

Discovering the source of smart:

Intelligent decisions, intelligent infrastructure

..... How we need to integrate different ways of creating and managing information to support better decision making – through the convergence of geospatial, BIM, big data and the internet of things.

*Dr Anne Kemp, FICE, FRICS, FRGS
Director and Fellow, Atkins*

*Chair of Association of Geographic Information, 2013 and 2014
Vice Chair of BuildingSmart UK
Chair of ICE BIM Action Group and BIM4Infrastructure UK*



High Speed 2
United Kingdom



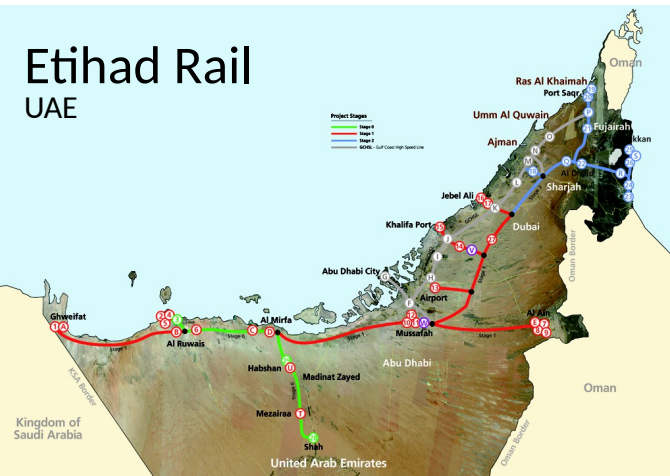
London 2012 Games
Olympic Park



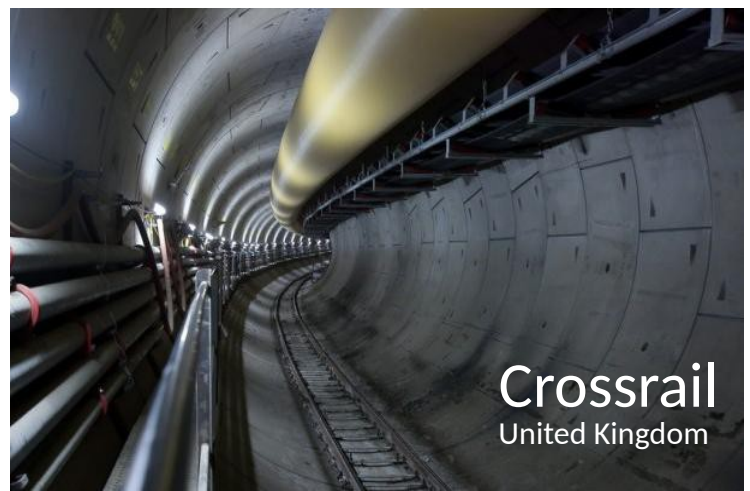
Riyadh Metro
Saudi Arabia



M25 DBFO
United Kingdom



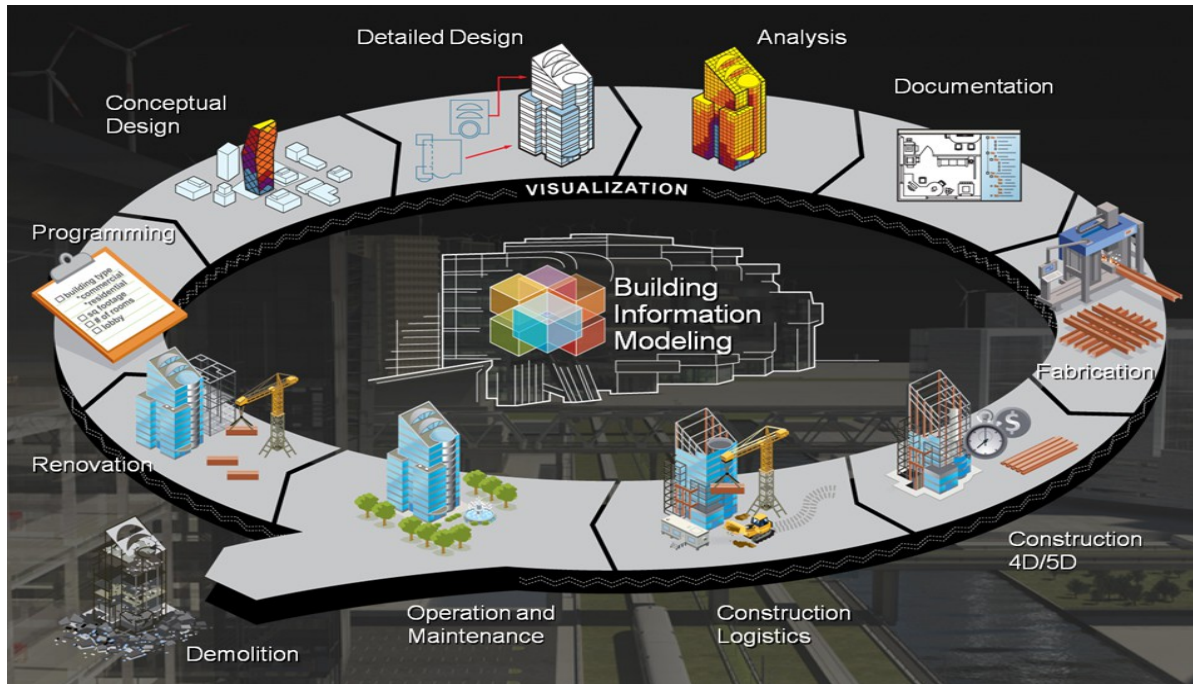
Etihad Rail
UAE



Crossrail
United Kingdom

BIM Whole Lifecycle IM

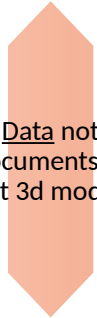
.... Start with the end in mind
..... For anything which is built



Courtesy of Autodesk

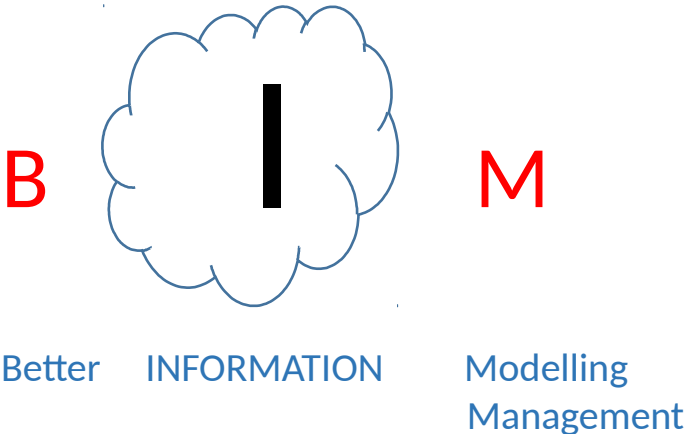
A UK Government Mandate – and the way to integrated, sustainable and resilient infrastructure and Smart Cities

Core Principles



Data not
documents or
just 3d models

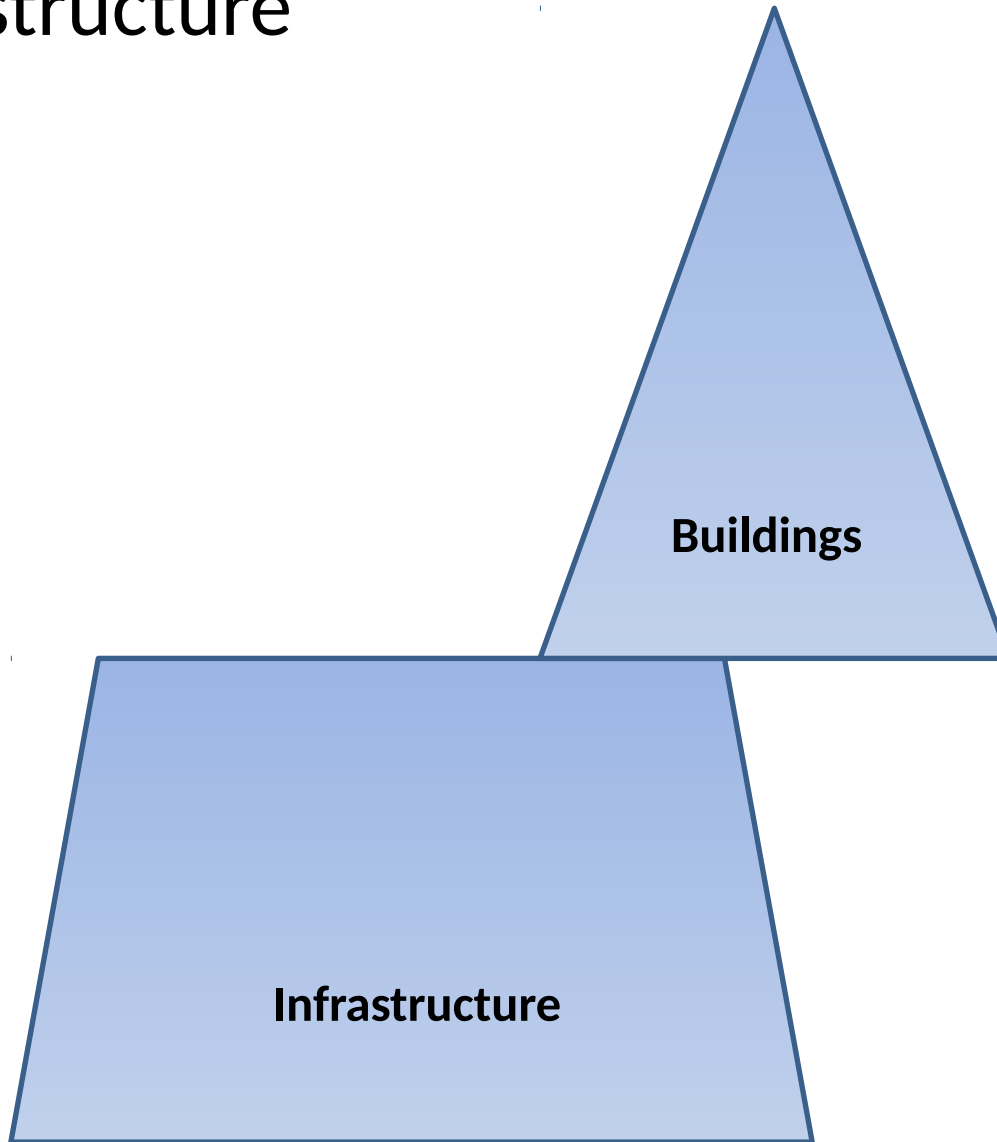
Its all about information



With the lowest common denominator being digital data Liberated Data

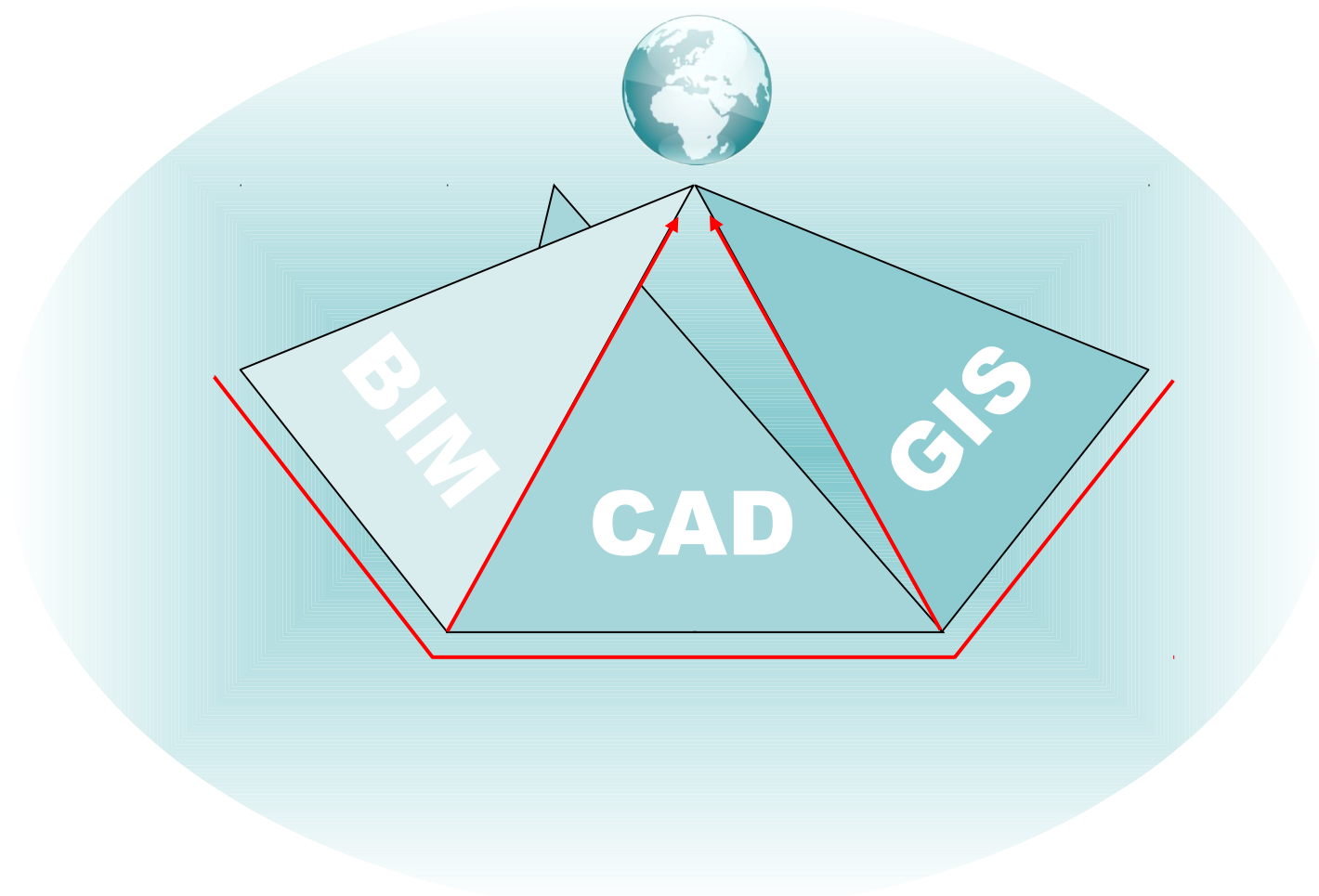


The different stages of Buildings and Infrastructure



Integrated technologies

Aligned staff, software, data, standards, workflows



Completing “Level-2” BIM Suite

PAS 1192-2:2013
Specification for information management for the capital/delivery phase of construction projects using building information modelling

bsi.

PAS 1192-3:2014
Specification for information management for the operational phase of assets using building information modelling

bsi.

001NBSLRest_PhlpConstruction_COBie.xls [Compatibility Mode] - Microsoft Excel

SP-65-70-96 - Waste Storage Spaces

	A	B	C	D	E
	Name	CreatedBy	CreatedOn	Category	FloorName
2	20BOH.01	stephen.hamil@theh	2012-10-25T13:36:55	SP-45-20-45 - Kitchens	Ground Fl
3	20BOH.02	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-10-51 - Lobbies	Ground Fl
4	20BOH.03	stephen.hamil@theh	2012-10-25T13:36:55	SP-45-20-45 - Kitchens	Ground Fl
5	20BOH.04	stephen.hamil@theh	2012-10-25T13:36:55	SP-60-60-15 - Cooling Spaces	Ground Fl
6	20BOH.05	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-80-64 - Plant Rooms	Ground Fl
7	20BOH.06	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-70-96 - Waste Storage Spaces	Ground Fl
8	20BOH.07	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-50-25 - Drying and Airing Rod	Ground Fl
9	20BOH.08	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-70-96 - Waste Storage Spaces	Ground Fl
10	20BOH.09	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-10-51 - Lobbies	Ground Fl
11	20BOH.10	stephen.hamil@theh	2012-10-25T13:36:55	SP-45-20-26 - Larders	Ground Fl
12	20BOH.12	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-80-64 - Plant Rooms	Ground Fl
13	20BOH.14	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-80-64 - Plant Rooms	Ground Fl
14	20BOH.6	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-80-64 - Plant Rooms	Ground Fl
15	20INT.01	stephen.hamil@theh	2012-10-25T13:36:55	SP-45-20-58 - Open-Plan Dining Area	Ground Fl
16	20INT.04	stephen.hamil@theh	2012-10-25T13:36:55	SP-65-10-51 - Lobbies	Ground Fl

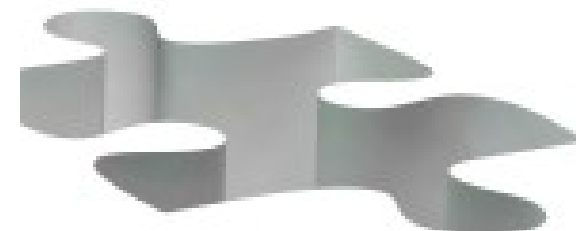
BUILDING INFORMATION MODEL (BIM) PROTOCOL
CIC/BIM Prot
1st edition 2013

Standard Protocol for use in projects using Building Information Models

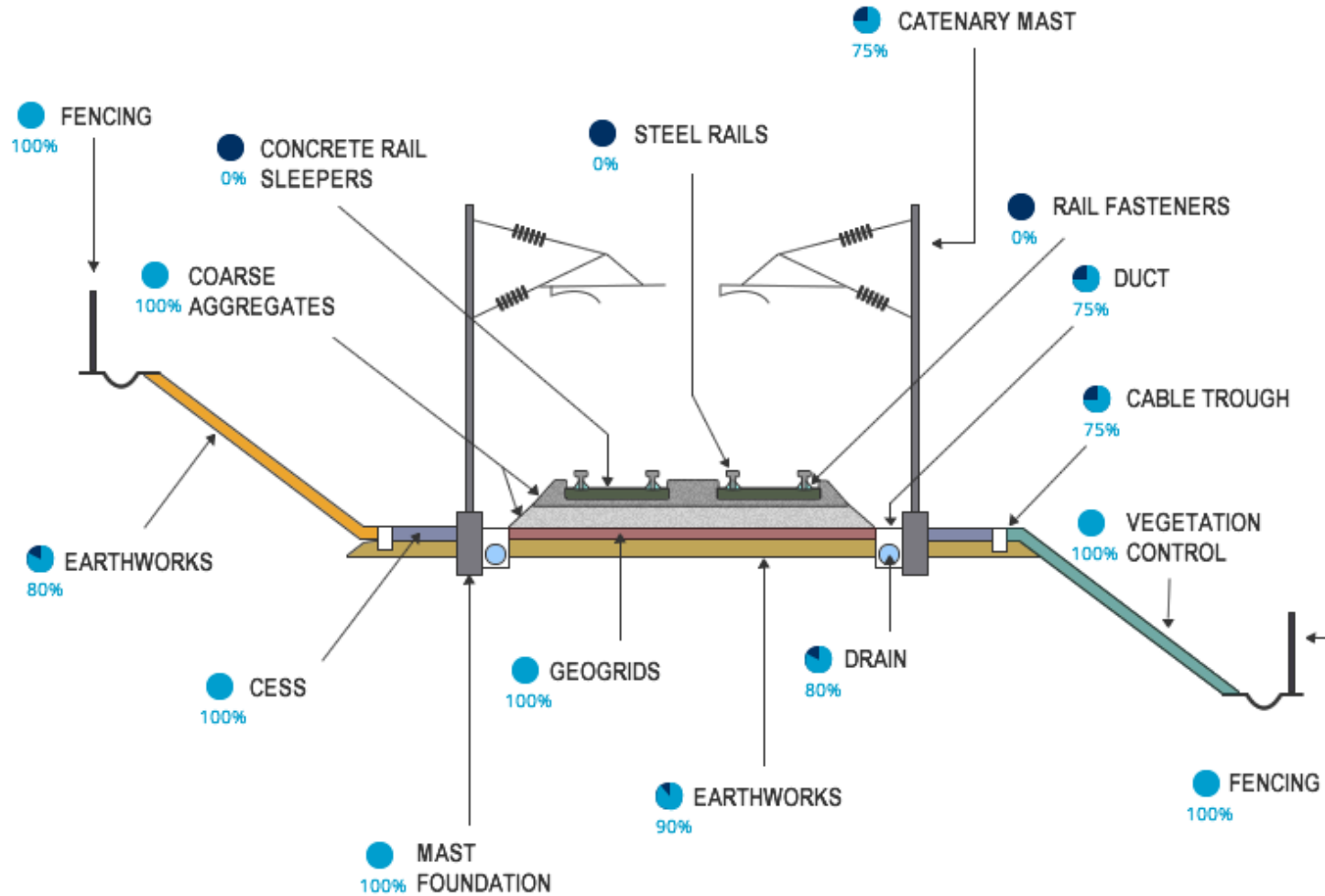
Cabinet Office

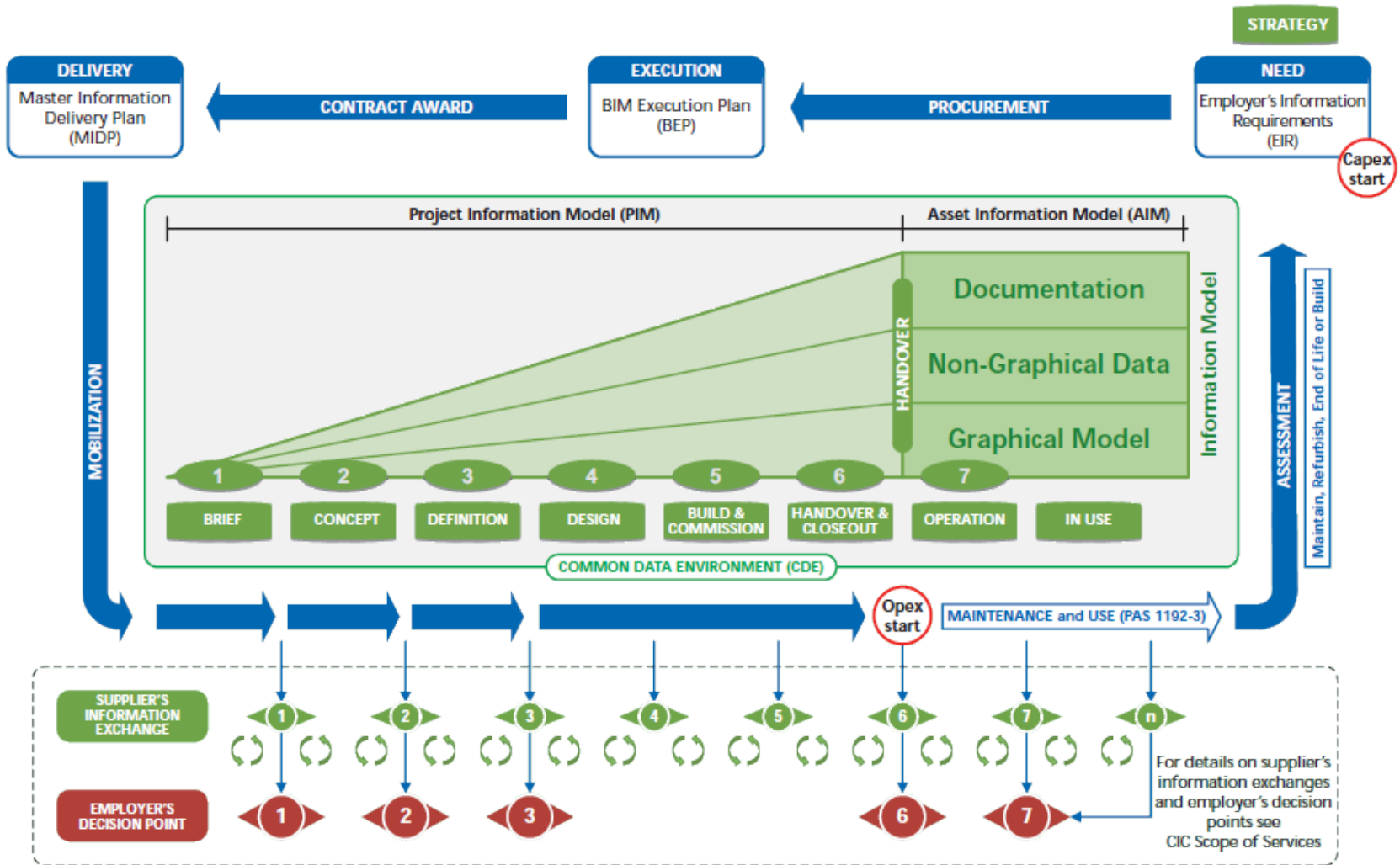
Government Soft Landings
Section 1 - Introduction

BiM
Government Soft Landings



A Toolkit for All: buildings, linear networks and geographical



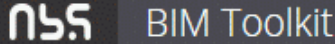



Legend

Green	Information process	Blue	Management process
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Digital Plan of Work

My projects (3) Objects Standards

007. Newtown High School

Gateshead, NE8 5XU

Participants Export



Stage 1. Brief

0 1 2 3 4 5 6 7

- Overview
- Details
- Roles
- Tasks**
- Objects
- Verify

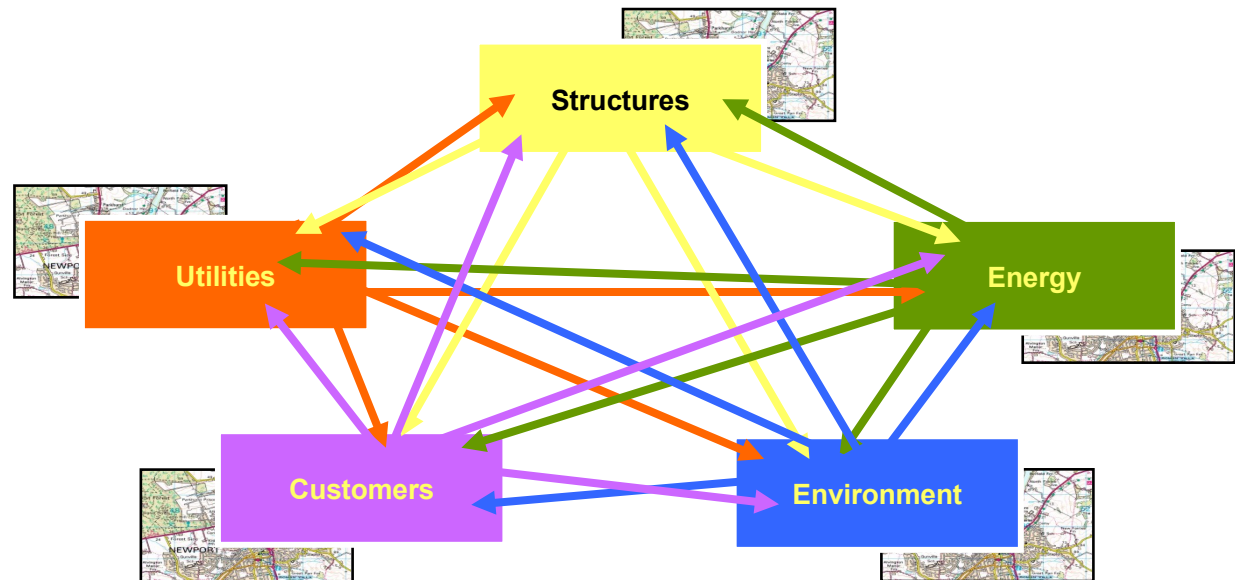
Tasks at Stage 1

Add task

Task	Role	
1.1 Develop the Project Objectives	Project Lead	
<p><i>The client's key objectives as set out in the Initial Project Brief. The document includes, where appropriate, the employer's Business Case, Sustainability Aspirations or other aspects that may influence the preparation of the brief and, in turn, the Concept Design stage. For example, Feasibility Studies may be required in order to test the Initial Project Brief against a given site, allowing certain high-level briefing issues to be considered before design work commences in earnest. Additional tasks may be added to other consultants at this stage to contribute to this task. "</i></p>		
1.2 Contribute to the Project Objectives	Big Widget Ltd	
1.3 Develop the Quality Objectives	Project Lead	
<p><i>The objectives that set out the quality aspects of a project. The objectives may comprise both subjective and objective aspects, although subjective aspects may be subject to a design quality indicator (DQI) benchmark review during the Feedback period. Additional tasks may be added to</i></p>		

Data Management and Use

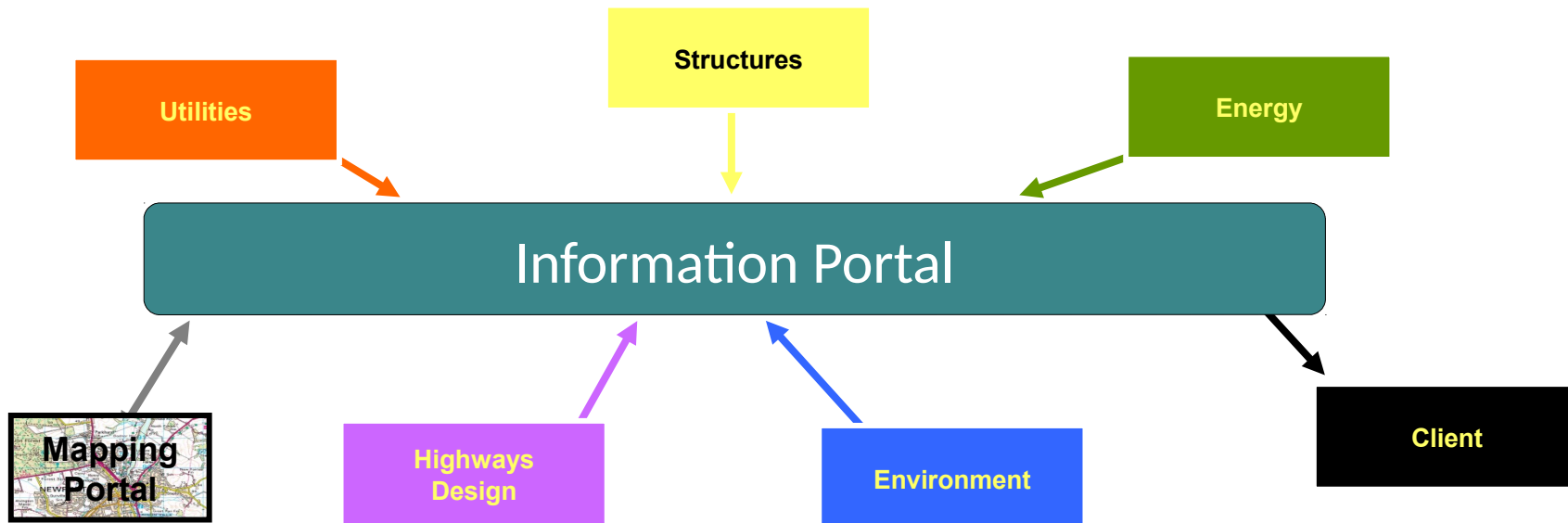
Multi-Discipline Project



- Data is converted to accommodate different tools
- Multiple copies across the network
 - Same data - different format

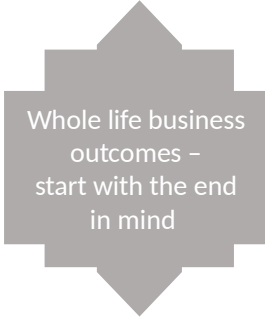
Integrated Data Management

Multi-Discipline Project

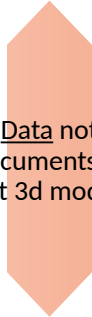


- Single source of truth used by all
- Data shared through common process and standards

Core Principles

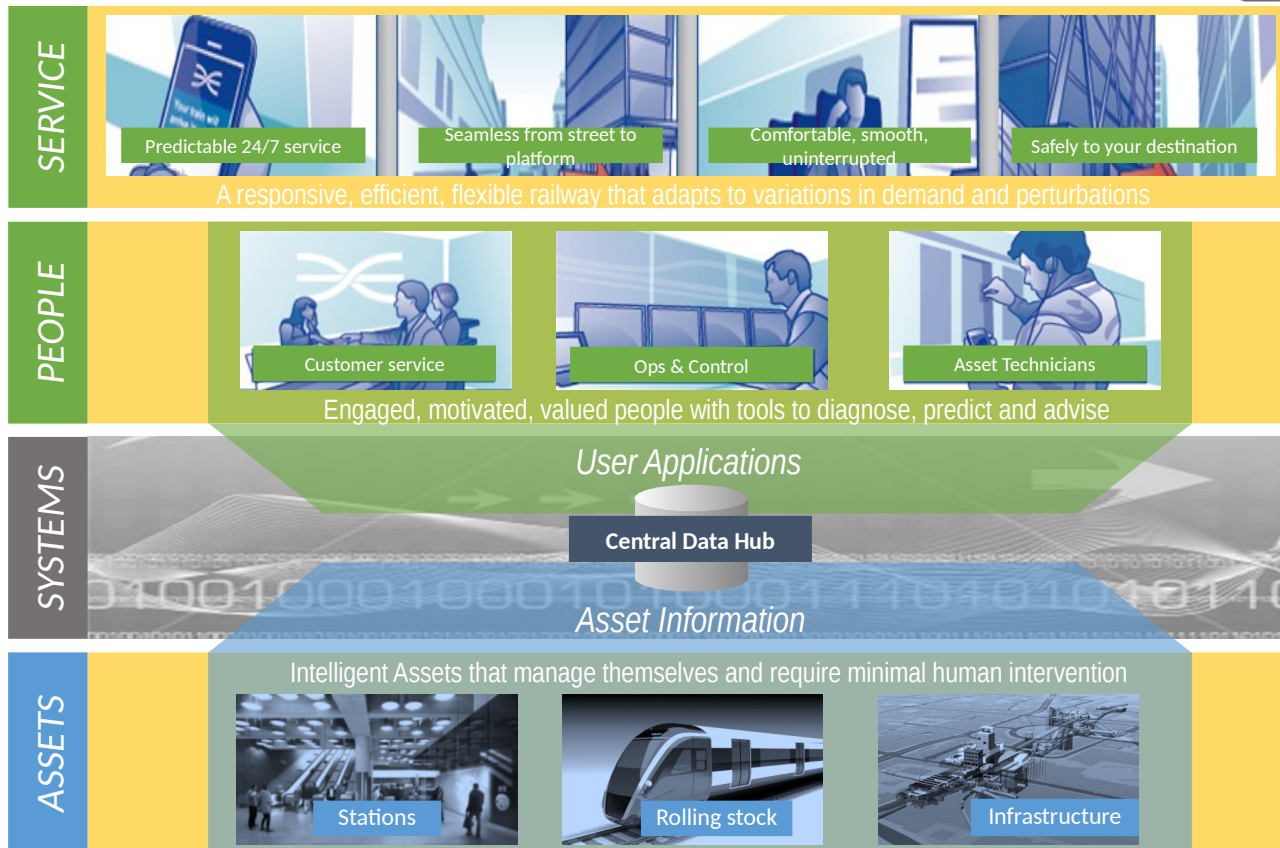


Whole life business
outcomes –
start with the end
in mind



Data not
documents or
just 3d models

Objective - intelligent infrastructure



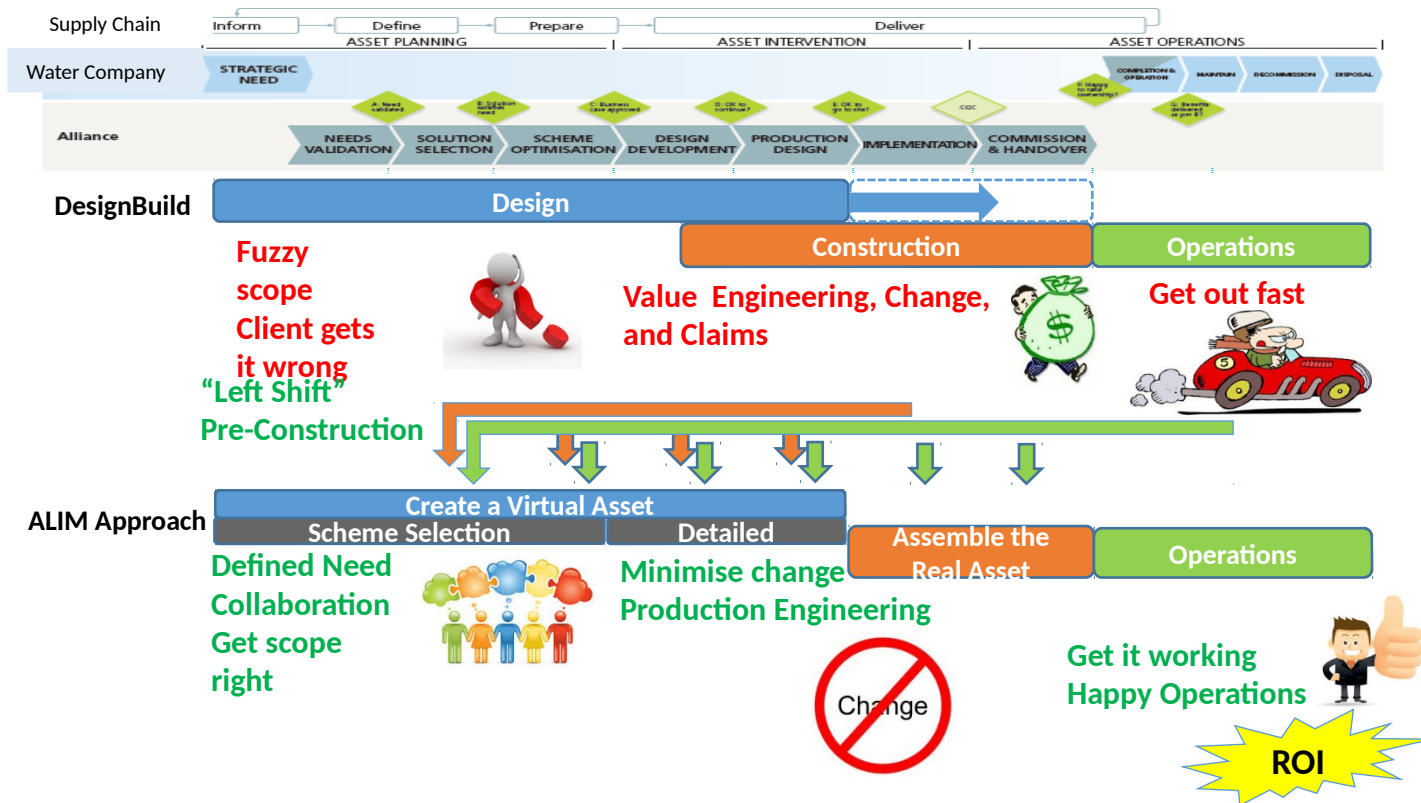
Core Principles

Whole life
business
outcomes
with the
in mind

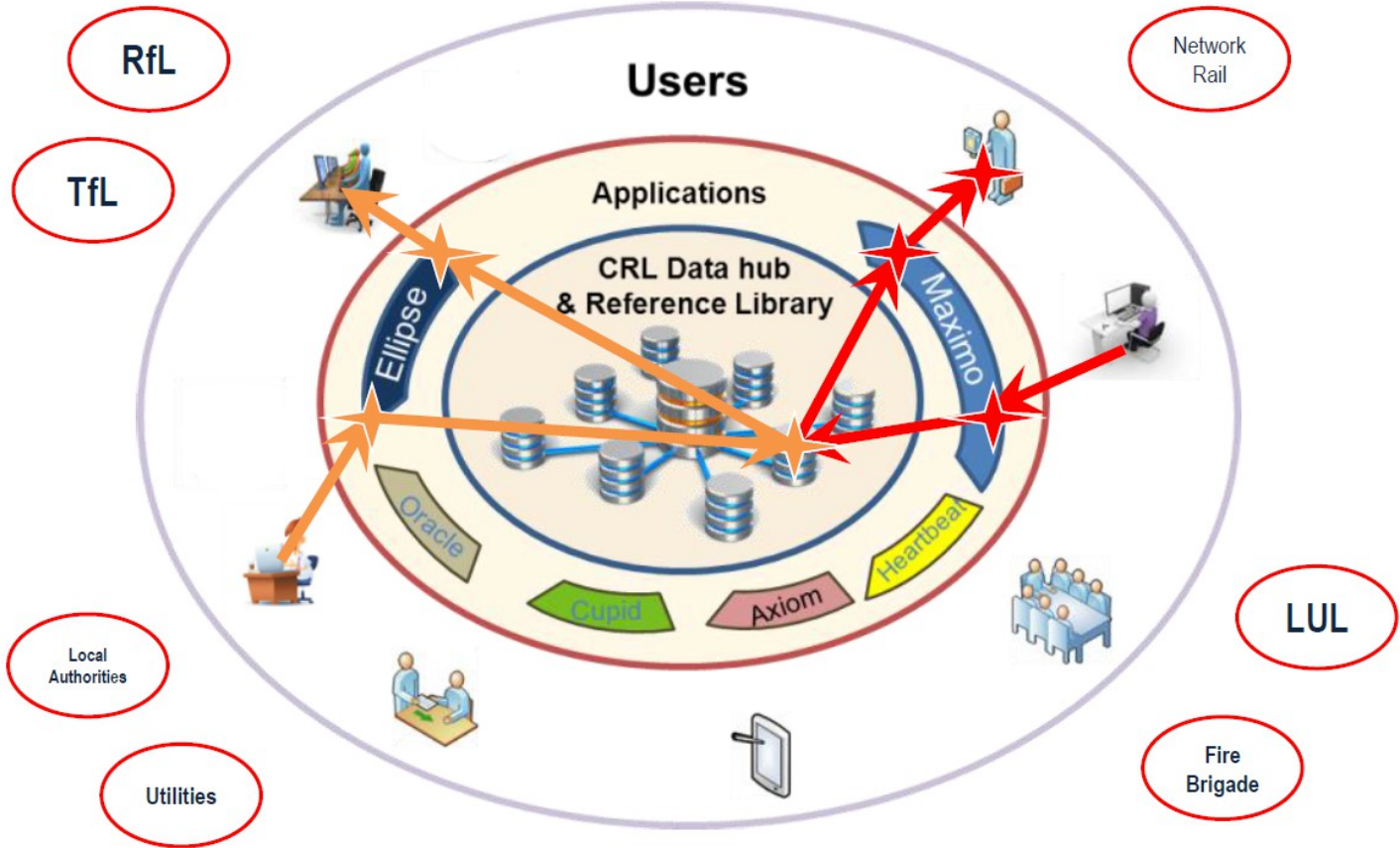
Data not
documents or
just 3d models

Think
assets not
projects

“Rechipping” the Workforce to Deliver Success and Make Money!!



Railway Data Hub

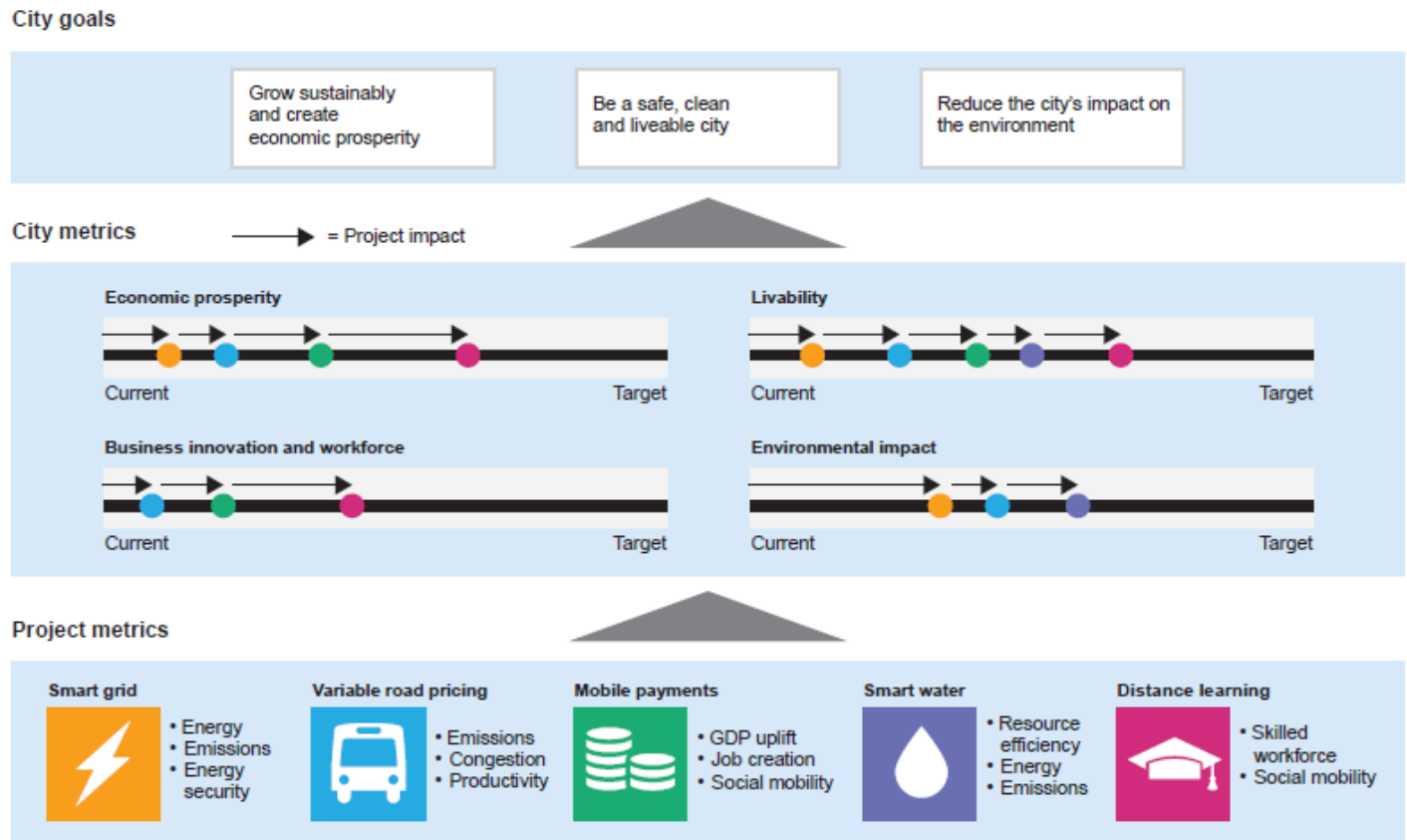


Building Information Modelling (BIM) is **transforming the way we design cities**, buildings and systems to perform throughout their entire life cycle.

Taking BIM to the next level.. But what is **it**?



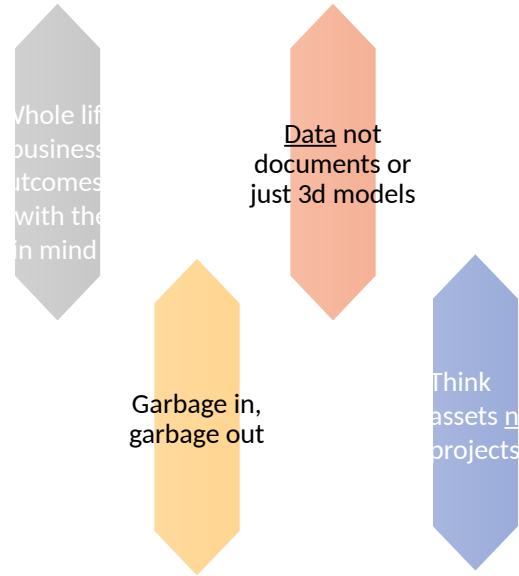
From smart technologies to a strategic framework

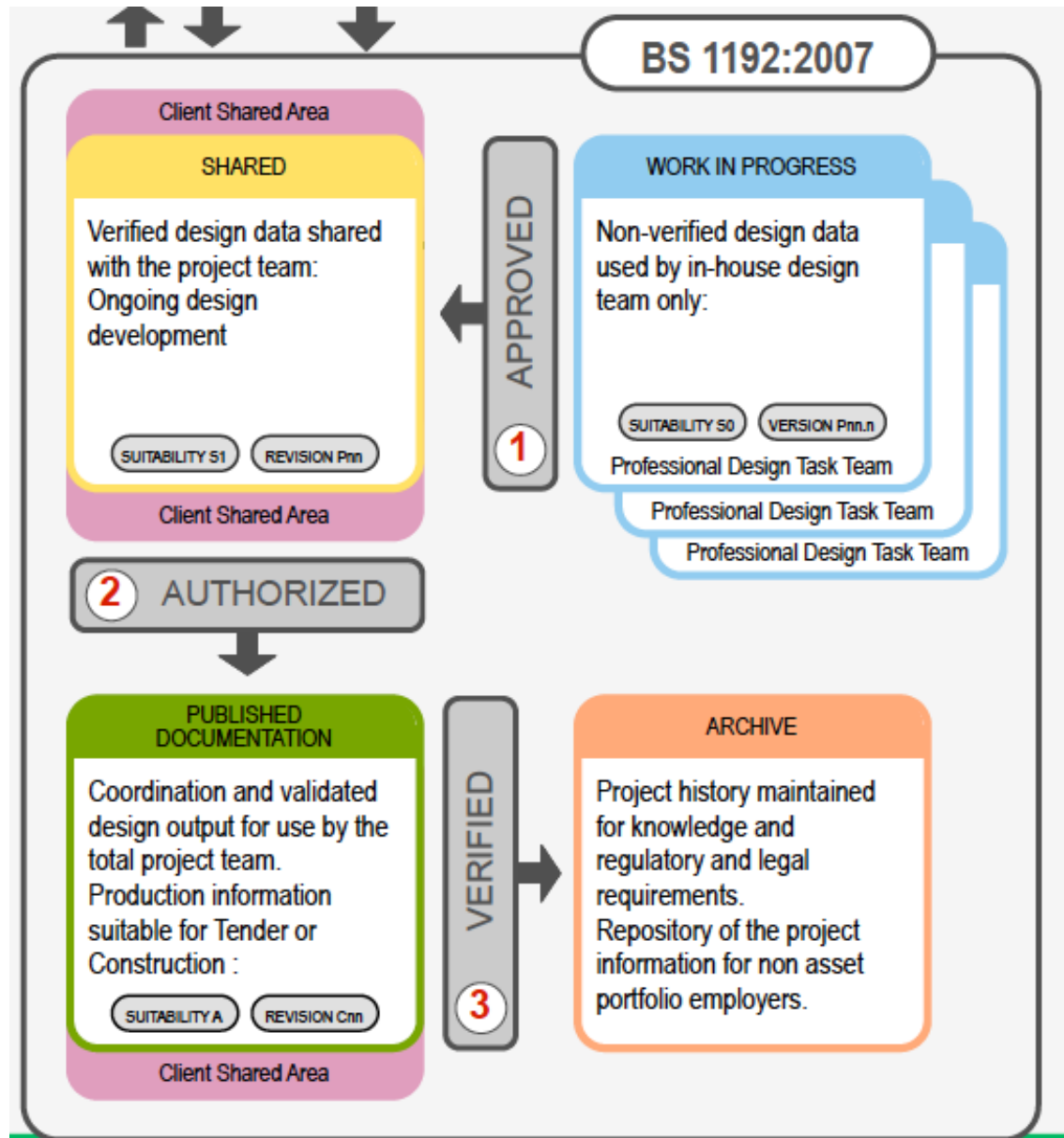


Measuring city projects against a common set of metrics

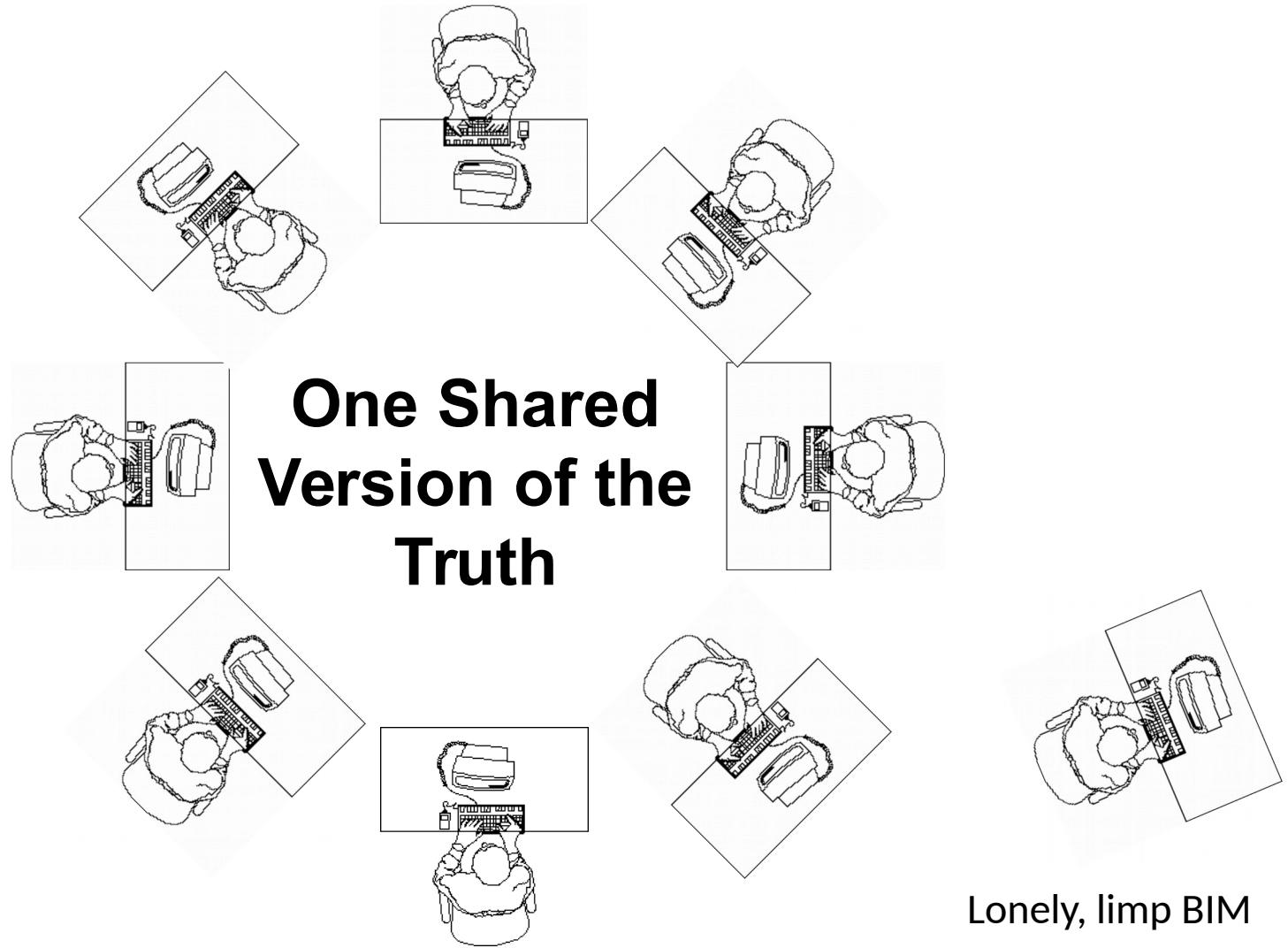
Infrastructure, buildings and activities reporting their state and behaviour to systems that learn and adapt in response.

Core Principles

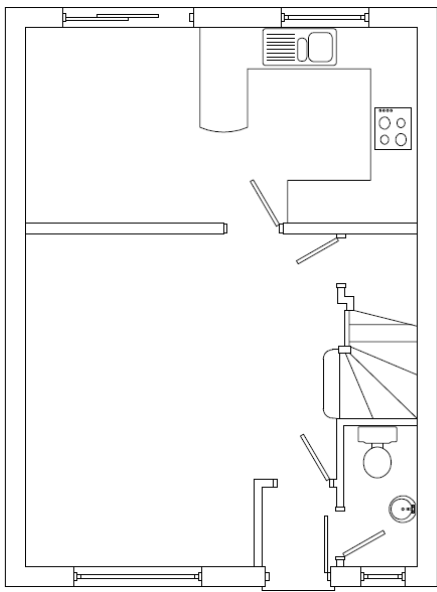




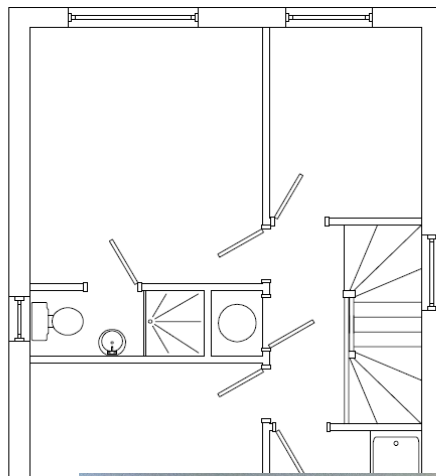
The future collaborative BIM team



CP1



Ground Floor

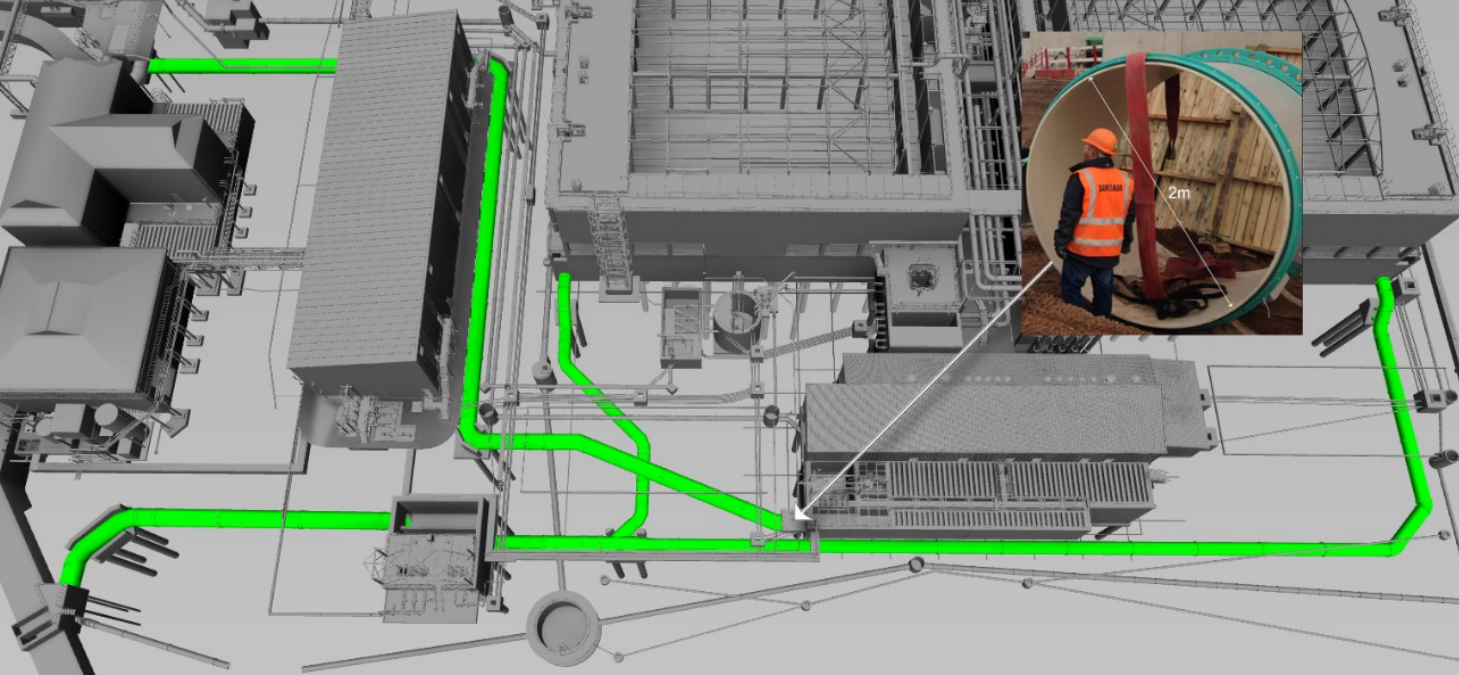


First Floor

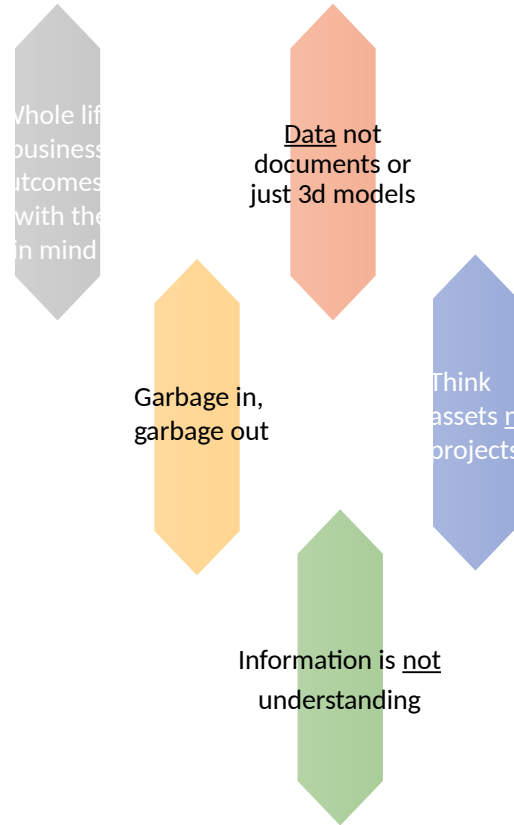
Title: Final Layout

Status:





Core Principles



THE RISK FACING CITIES

5 million

Number of people in Bangkok that could be at risk of flooding by 2070.

17%

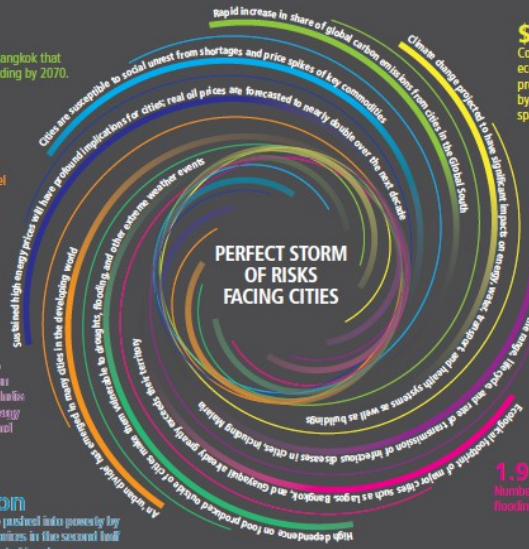
Estimated area of Mombasa that could be lost from a 0.3m sea level rise causing the loss of hotels, cultural monuments, and beaches that draw tourists.

20%

Percentage of people who do not have access to clean water in the world's poorest countries. The World Bank estimates that by 2025, 2 billion people will lack access to clean water.

44 million

Number of people pushed into poverty by increases in food prices in the second half of 2010, many located in urban areas.



\$418 million

Cost per year of replacing the ecosystem services (e.g. water provision, flood prevention) provided by Durban's network of green open space, 38% of the city's total budget.

85%

Percentage of climate change impacts mitigated by recent flooding.

\$39 billion

Economic loss from recent flooding in Bangkok through changes of more than 10 million buildings and impacts on commerce and industry.

1.9 million

Number of people affected by recent flooding in Manila.

FUTURE PROOFING CITIES



Data Analytics

Visualisation

Leadership

Data

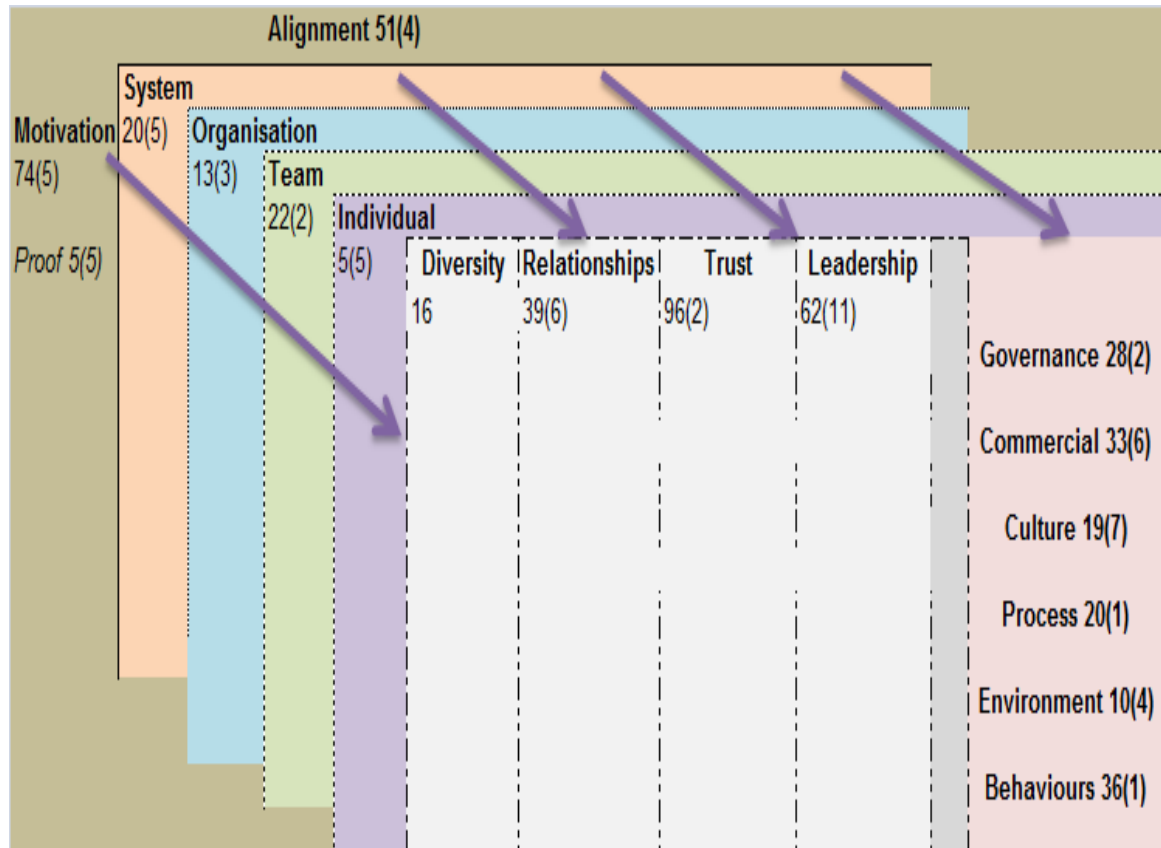
Management

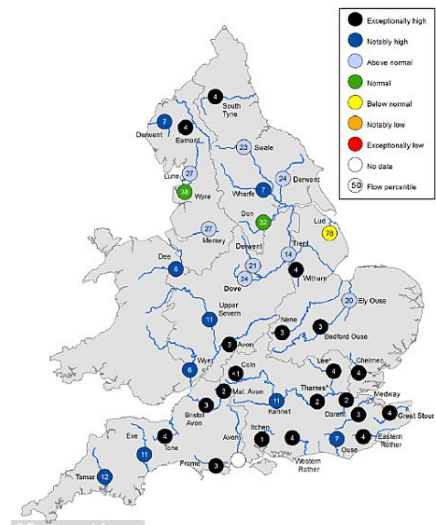
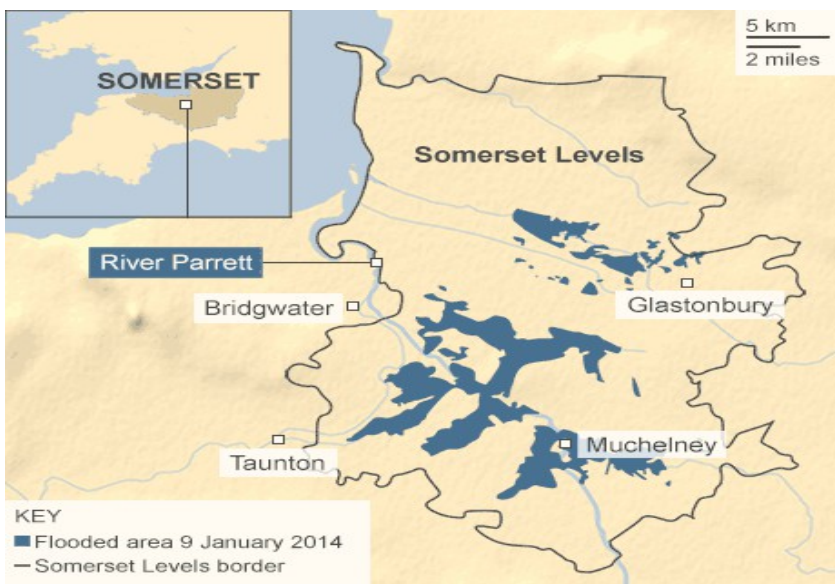
Spline

Operations

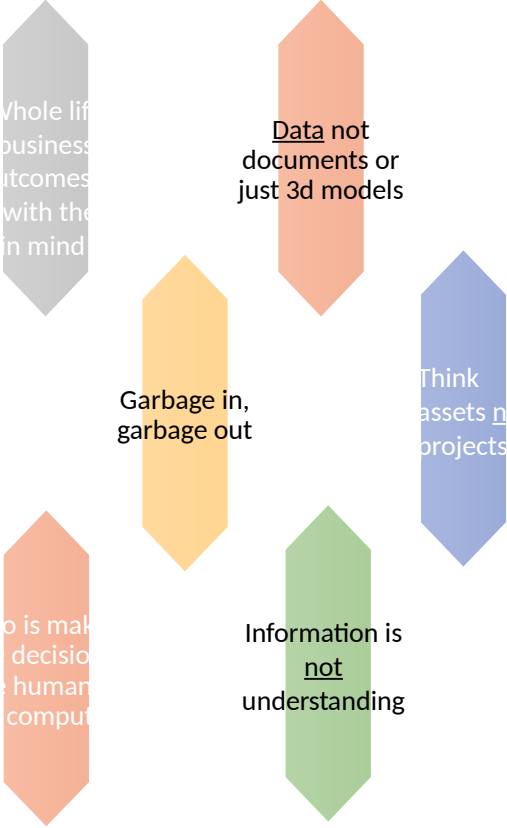
Decisions, Accessibility, Interpretation,
Intuition, Appropriateness

“We live in a world saturated with information. We have come to confuse information with understanding.”
“Blink” Gladwell 2007:264





Core Principles



We can and do make split-second decisions on the most minute sets of data. Sometimes our bias in those moments can steer us astray, but when managed correctly, those “instant” decisions are not just as good, *they can be better* than those made in full conscious analysis of all available data.

The message is clear. If you can distil your decision making to just the right subset of the data and you prime yourself correctly, you can make better decisions with less information

Mayor's Aviation Work Programme

(MAAWP)



Why?

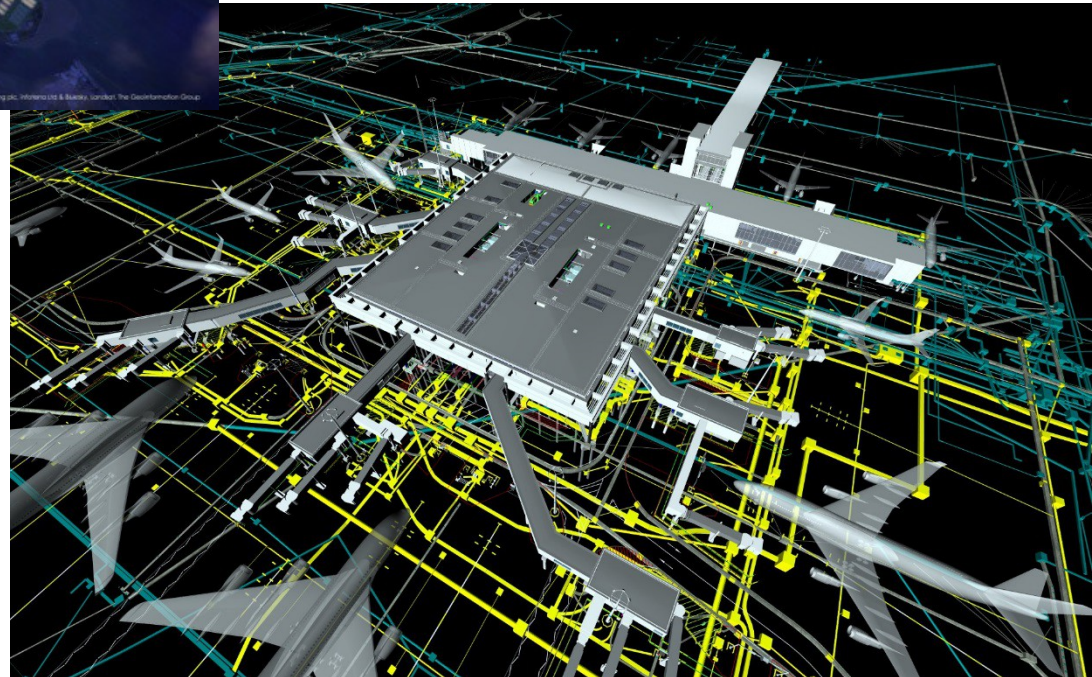
- Increase UK airport capacity
- Increase UK economic output
- Relieve capacity strain on London Heathrow which operates at 98%
- Create new jobs
- Create a hub to rival European competitors

Image shows:

- London in the distance with Thames estuary airport scenario in the foreground

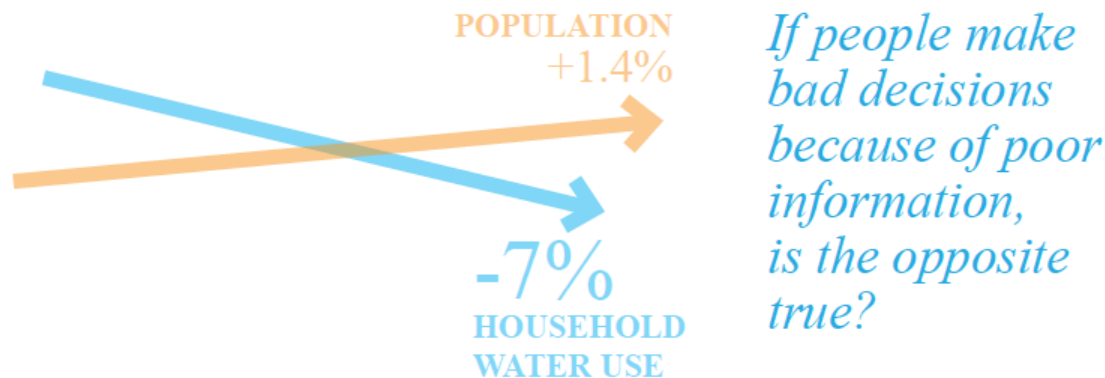
Integrated applications during project

- Website for easy data delivery
- Environmental Constraint analysis
- Models built for repetitive scenarios analysis.



What makes a City “smart”?

‘Smart’ holds the promise of finding new ways for citizens get the services they crave, without using exponentially more resources. The marriage of technology with the physical and built environment enables more efficient construction and management of infrastructure, and the potential to change behaviour for personal or public good.



Lessons from other sectors

Array of data signals

Predictive

Real-time

Continuous

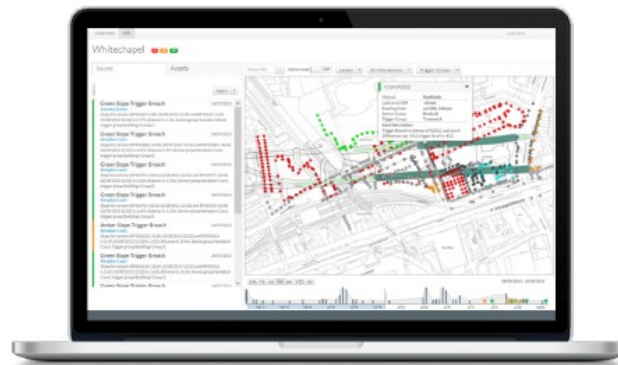


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Results

Working in partnership
with Arup and Atkins

Validated on two years
worth of data



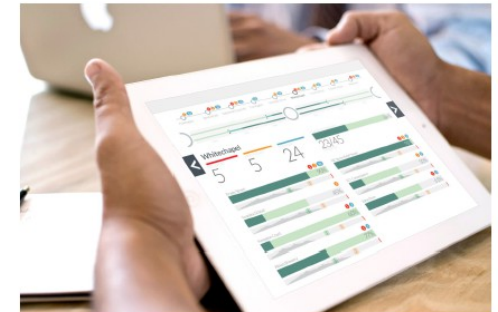
Impact

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Risk management
Real-time detection
across whole area

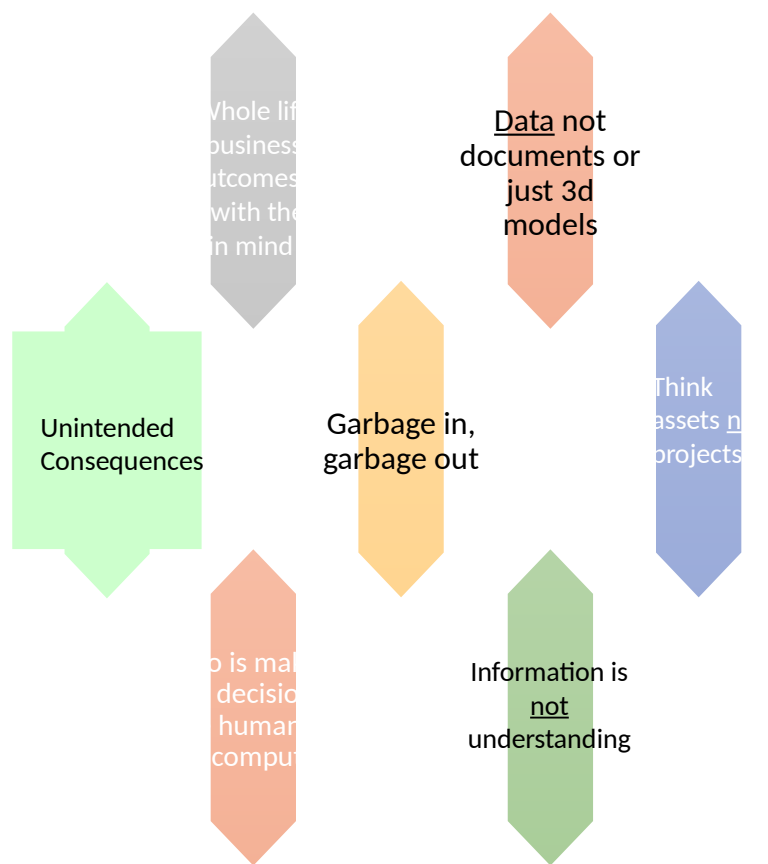
Event forecasting
giving up to 10 days
early warning

Cost
Optimal fit typically
results in 20%



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The anchors for a Digital World in which BIM and Geospatial integrate as enablers



Core principles to remember