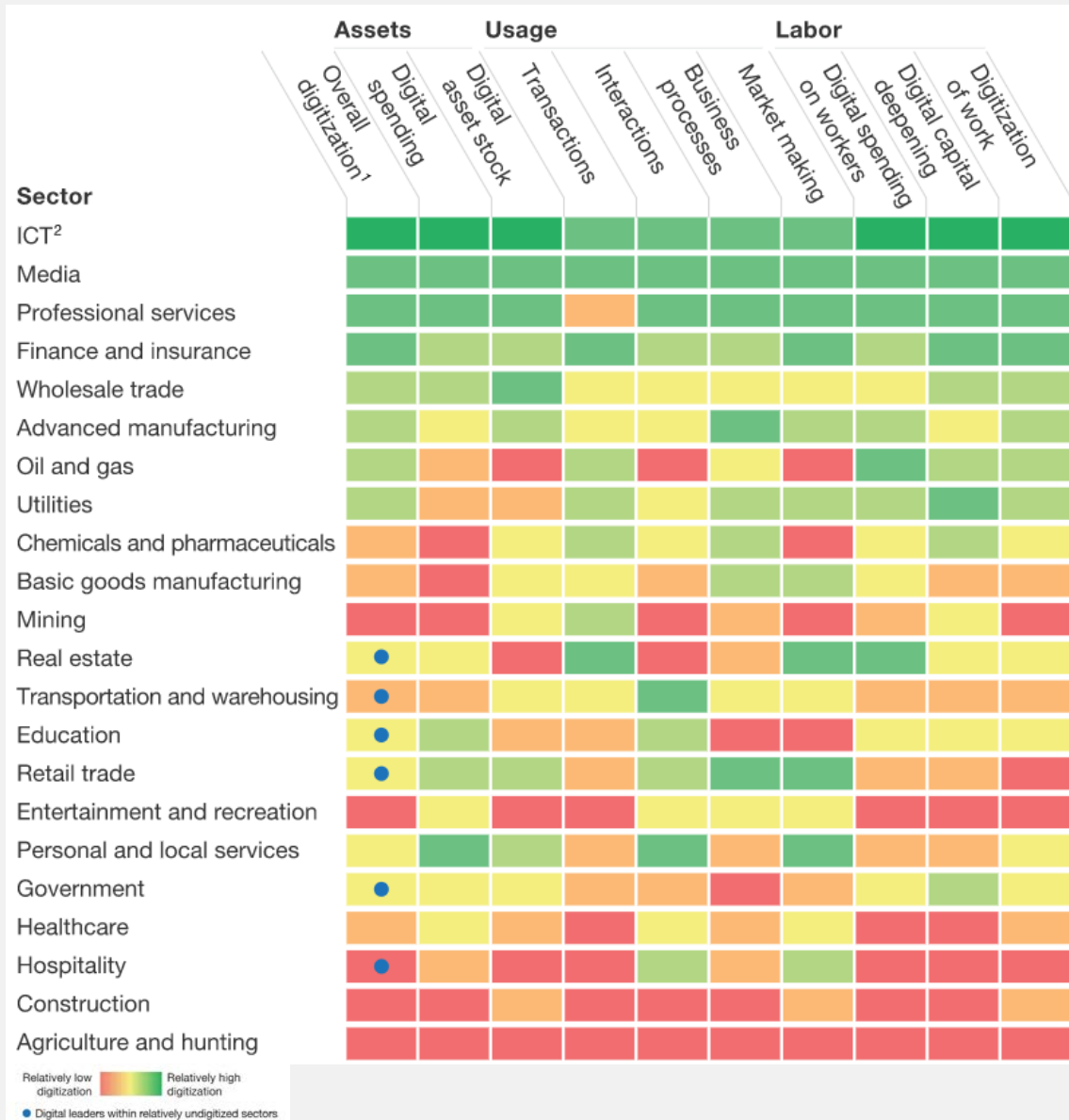


**Capital Projects can be
important**

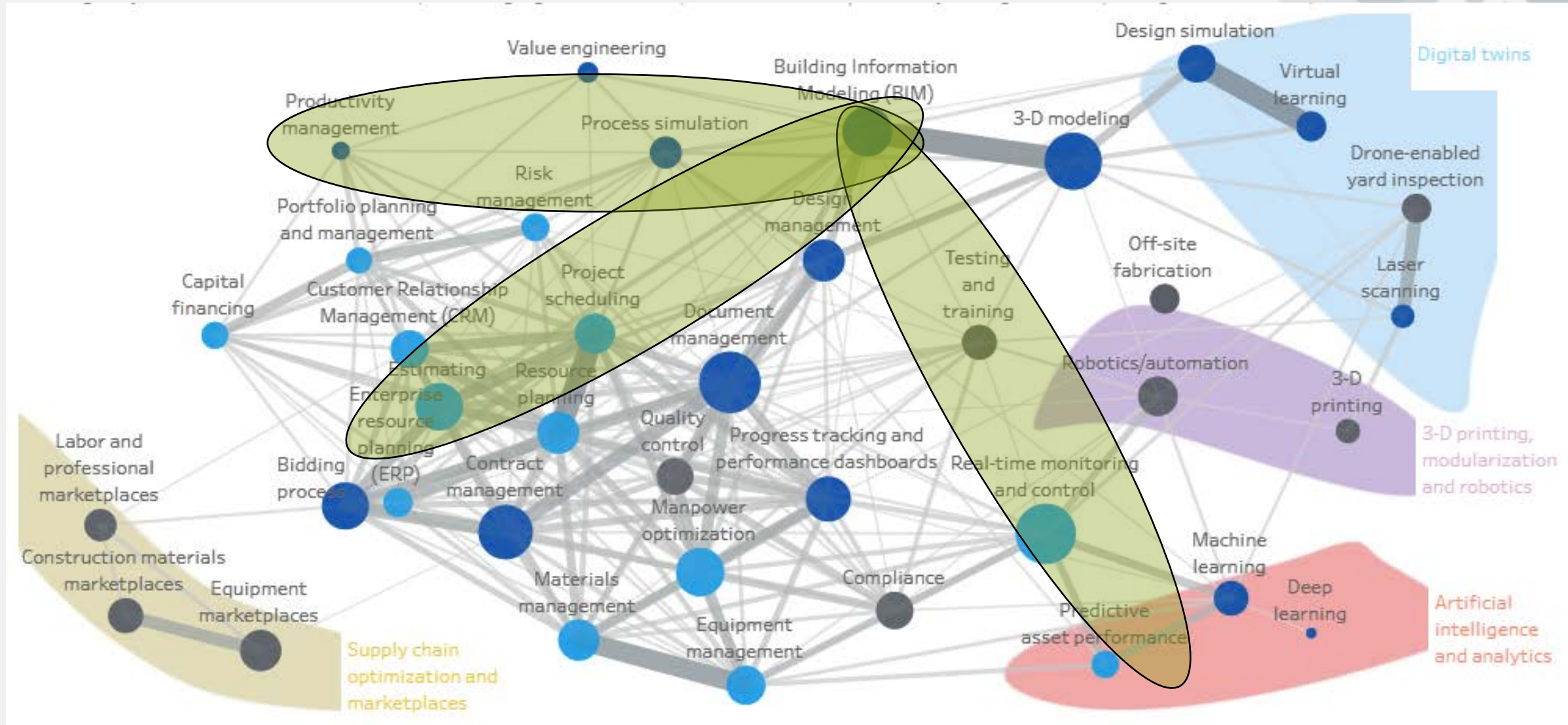
**Anything that people
risk is helpful**

They allow us to grow

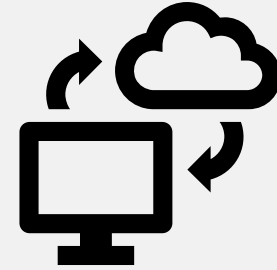
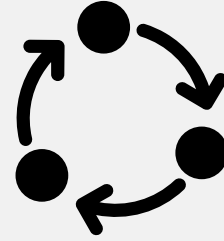
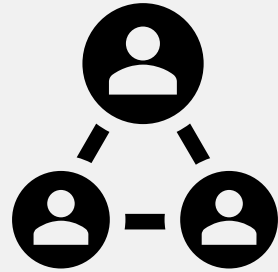
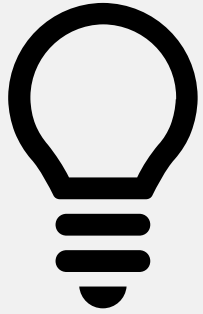
Link between Digitisation and Productivity?



Capital Projects/Construction 'Hotspots'



What capability do we need for digital?



- Good baseline and progress measurements
- Setting up planned value with clear traceability to scope can be time-consuming
- Measuring achieved and actual cost can be resource intensive
- Integrated data structures can be hard to achieve

System to Support Collaboration and Data

Must

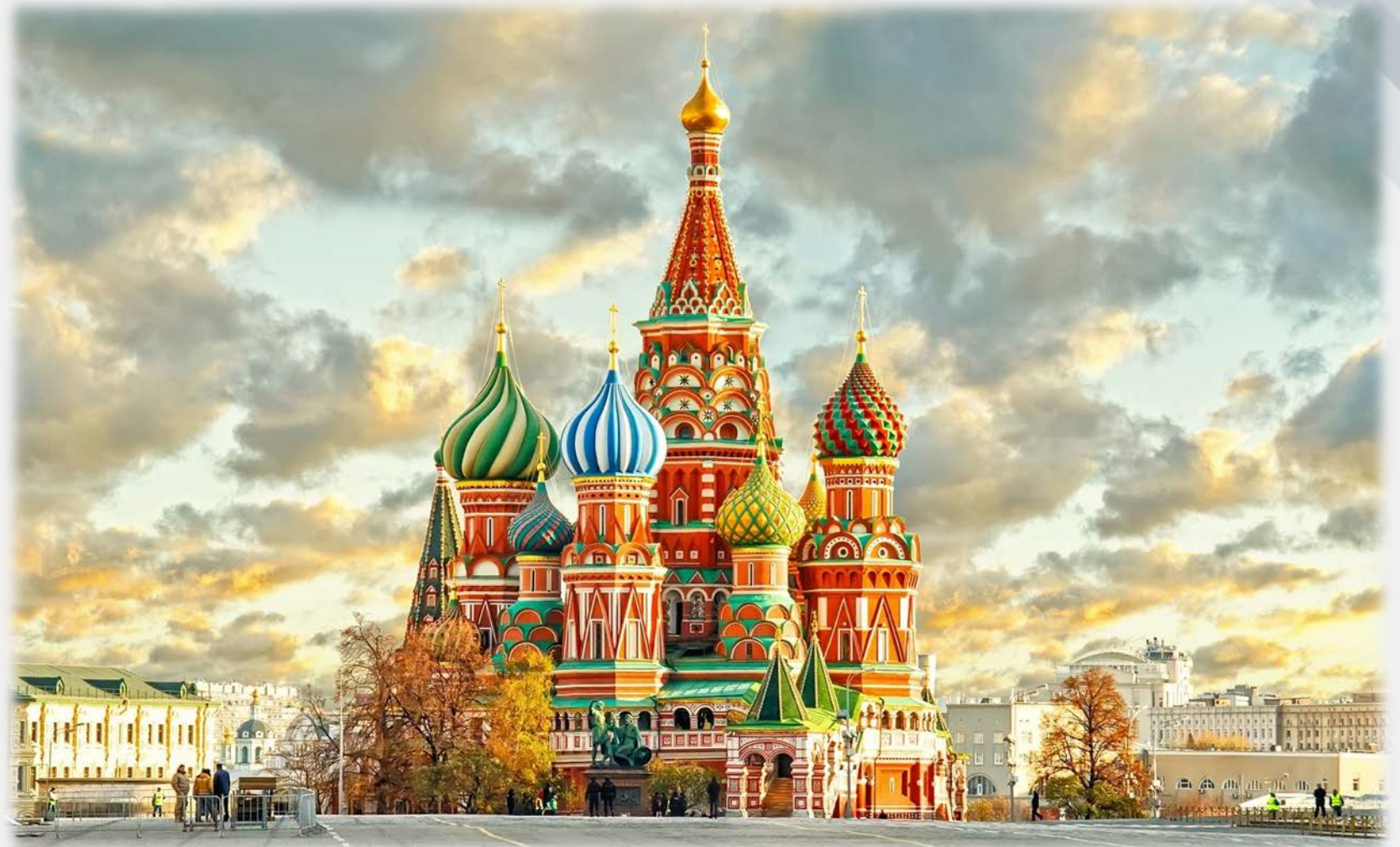
O

Should

Could

O

Won't

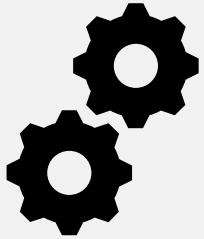




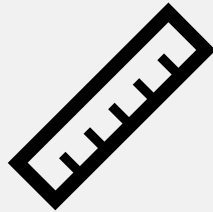
Since I last spoke...

What have we achieved?

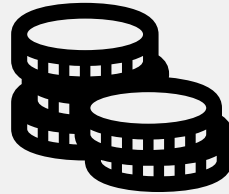
SYSTEM



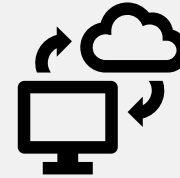
QUANTIFICATION



TIME-PHASING £



FIELD DATA CAPTURE

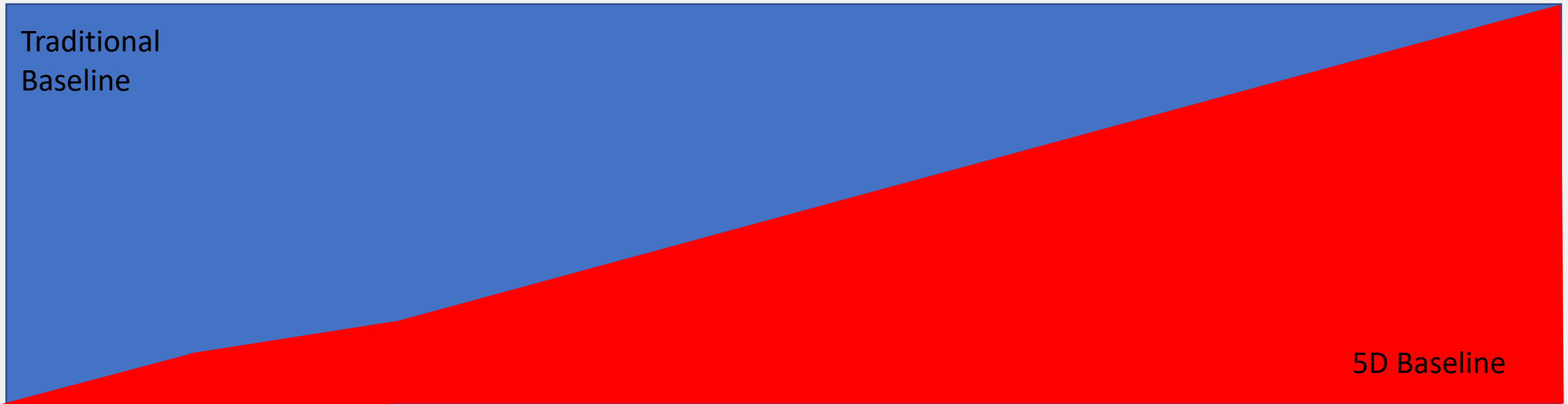
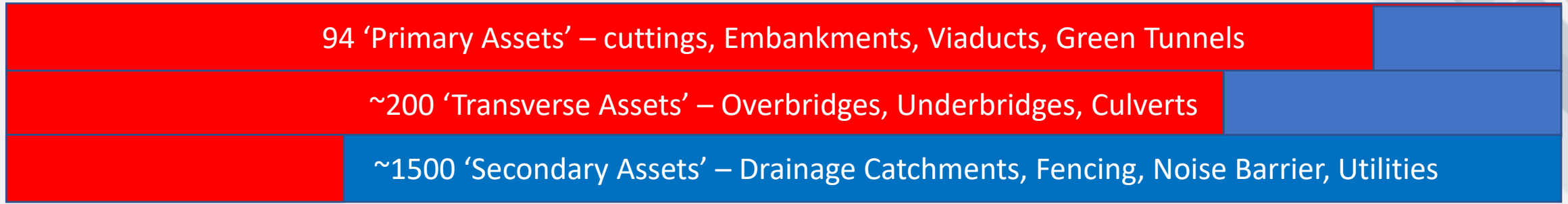


ON DEMAND



- System procured and implemented (documentation ongoing)
- Production of CESMM4 BoQs proven (several ‘exemplar assets’)
- Link of BoQs to schedule proven
- Capture of data from tablet proven (not yet automated)
- Production of stage 1 on-demand reports proven and working (116 periods)

Progression to 5D Baseline



Feb 2019

Jun 2019

Dec 2019





BIM and Controls Integration



Project Workflow



Object - Visualisation

Structure	Code	Description
		Objects
	C	Contract Group
	C.C3	Contract C3
	C.C3.CS07	Brackley to Southam
	C.C3.CS07.CL	Brackley to Greatworth
	C.C3.CS07.CL	095-L1 Turweston Embankment Group
	C.C3.CS07.CL	095-L2 Turweston Viaduct
	C.C3.CS07.CL	095-L3 Helmdon Embankment Group
	C.C3.CS07.CL	096-L1 Brackley South Cutting Group
	C.C3.CS07.CL	097-L1 Brackley Embankment Group
	C.C3.CS07.CL	098-L1 Brackley North Cutting Group
	C.C3.CS07.CL	099-L1 Greatworth South Embankment
	C.C3.CS07.CL	099-L2 Greatworth South Cutting
	C.C3.CS07.CL	101-L2 Greatworth North Cutting

Object - Visualisation

Object - Selection Set

Project Workflow



Objects

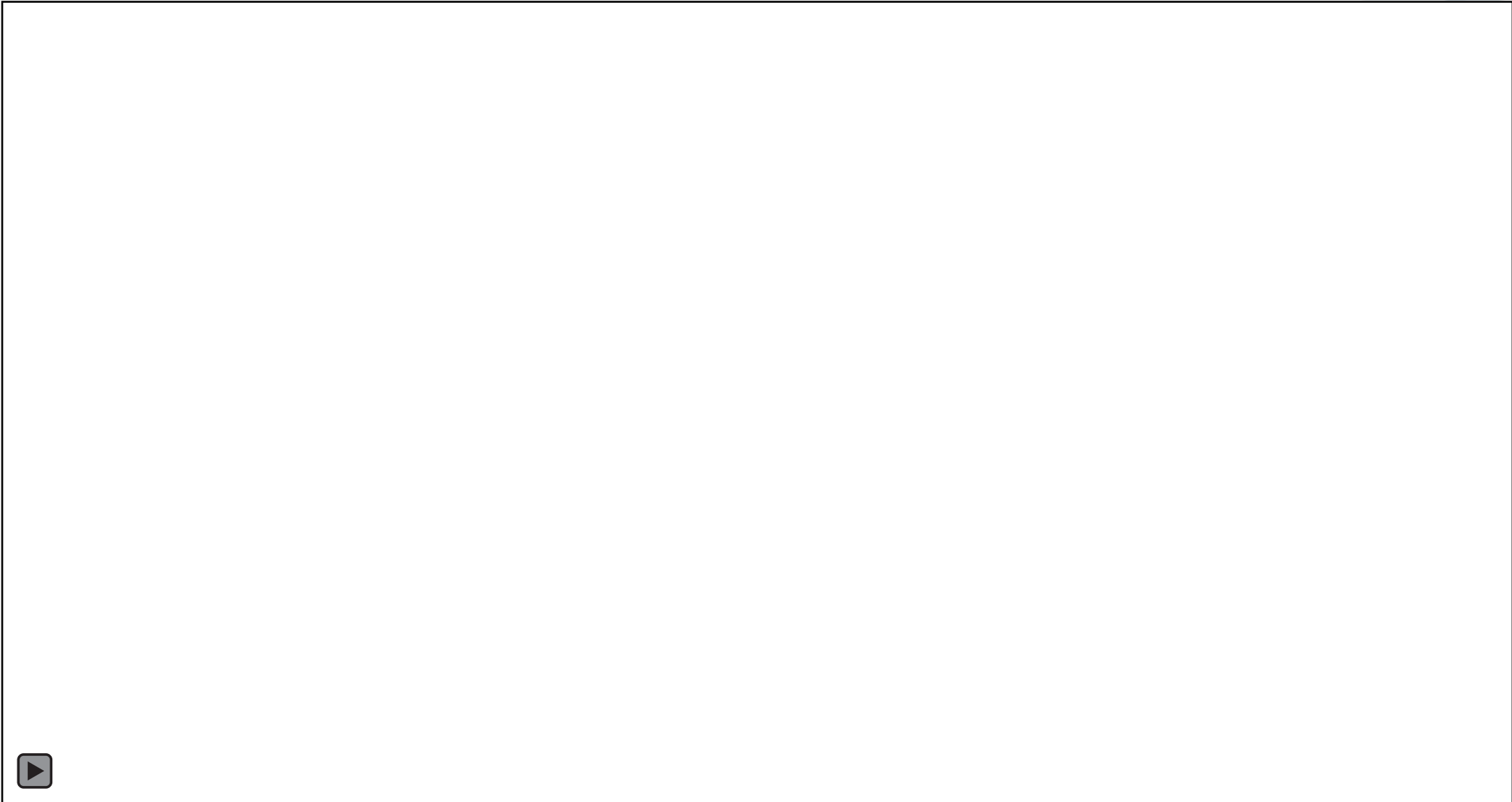
Filter (Description) 100%

Structure	Code	Description
		Objects
[-]	C	Contract Group
[-]	C.C3	Contract C3
[-]	C.C3.CS07	Brackley to Southam
[-]	C.C3.CS07.CL12	Brackley to Greatworth
[-]	C.C3.CS07.CL12.HS2-00002C5TU	098-L1 Brackley North Cutting Group
[+]	C.C3.CS07.CL12.HS2-00002C5TU.HS2-00002BVK0	Brackley North Cutting Drainage System
[+]	C.C3.CS07.CL12.HS2-00002C5TU.HS2-00002BVK2	Brackley North Cutting Mitigation Earthworks
[+]	C.C3.CS07.CL12.HS2-00002C5TU.HS2-000001068	098-L1 Brackley North Cutting
[+]	C.C3.CS07.CL12.HS2-00002C5TU.HS2-000001336	Radstone Road Overbridge
[+]	C.C3.CS07.CL12.HS2-00002C5TU.HS2-000001337	Bridleway AX18 Accommodation Overbridge

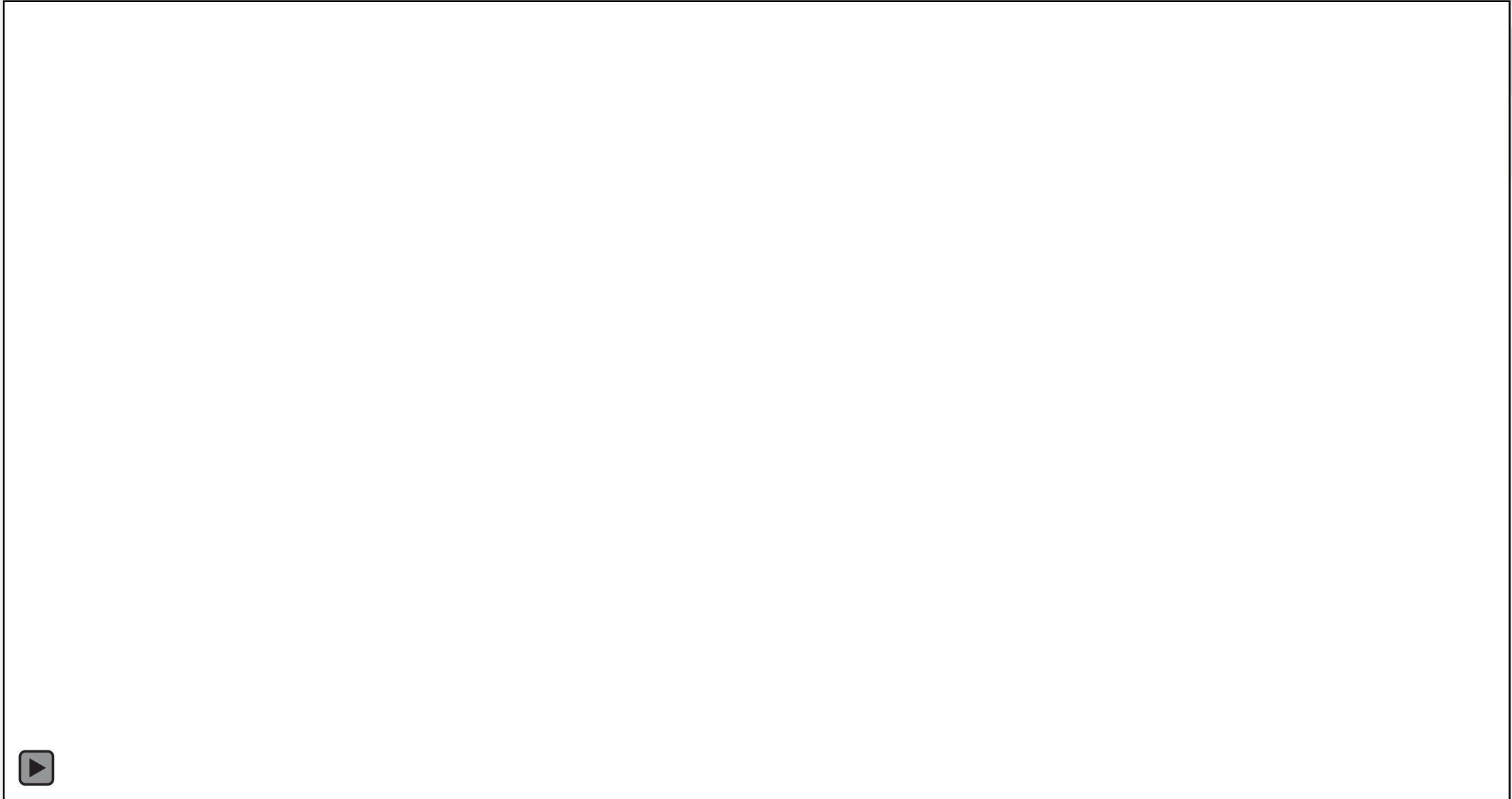
Object - Visualisation

Object - Visualisation | Object - Selection Set

Project Workflow



Project Workflow



Project Workflow

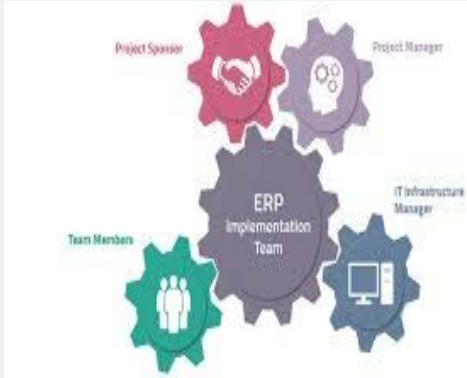


Project Workflow

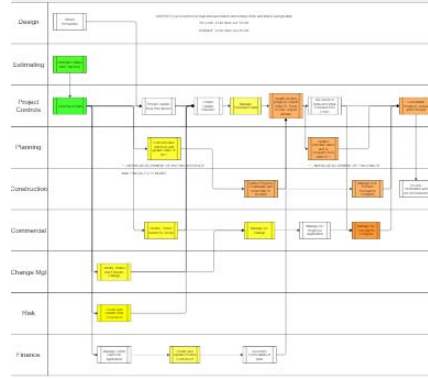


What were the challenges?

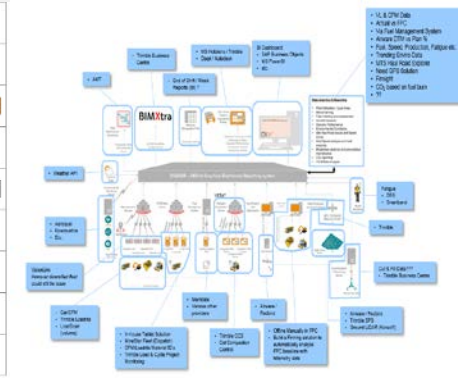
IMPLEMENTATION



PROCESS



ARCHITECTURE



PERFORMANCE



MULTI-TASKING



- Lack of dedicated implementation team
- Limited resource to define and document process
- Scale of data affects system performance – data architecture critical
- No software is bug free – find a vendor who will support you well
- Separate 'stakeholder' and 'technical' management in implementation



Applications of Artificial Intelligence and Internet of Things



AI Potential



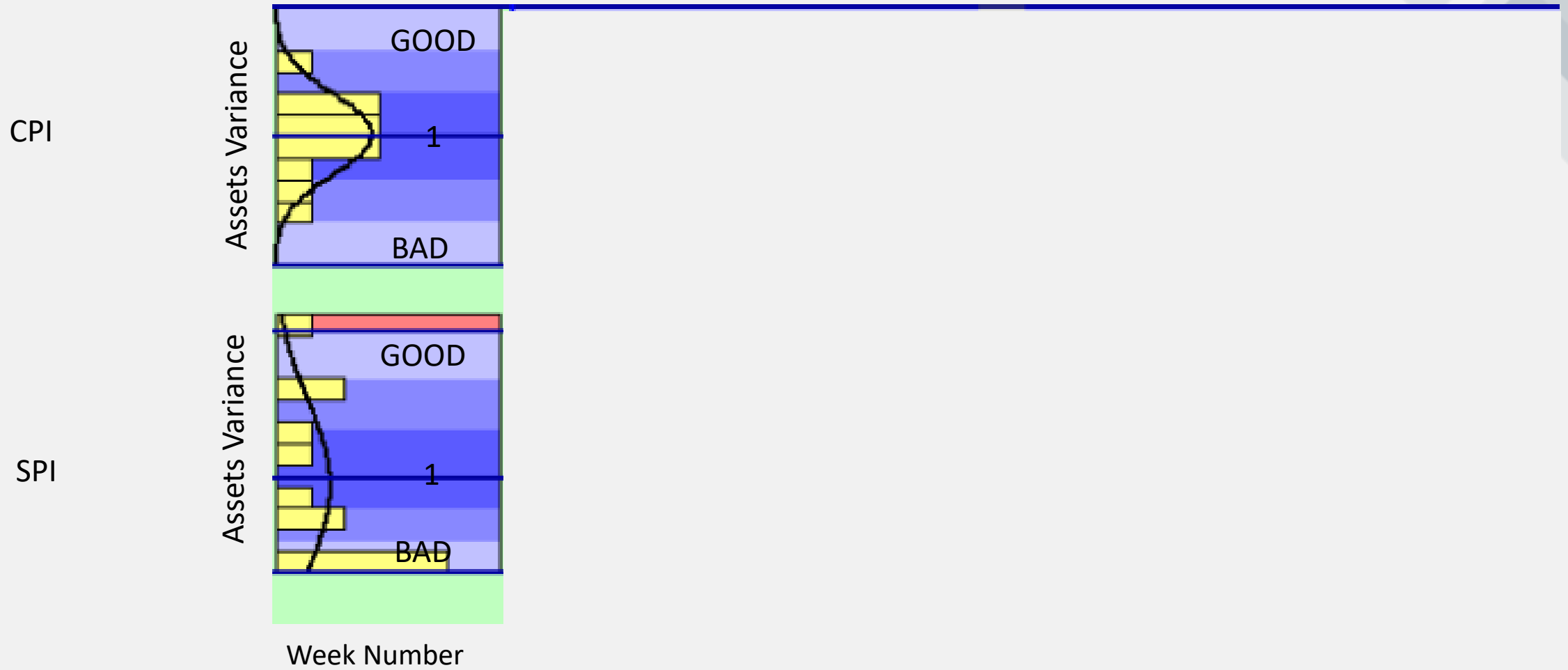
<https://techcrunch.com/2017/12/13/nvidia-and-construction-giant-komatsu-partner-on-ai-for-job-site-safety>

- Camera/image recognition of people/equipment and tasks – automate data acquisition for progress measurement
 - Cuts down effort involved in cost allocation
 - Improves accuracy of data set and therefore it's usefulness
 - Improves speed of data collection and therefore reduces time for feedback
 - Allows in-time not too-late interventions
- Will improve safety
- Will help optimize equipment usage

Current Applications

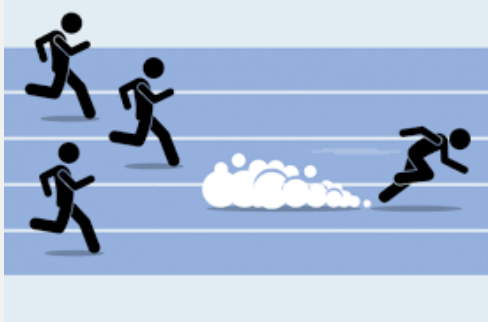


AI Potential

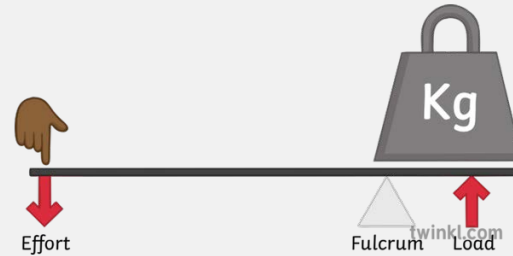


Benefits

FASTER



LESS EFFORT



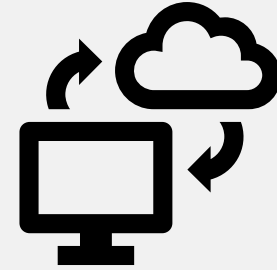
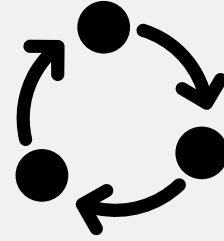
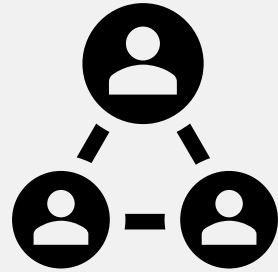
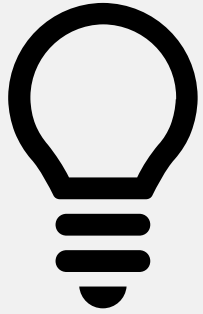
AVOID DUPLICATION



- Faster quantification (~3-5 x as fast)
- Faster base pricing (~3-5 x as fast)
- Less effort to present traceable reports (1/2 x as much)
- Avoidance of duplication of progress measurement (3/4 x as much)
- Productivity insights sometime in excess of 5% increase

ROI – Typically > 500%: Payback period – Typically 1-2 years

Recap



- Inspired Leadership – foster innovation, determination & drive
- Diverse collaborative team – engagement and commitment
- Clear processes – accountability understood for the inputs
- Technology partner – system and implementation



Q&A

LogiKal: stand 5

Find me at stand 5 to discuss 5D BIM and the case study in more detail



Amsterdam | Birmingham | Brisbane | Dublin
Hong Kong | London | Perth | Sydney