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

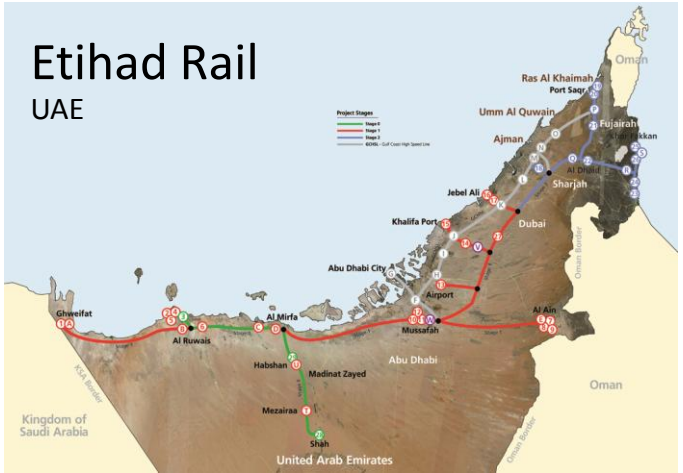
Chair of Association of Geographic Information, 2013 and 2014
Vice Chair of BuildingSmart UK
Chair of ICE BIM Action Group

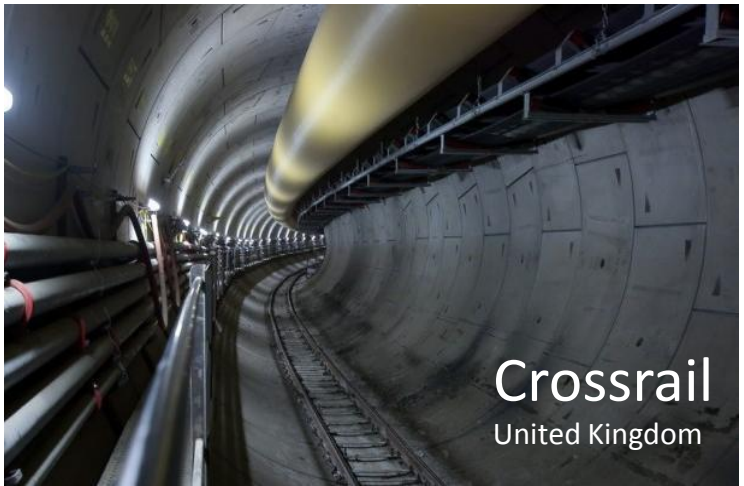

High Speed 2
United Kingdom


London 2012 Games
Olympic Park


Riyadh Metro
Saudi Arabia

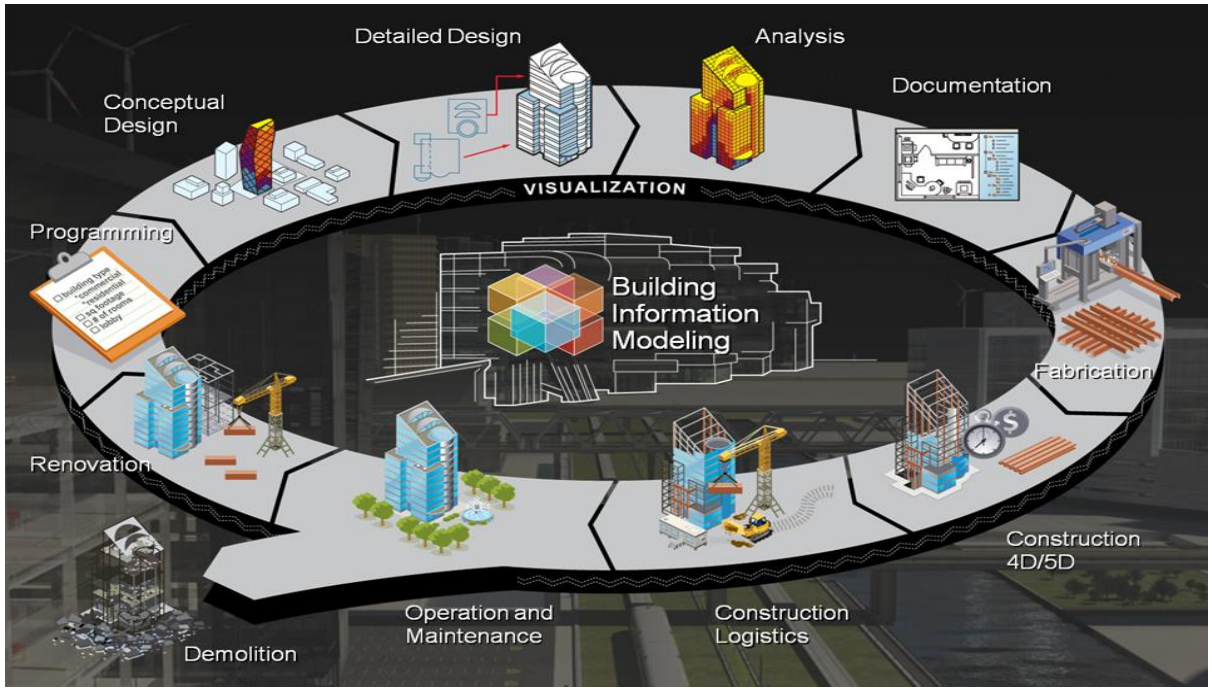

M25 DBFO
United Kingdom
M4
The WEST
Reading
Slough
London (W & C)
Heathrow
(Terminals 1, 2 & 3)
M4
(M40, M1, M11)
Oxford, Watford, Stansted
M25


Etihad Rail
UAE
Oman
Ras Al Khaimah
Port Saqr
Umm Al Quwain
Fujairah
Ajman
Sharjah
Jebel Ali
Khalifa Port
Dubai
Abu Dhabi City
Airport
Ghweifat
Al Mirfa
Al Ruwais
Mussafah
Al Ain
Habshan
Madinat Zayed
Abu Dhabi
Oman
Mezairaa
Shah
Kingdom of
Saudi Arabia
United Arab Emirates


Crossrail
United Kingdom

BIM …… Whole Lifecycle IM

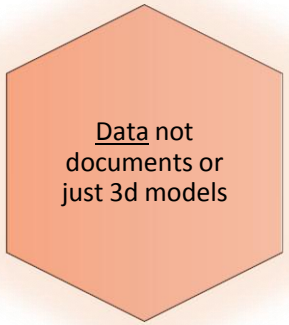
…. Start with the end in mind
…… For anything which is built



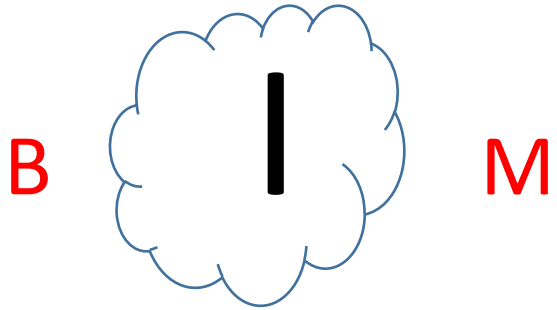
Courtesy of Autodesk

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

Core Principles

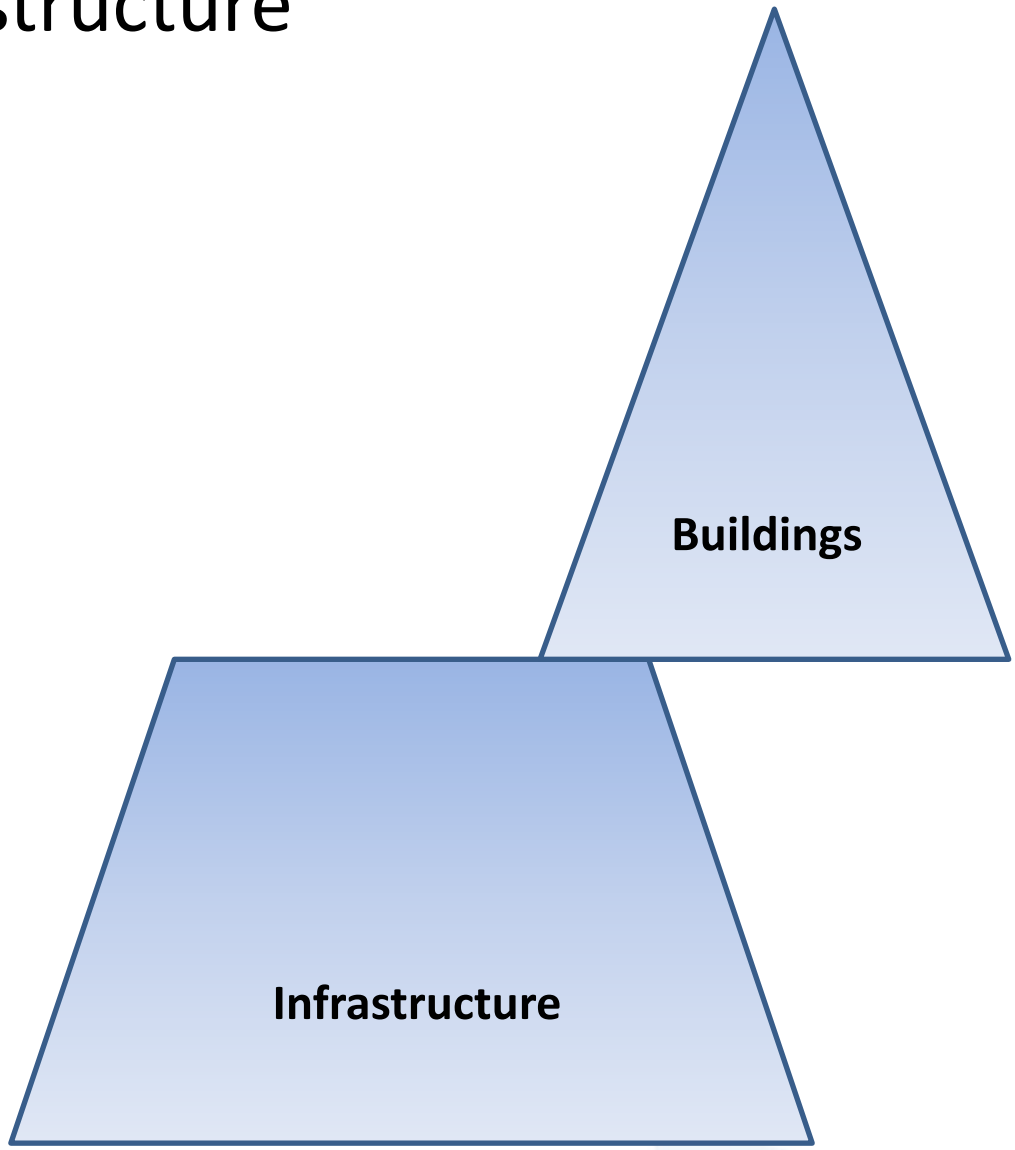


Its all about information



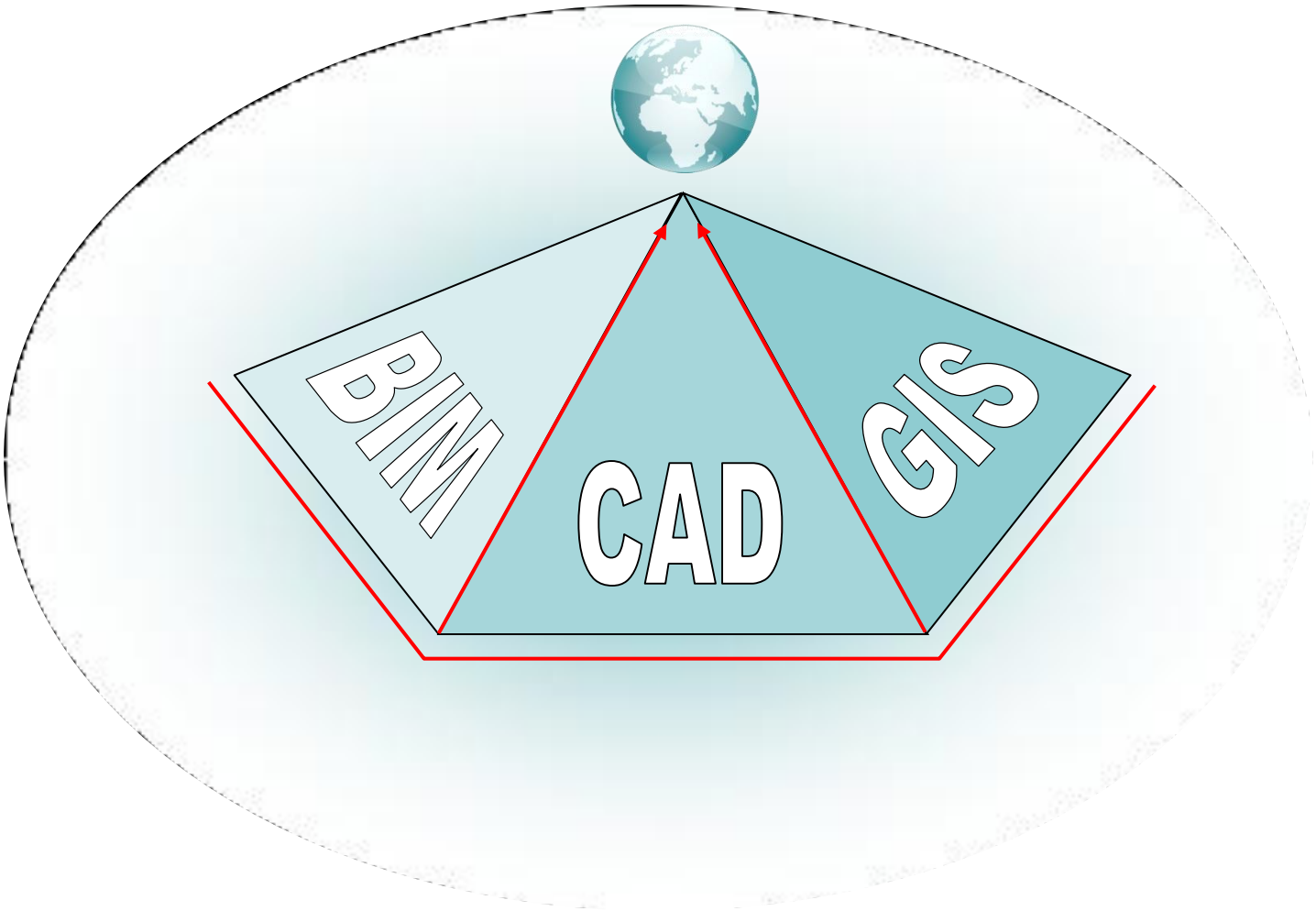
With the lowest common denominator being digital data …… ***Liberated*** Data

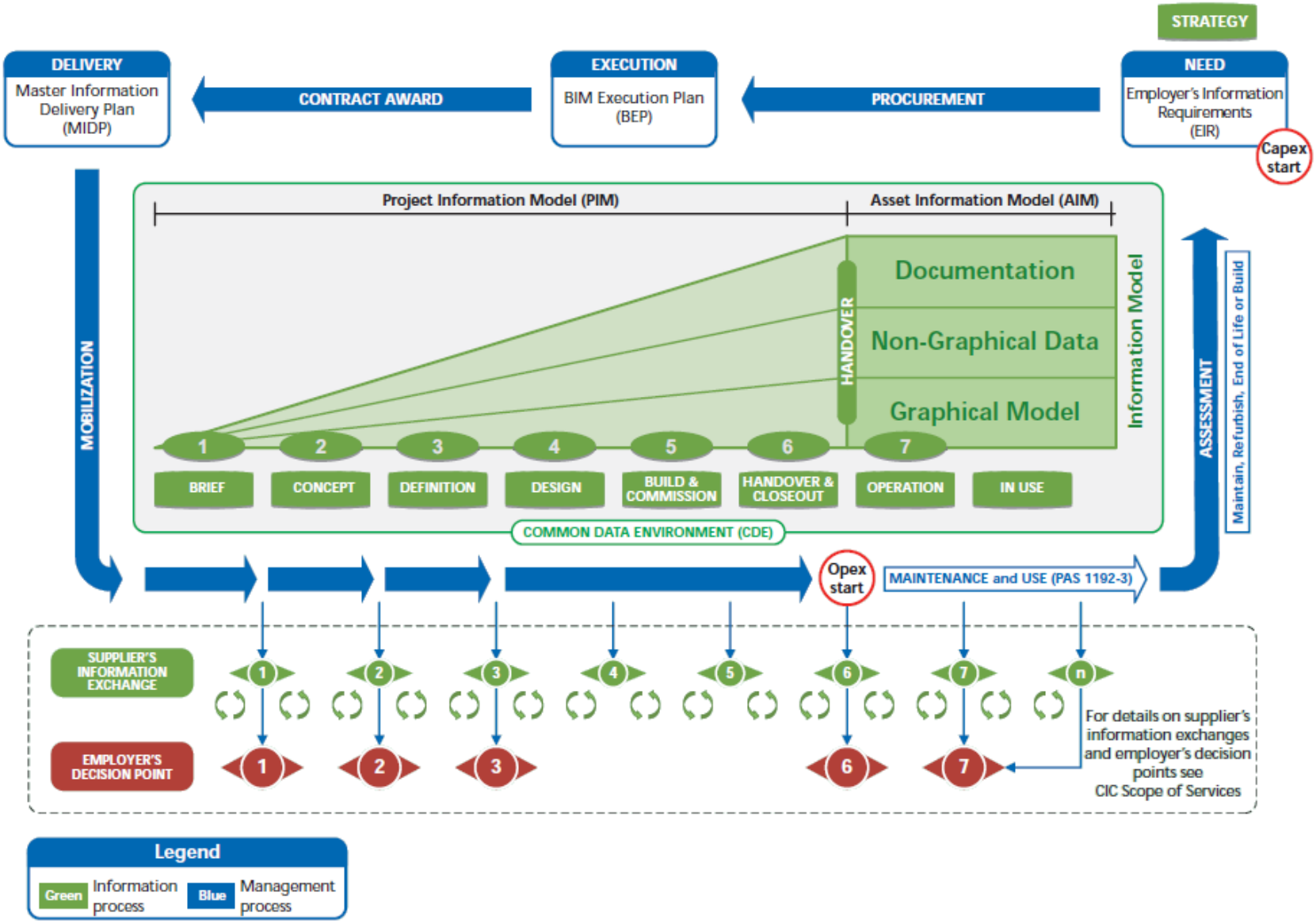
The different stages of Buildings and Infrastructure



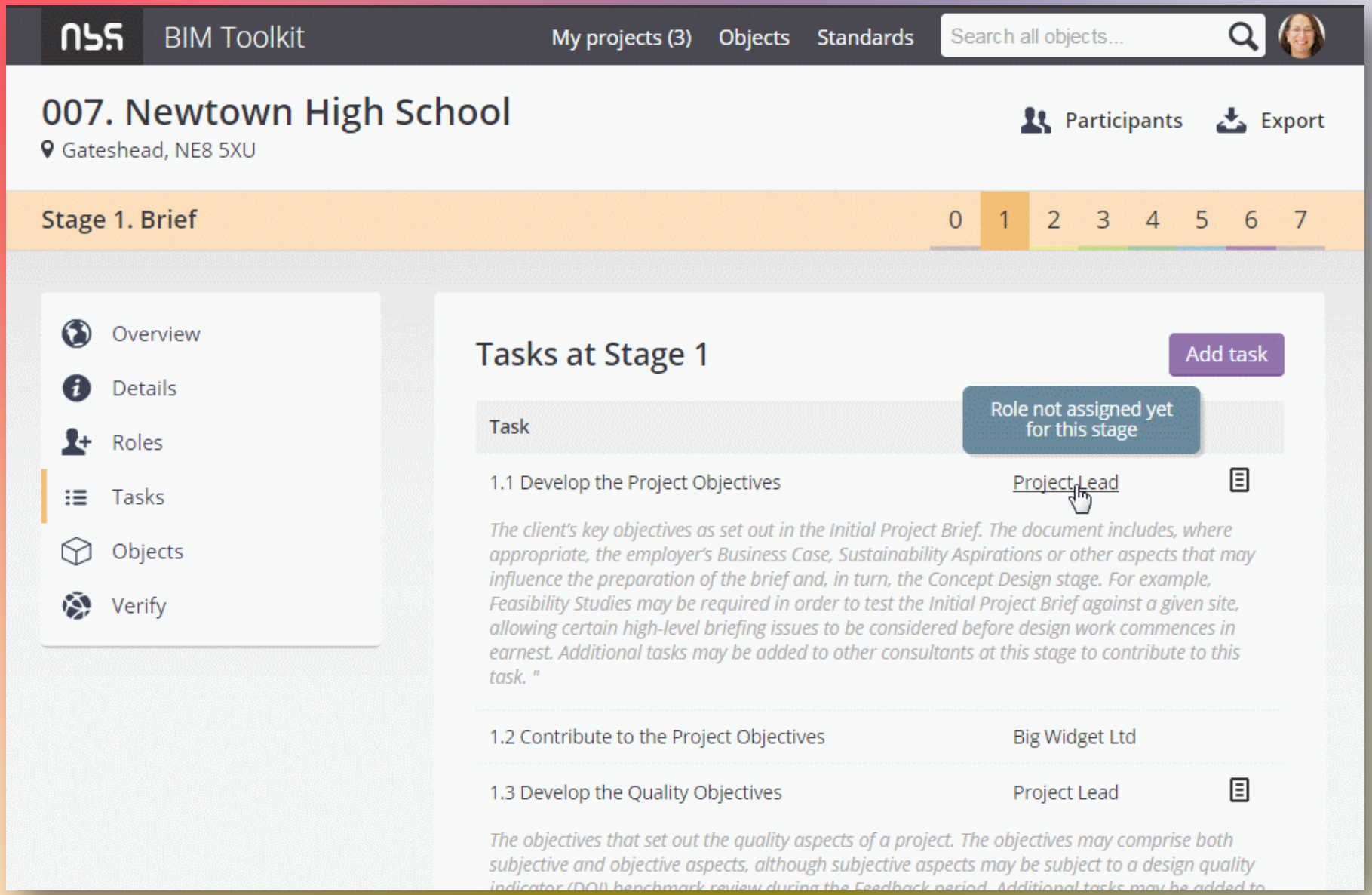
Integrated technologies

Aligned staff, software, data, standards, workflows

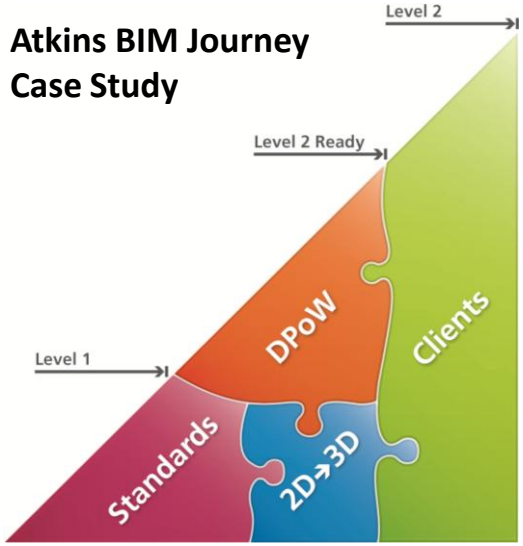




Digital Plan of Work



Atkins BIM Journey Case Study



- Developed standards for managing CAD/BIM projects
- Digital Plan of Work
- Inform, inspire, integrate (head & heart)
- Organisational roles & staffing BIM process design
- CDE data exchange & change control
- Implementation of BIM practices

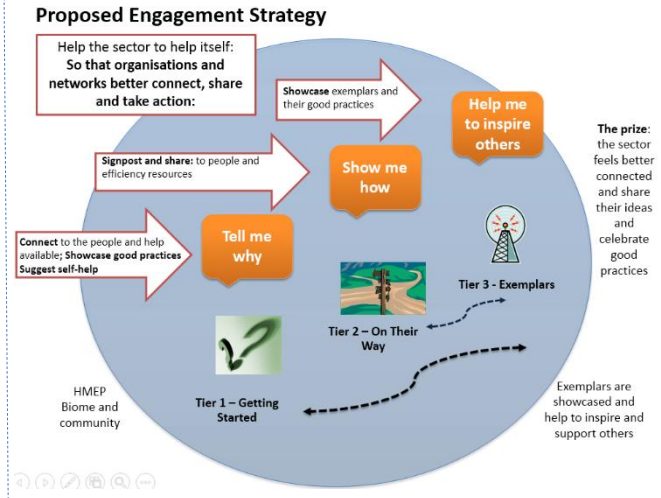
5 Key Points to adopt our BIM standards

- BEP — Teams that create and follow BIM Execution Plans together (BEP)
- Using WIP, Shared, Published and Archived data storage areas in a Common Data Environment (CDE)
- Correctly named data with a defined purpose and status
- Only properly checked data getting Shared and Published
- Delivering the defined Level of Detail and Information

Highways Maintenance Efficiency Programme (HMEP) Case Study

HMEP

Successful Business Change



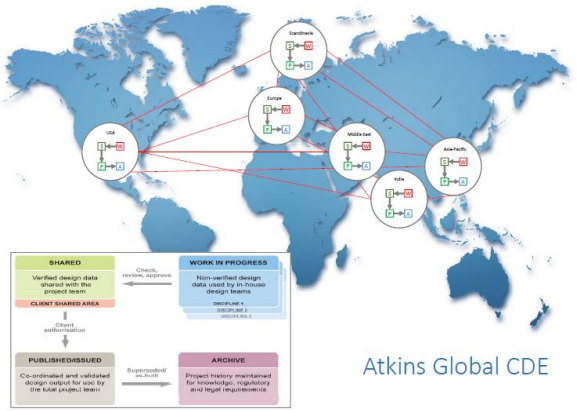
"By the highways sector, for the highways sector"

- Developing new ways of working
- Sectors learn to do things differently
- Engagement strategy
- Readiness Assessment Tool
- Creating a strong sense of identity
- Bringing together public & private sector

Transport for London

Atkins Global CDE Case Study

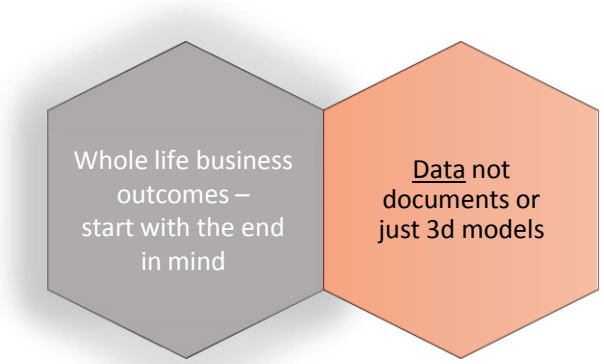
- Collaboration in a managed environment
- Embedded BS1192 workflows
- Trust of information
- Audit trail of design activities
- Enables distributed working



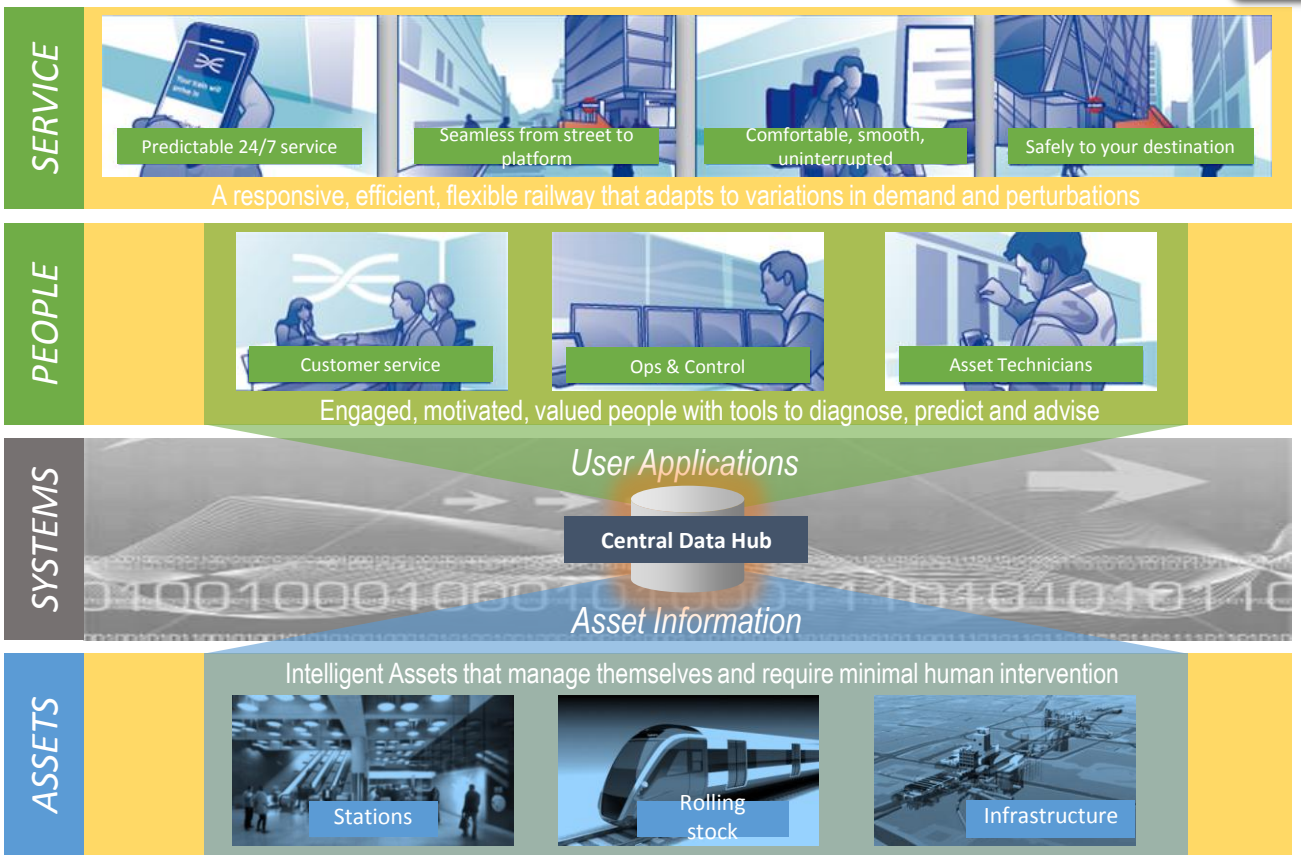
Atkins Global CDE

fast
Riyadh Metro Alliance

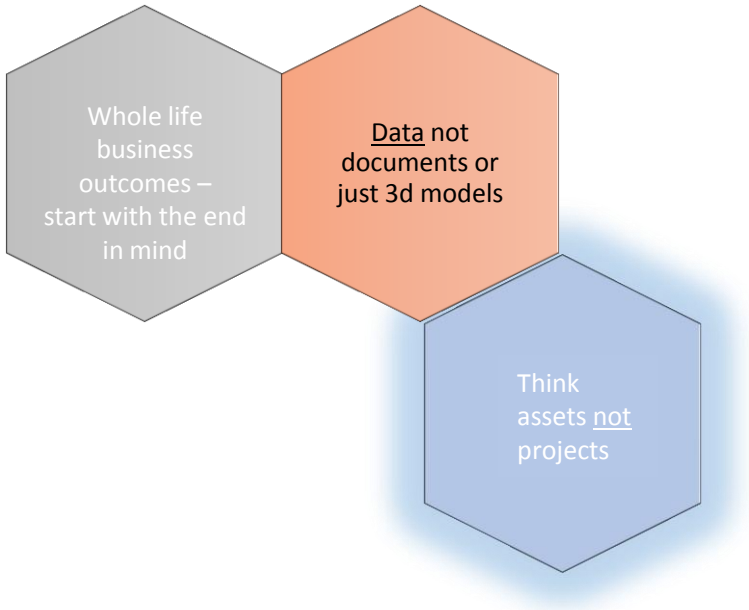
Core Principles



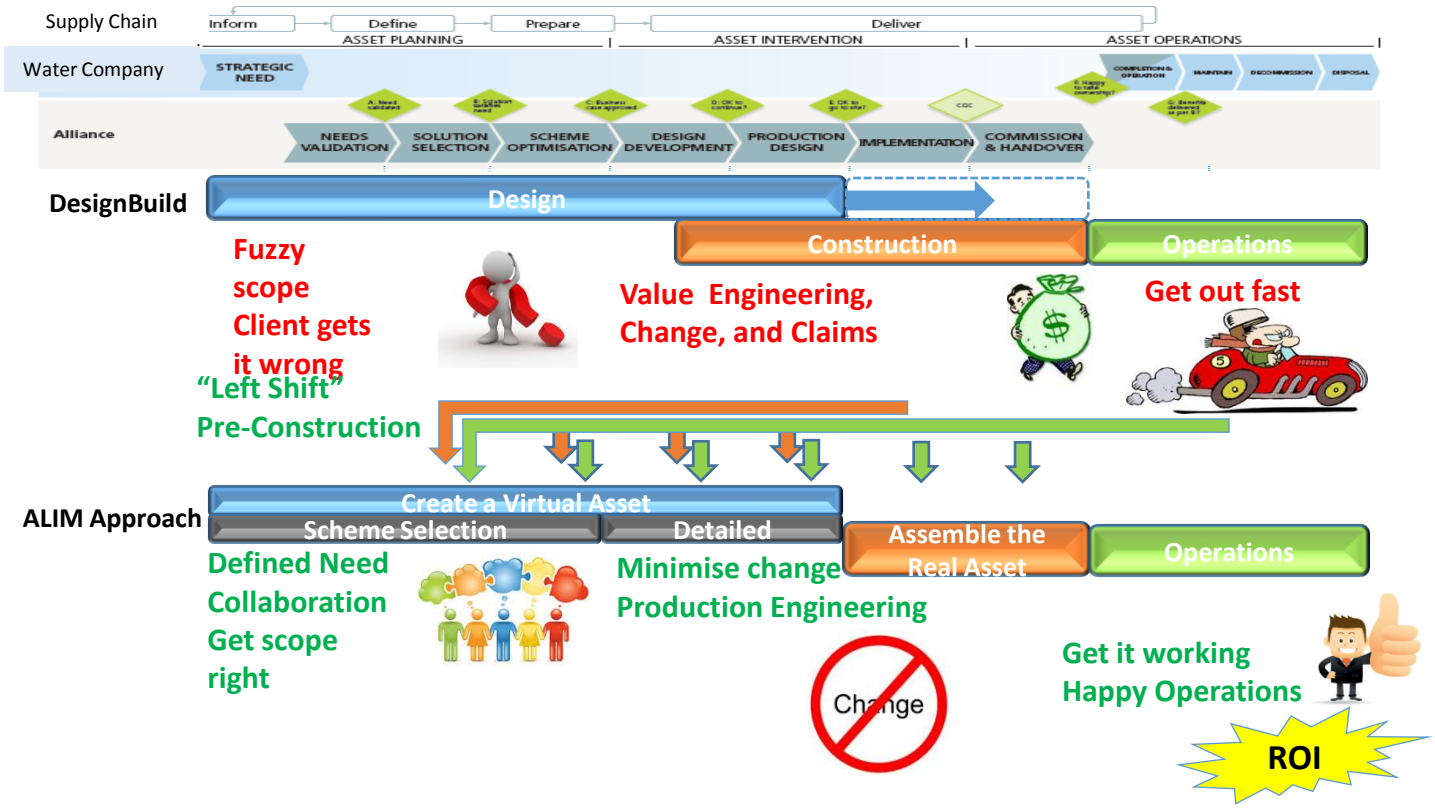
Objective - intelligent infrastructure



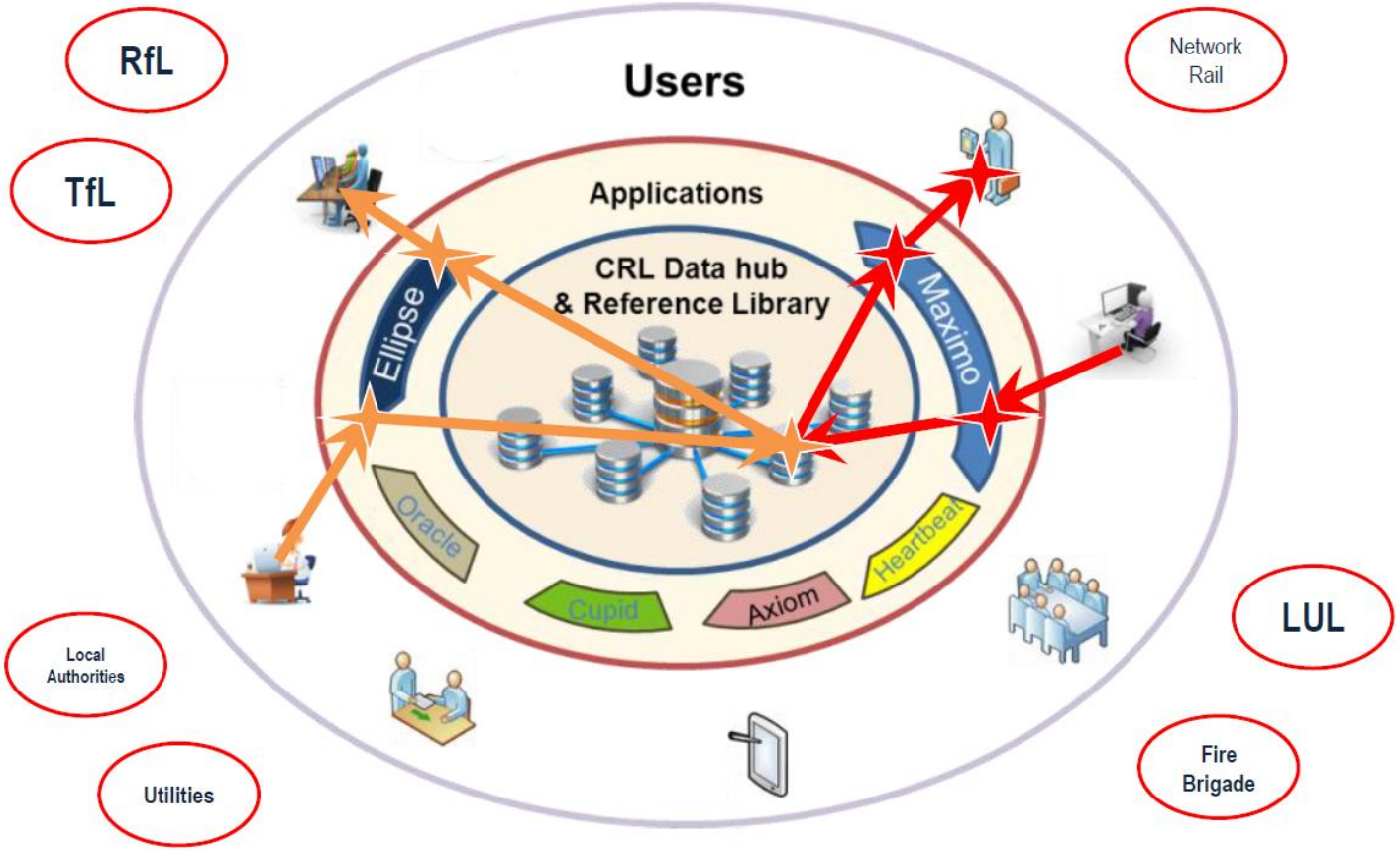
Core Principles



“Rechipping” the Workforce to Deliver Integrated, Smart Outcomes



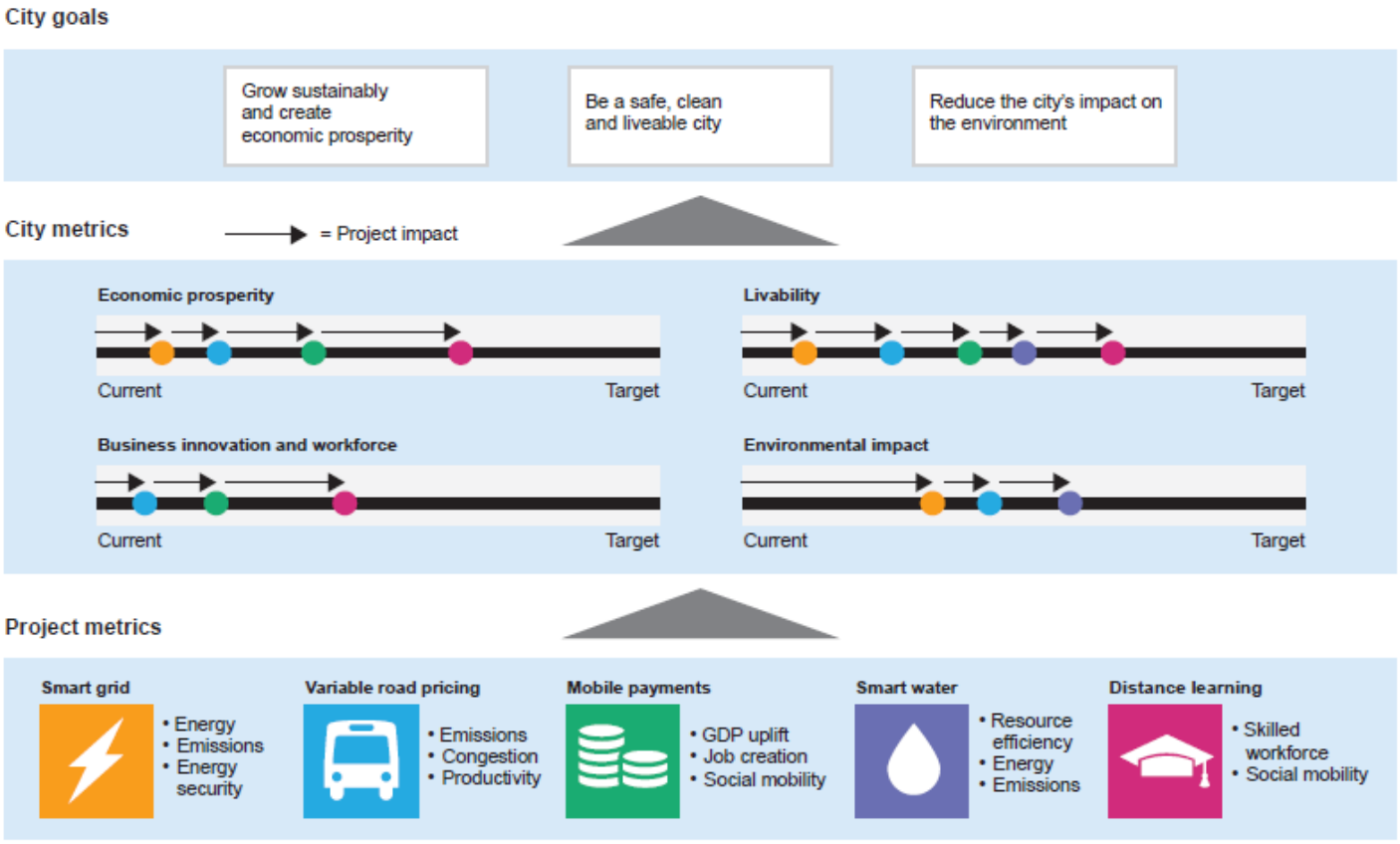
Railway Data Hub



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?

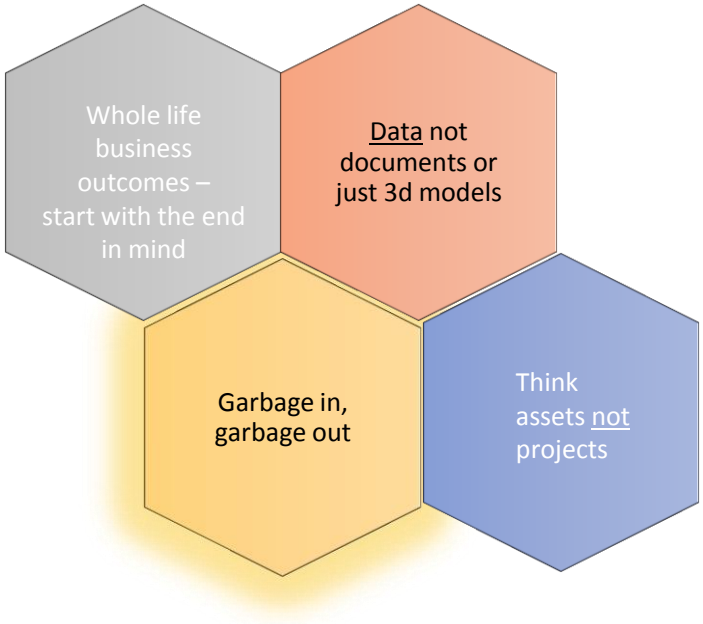
From smart technologies to a strategic framework

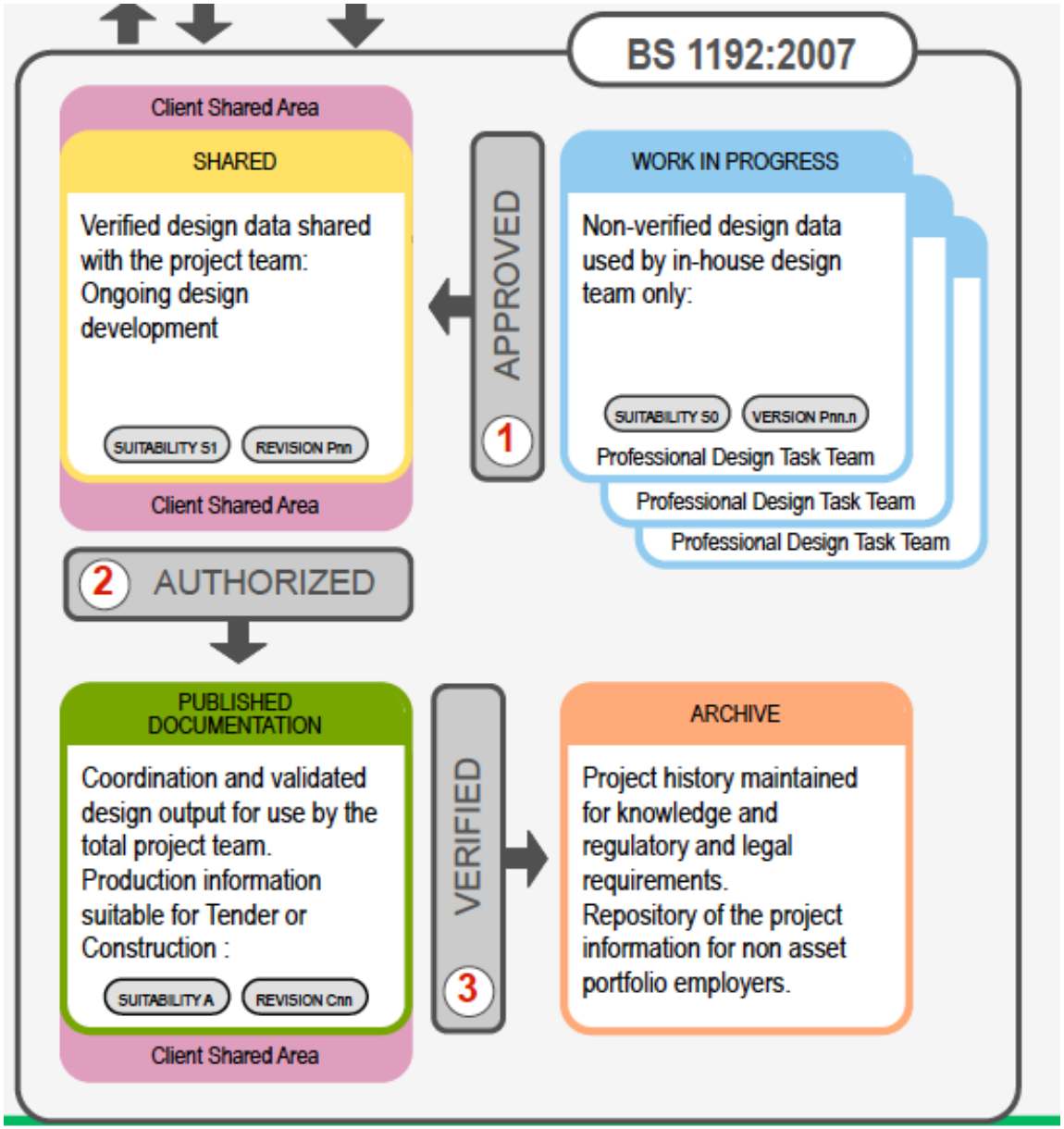


Measuring city projects against a common set of metrics

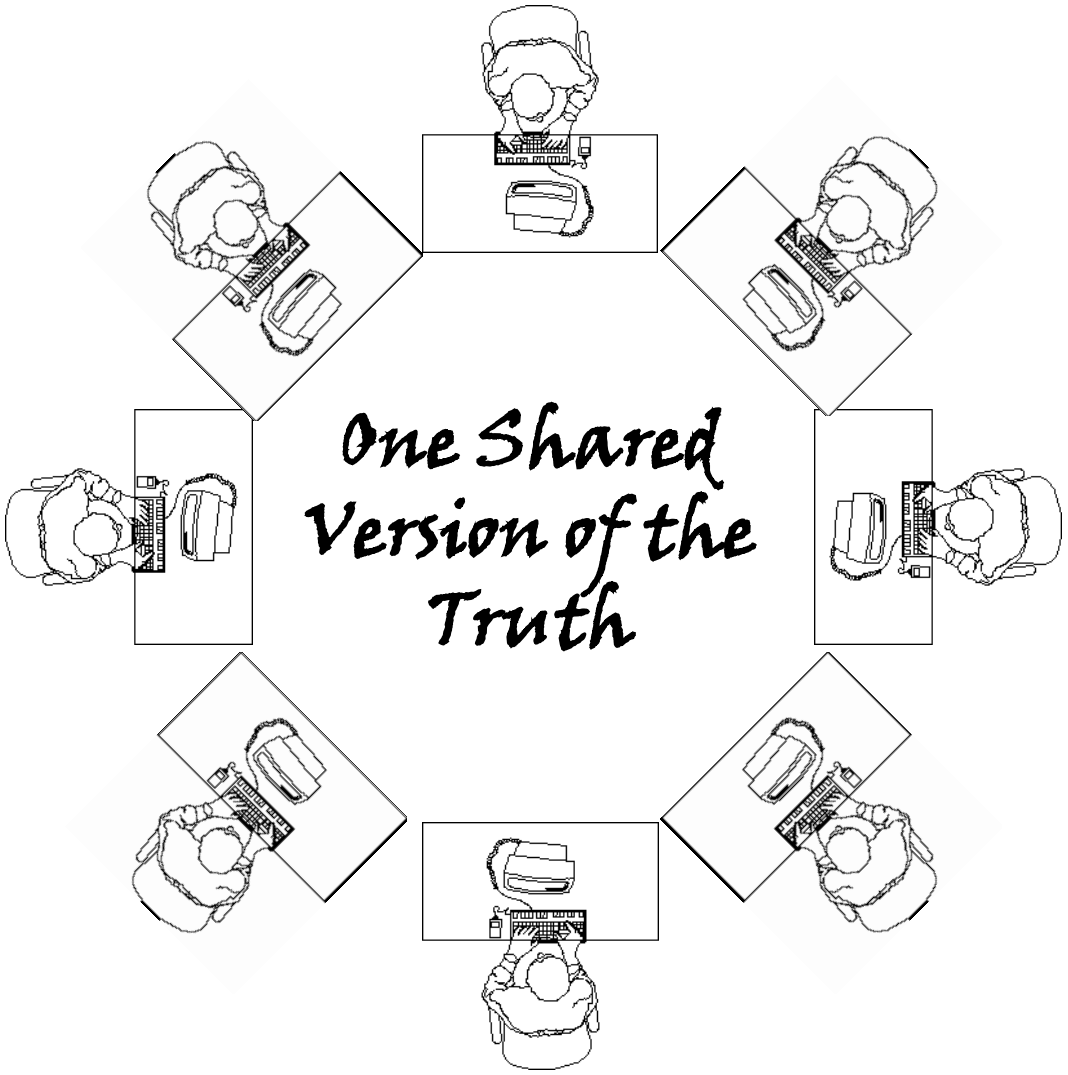
Infrastructure, buildings and activities reporting their state and behaviour to systems that learn and adapt in response.

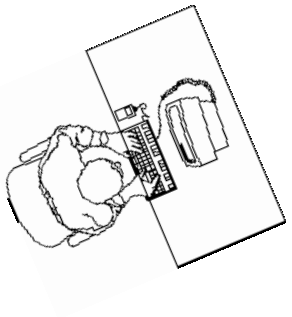
Core Principles




BS 1192:2007
Client Shared Area
SHARED
Verified design data shared with the project team: Ongoing design development
SUITABILITY S1
REVISION Pnn
Client Shared Area
APPROVED
1
WORK IN PROGRESS
Non-verified design data used by in-house design team only:
SUITABILITY S0
VERSION Pnn.n
Professional Design Task Team
Professional Design Task Team
Professional Design Task Team
2 AUTHORIZED
PUBLISHED DOCUMENTATION
Coordination and validated design output for use by the total project team. Production information suitable for Tender or Construction :
SUITABILITY A
REVISION Cnn
Client Shared Area
VERIFIED
3
ARCHIVE
Project history maintained for knowledge and regulatory and legal requirements. Repository of the project information for non asset portfolio employers.

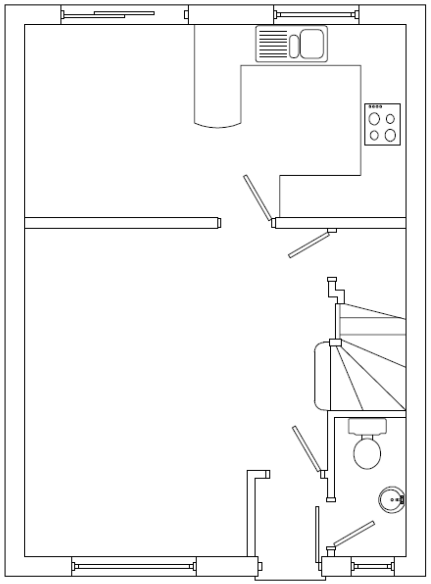
The future collaborative BIM team



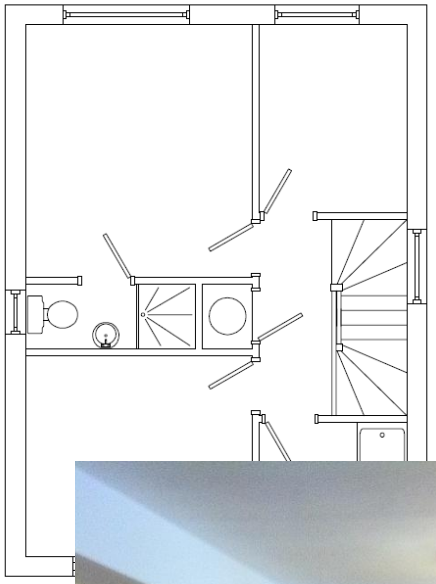


Lonely, limp BIM

CP1



Ground Floor



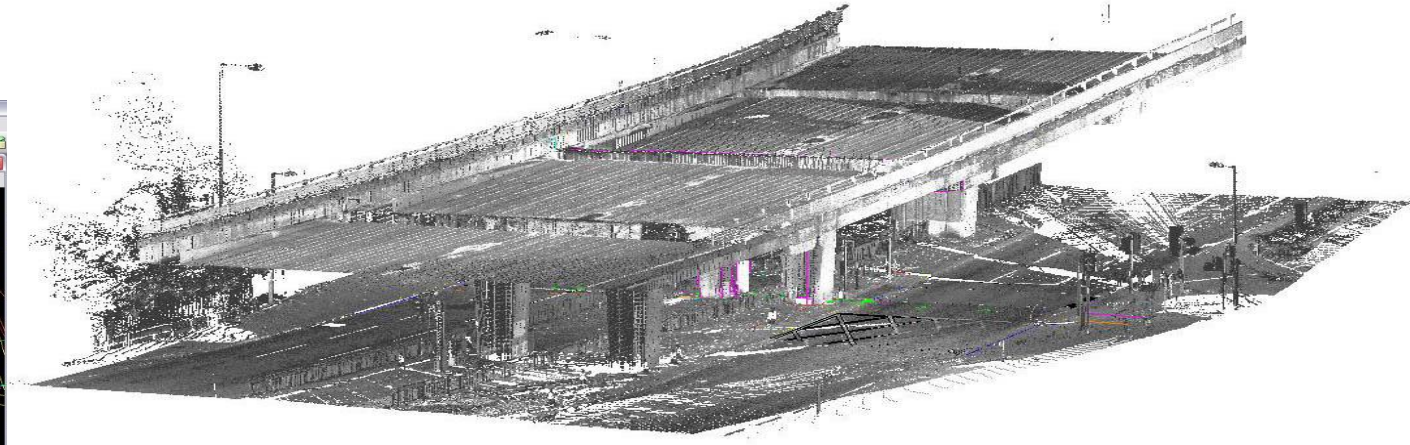
First F

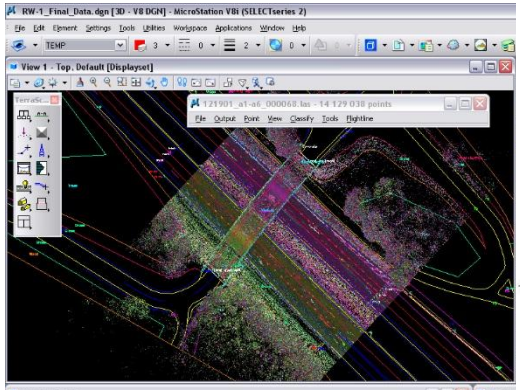
Title: Final Layout

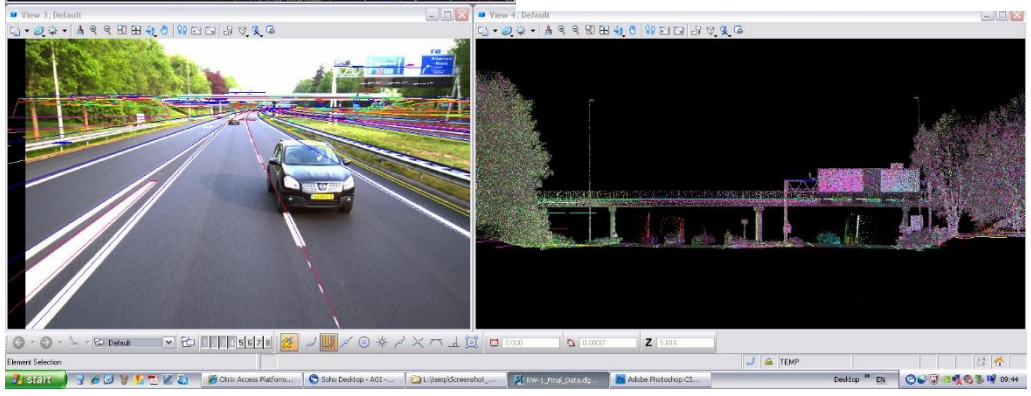
Status:

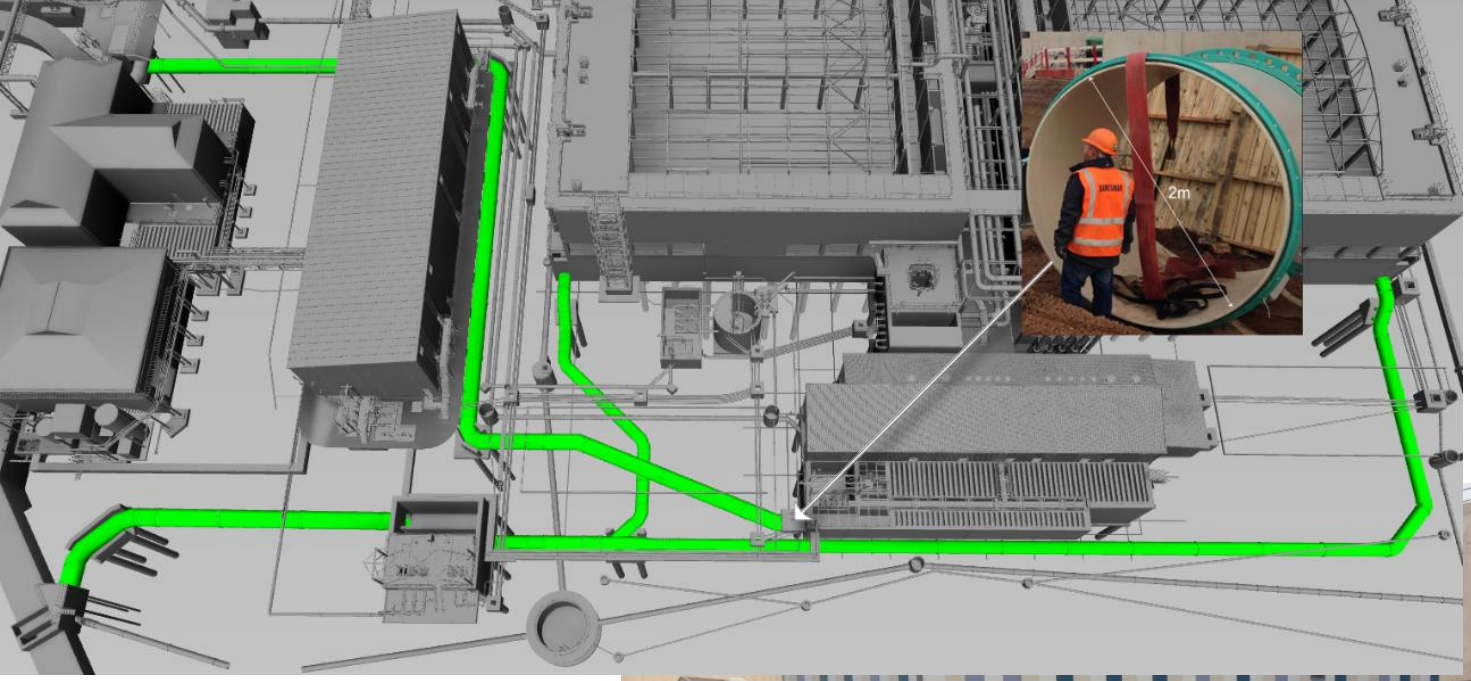
Project Example – M4 Elevated section

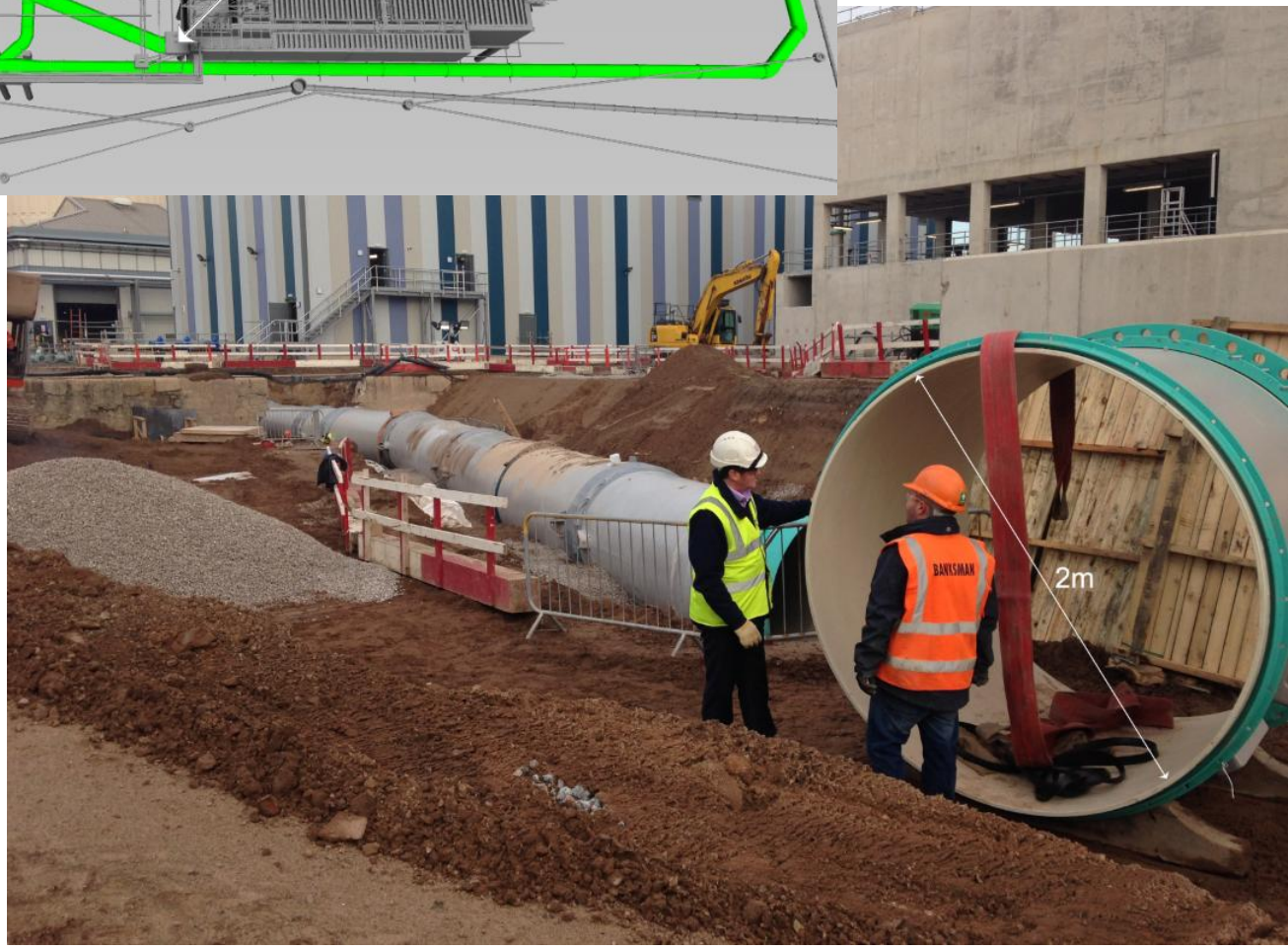
- Services delivered
  - 103 piers over approx 2km
  - data extraction from static and mobile point cloud
  - Plans, elevations and 3D wireframe model of piers and surrounding areas
  - up to +/- 0.01m xyz








2m


BANKSMAN
2m

Lessons from other sectors

Array of data signals

Predictive

Real-time

Continuous

Results

Working in partnership with Arup and Atkins

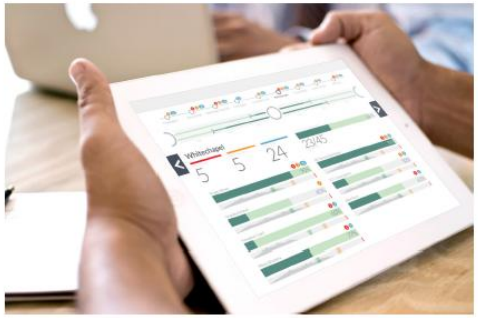
Validated on two years worth of data

Impact

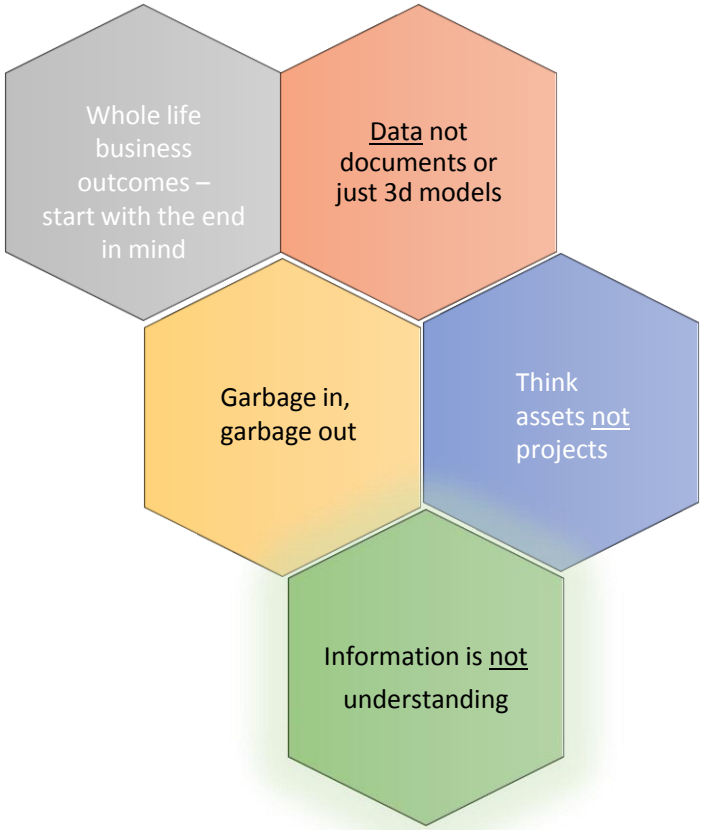
Risk management
Real-time detection across whole area

Event forecasting giving up to 10 days early warning

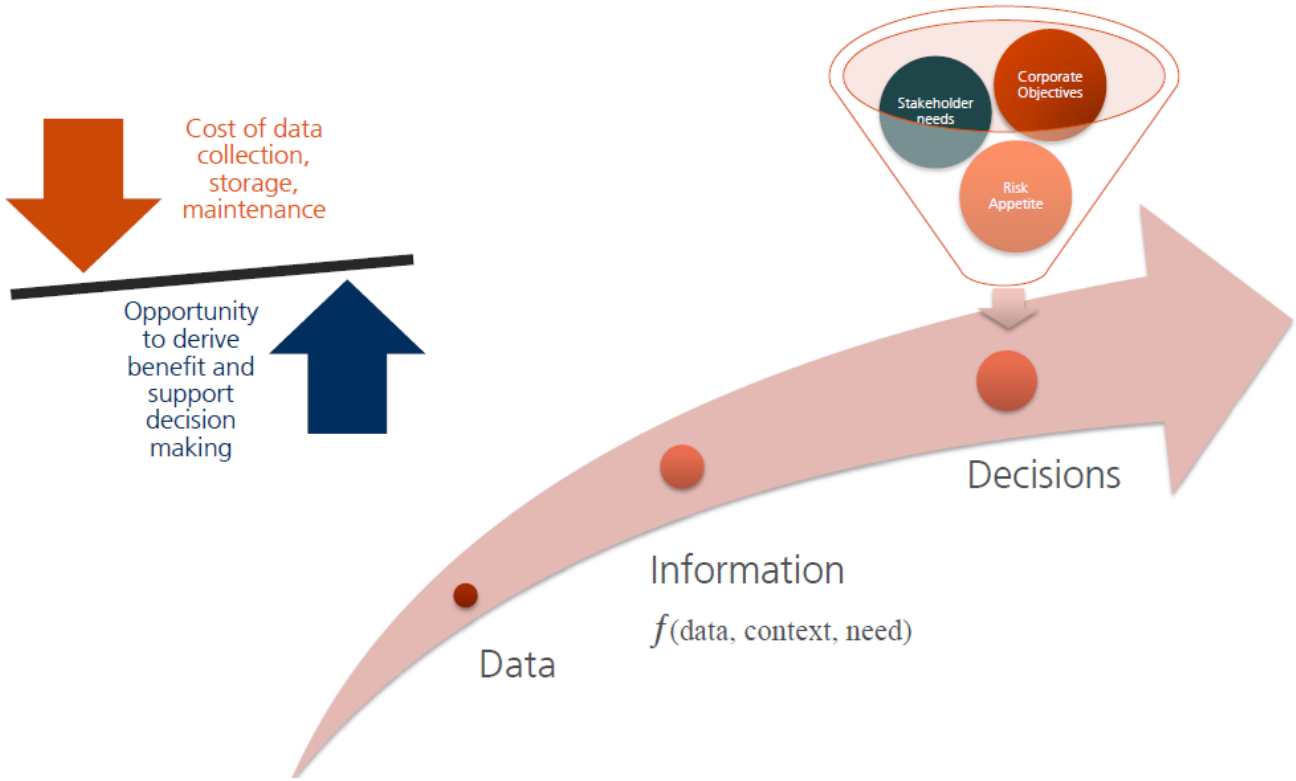
Cost
Optimal fit typically results in 20%



Core Principles



From Data to Decisions



Chris Knowles, Lloyd's Register YII2014

Data Analytics

Visualisation

Leadership

Data

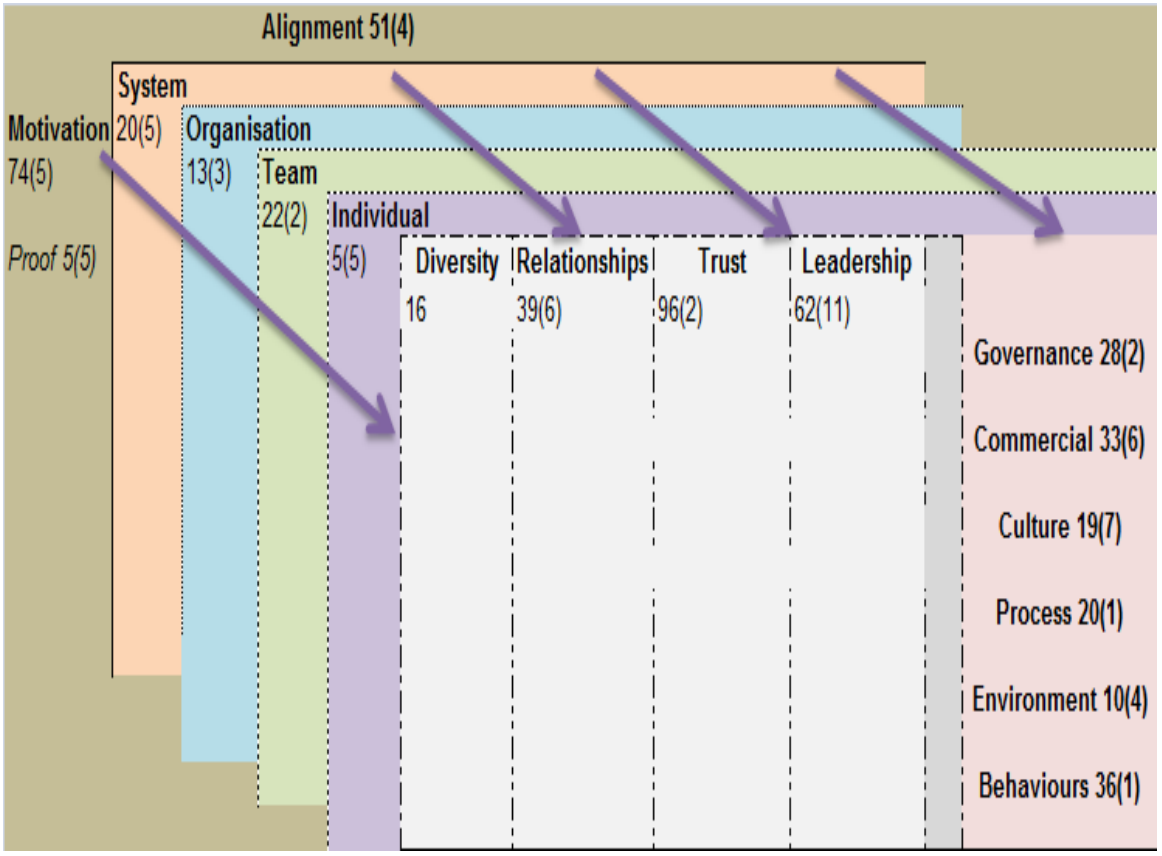
Management

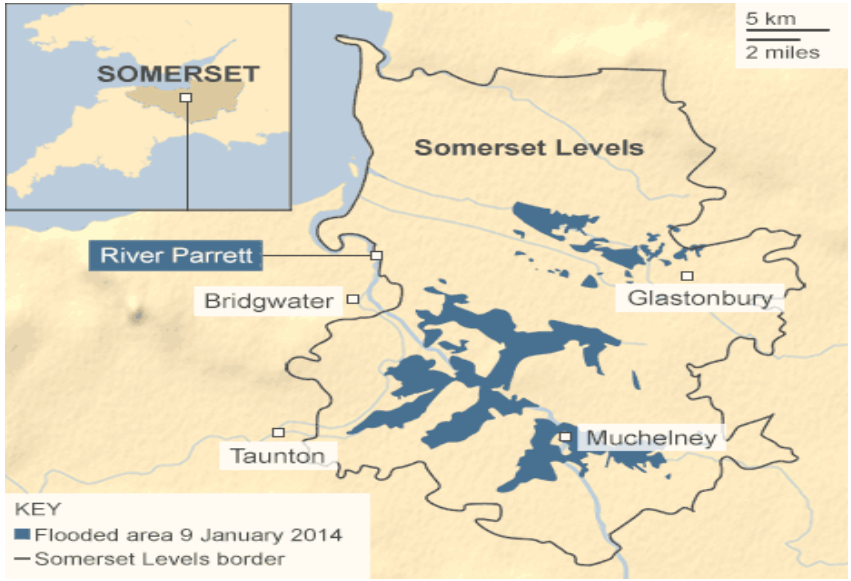
Spline

Operations

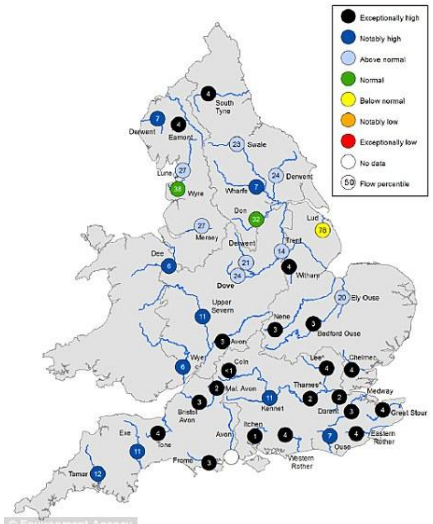
Decisions, Accessibility, Interpretation, Intuition, Appropriateness

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




SOMERSET
5 km
2 miles
Somerset Levels
River Parrett
Bridgwater
Glastonbury
Taunton
Muchelney
KEY
Flooded area 9 January 2014
Somerset Levels border


© David Hedges SWNS.com


Exceptionally high
Notably high
Above normal
Normal
Below normal
Notably low
Exceptionally low
No data
Flow percentile
South Tyne
Derwent
Eamont
Swale
Lune
Wyre
Wharfe
Derwent
Don
Lud
Trent
Mersey
Derwent
Dove
Idle
Soar
Witham
Ely Ouse
Upper Severn
Nene
Bedford Ouse
Avon
Wye
Colne
Lee
Chelmer
Mid Avon
Thames
Medway
Bristol Avon
Kennet
Darent
Great Stour
Exe
Tone
Avon
Ouse
Eastern Rother
Western Rother
Tamar
Frome
© Environment Agency


New Civil Engineer
nce
06.02.14
CHUNNEL DRAMA
MITCHELL SPEAKS
ON THE TABLET
WHERE'S THE ENGINEERING JUDGEMENT?
MINISTERS ARE DITCHING STRATEGIC FLOOD RISK MANAGEMENT IN FAVOUR OF KNEE JERK SOLUTIONS ON THE SOMERSET LEVELS. HOW DO ENGINEERS MAKE THEMSELVES HEARD?


The Telegraph
Home
News
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Finance
Comment
Culture
Travel
Life
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Fashion
Politics
Investigations
Obits
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Earth
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Scotland
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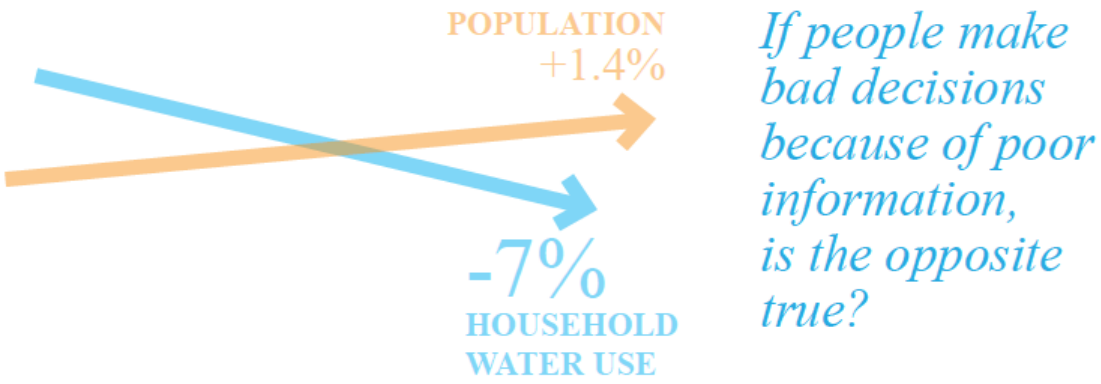
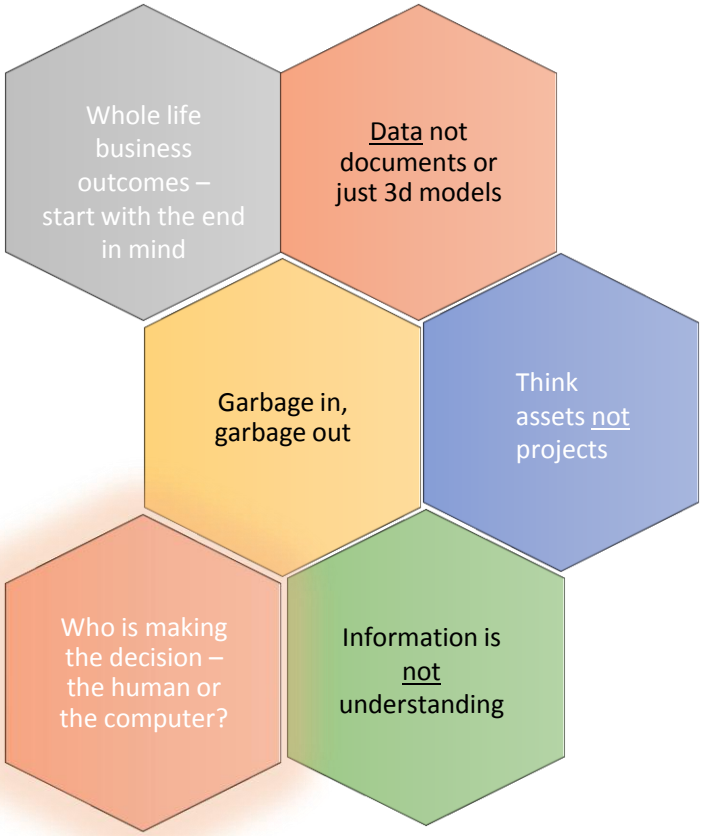
Climate Change
Wildlife
Outdoors
Picture Galleries
Dredging will ease flooding in Somerset Levels, admits Environment Agency boss
Lord Chris Smith, the chairman of the Environment Agency, has admitted dredging is likely to be part of the plan to reclaim flooded land in the Somerset Levels amid claims not enough has been done to protect homes and farmland

What makes a City “smart”?

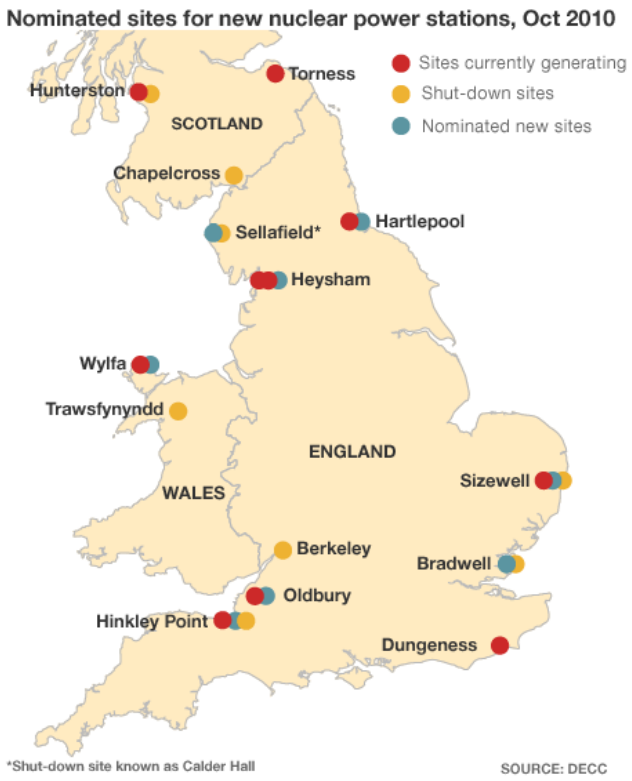
‘Smart‘ holds the promise of finding new ways for citizens get the services they crave, without using exponentially more resources. The marriage of technology with the physical and built environment enables more efficient construction and management of infrastructure, and the potential to change behaviour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



Core Principles



Site Selection



- Multi-criteria decision analysis
- Include multiple datasets in one single analysis
- Example datasets
  - Transport infrastructure
  - No fly zones
  - Military practice areas
  - Environmentally sensitive areas
  - Urban Areas
- GIS web map creation for use by key decision makers

Mayor’s Aviation Work Programme (MAWP)

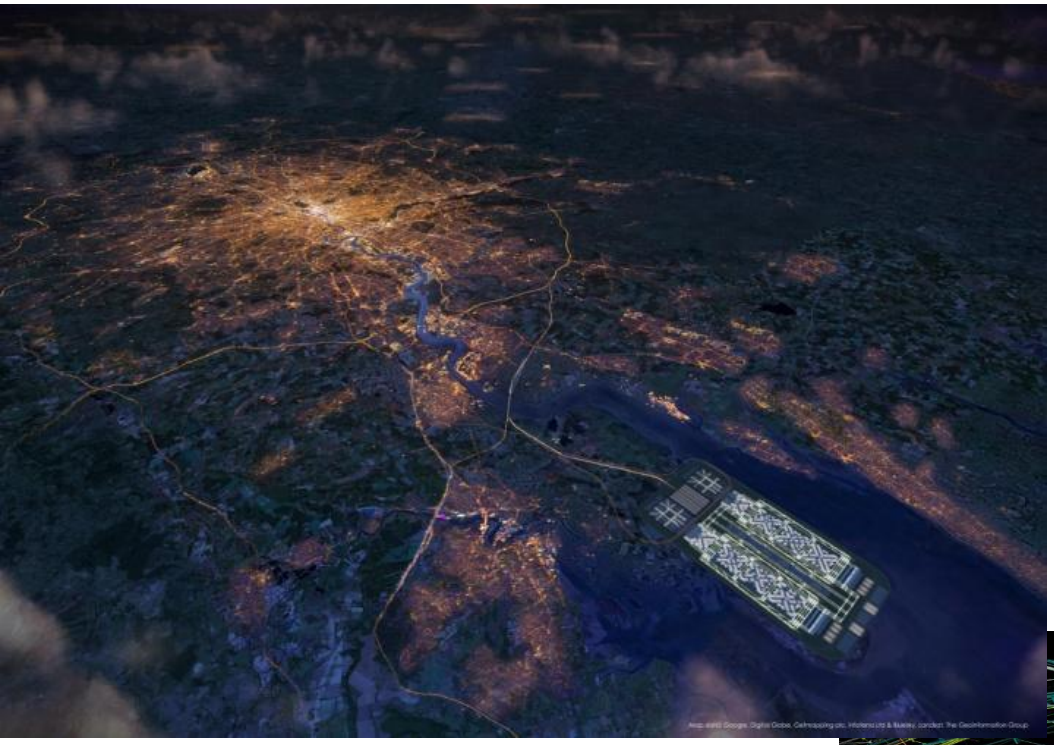
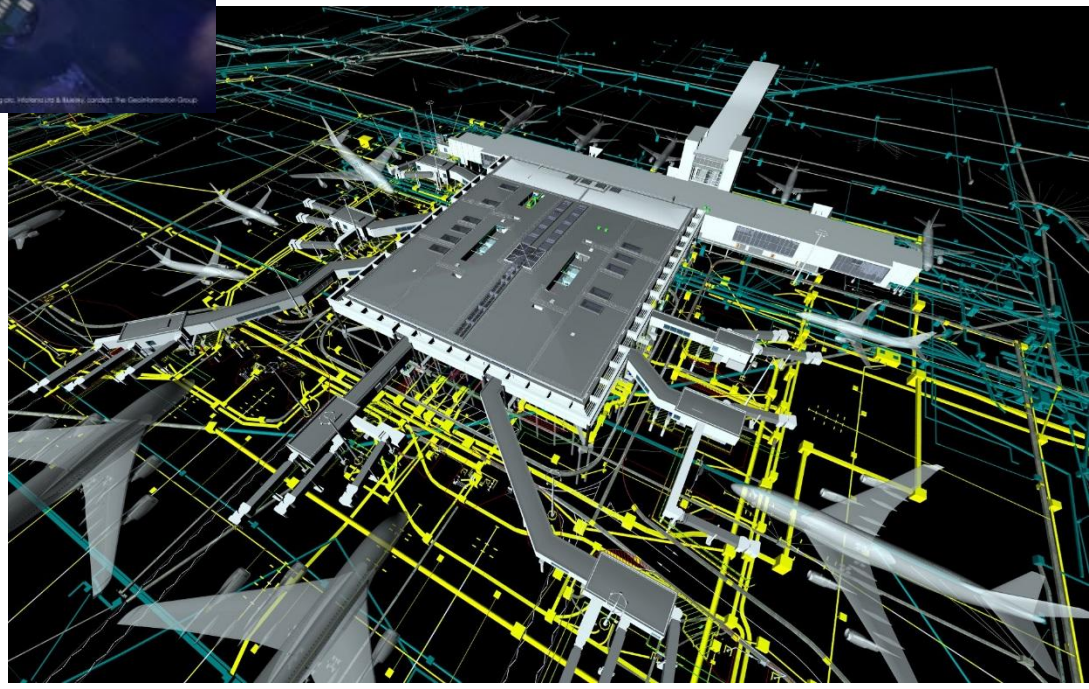


Image shows:
- London in the distance with Thames estuary airport scenario in the foreground

Why?

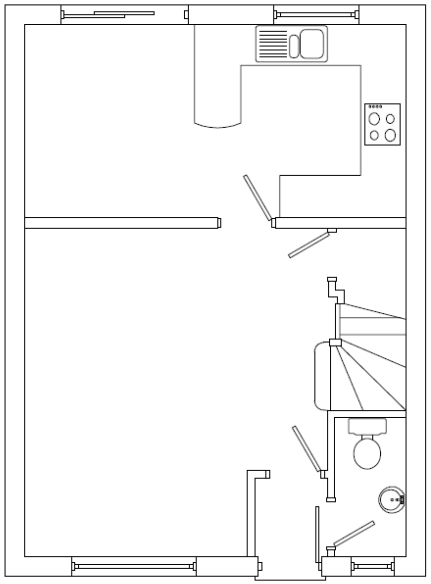
- Increase UK airport capacity
- Increase UK economic output
- Relieve capacity strain on London Heathrow which operates at 98%
- Create new jobs
- Create a hub to rival European competitors



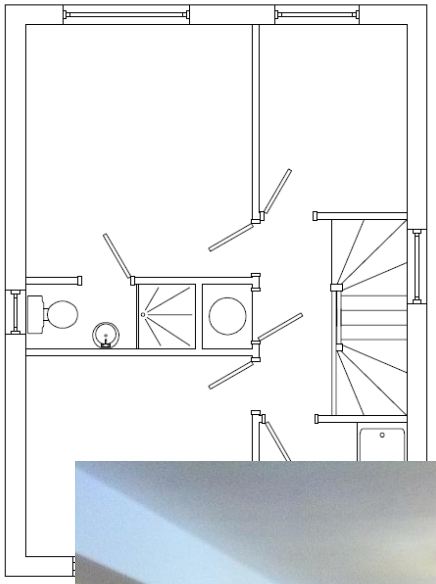
Integrated applications during project

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

CP1



Ground Floor



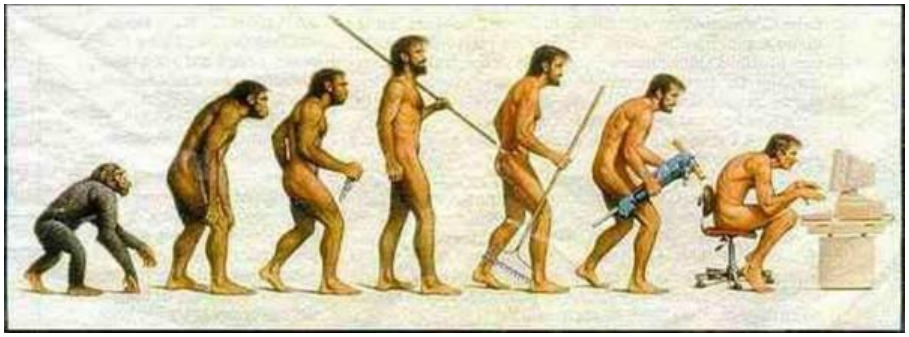
First F

Title: Final Layout

Status:

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

Core principles to remember

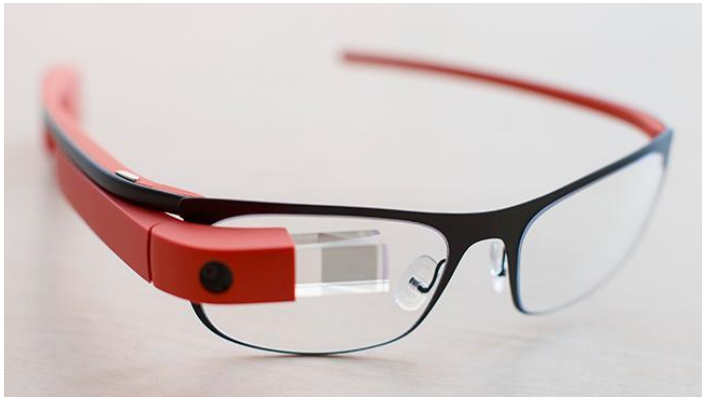


The essence of being human – more than simply intellect

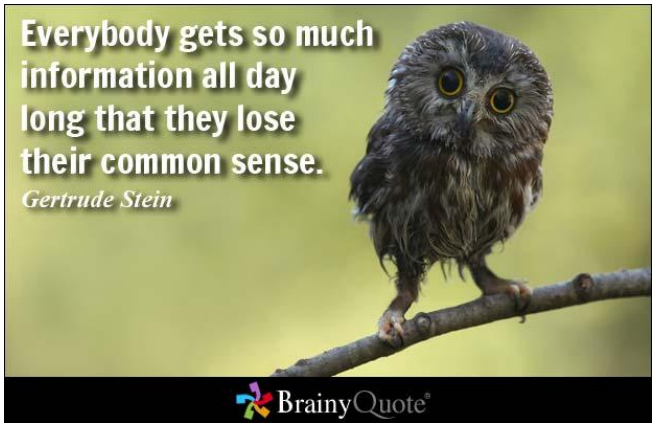
Alignment, motivation
Leadership, relationships, trust, diversity (of thinking)

Mind change
Susan Greenfield, 2014

The merging of our virtual and physical worlds – how far do we go?



Health and Safety Moment
First case of IAD from Google Glass – 14 October 2014



Our digital future - http://vimeo.com/101752405

What we have now

Contributions of Geospatial/BIM	
CLARITY	Clarity of delivery
TECHNICAL JUDGEMENT	Converging information production with sound engineering judgement and design
ACCESS	Wider, faster access to comprehensible and integrated information
LATERAL THINKING	Enabling reflective, adaptive thinking to incorporate whole life and integrated systems approach within the wider geographic context.
INNOVATION	Harnessing innovative technologies and harvesting intelligence from big data
DECISIONS	Fostering instinctive but rigorous collaboration and better decision making

Where we are headed …… our digital future
Smart Cities, Smart Infrastructure

Our Future Living – and the essence of who we are as human beings