Crossrail

Constructing Excellence

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Head of Technical Information

Crossrail Ltd

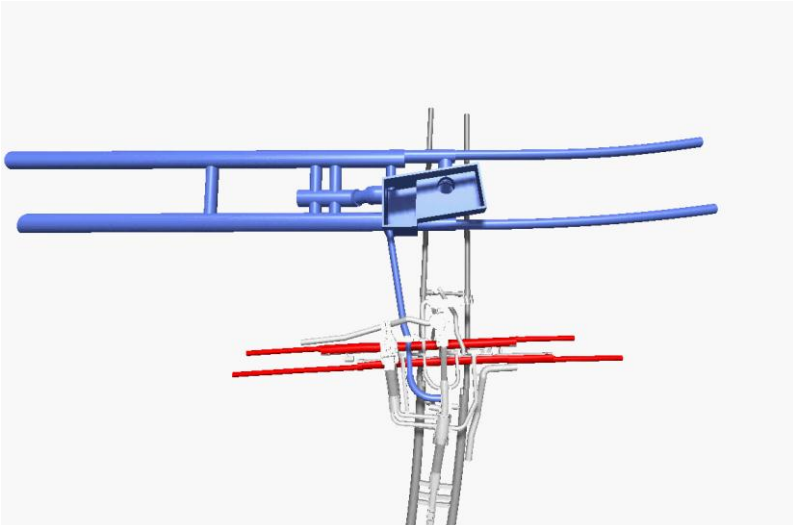
26th March 2014

MOVING LONDON FORWARD

Overview

- Where are we up to?
- Asset Information
- BIM in Asset Management
- Innovation

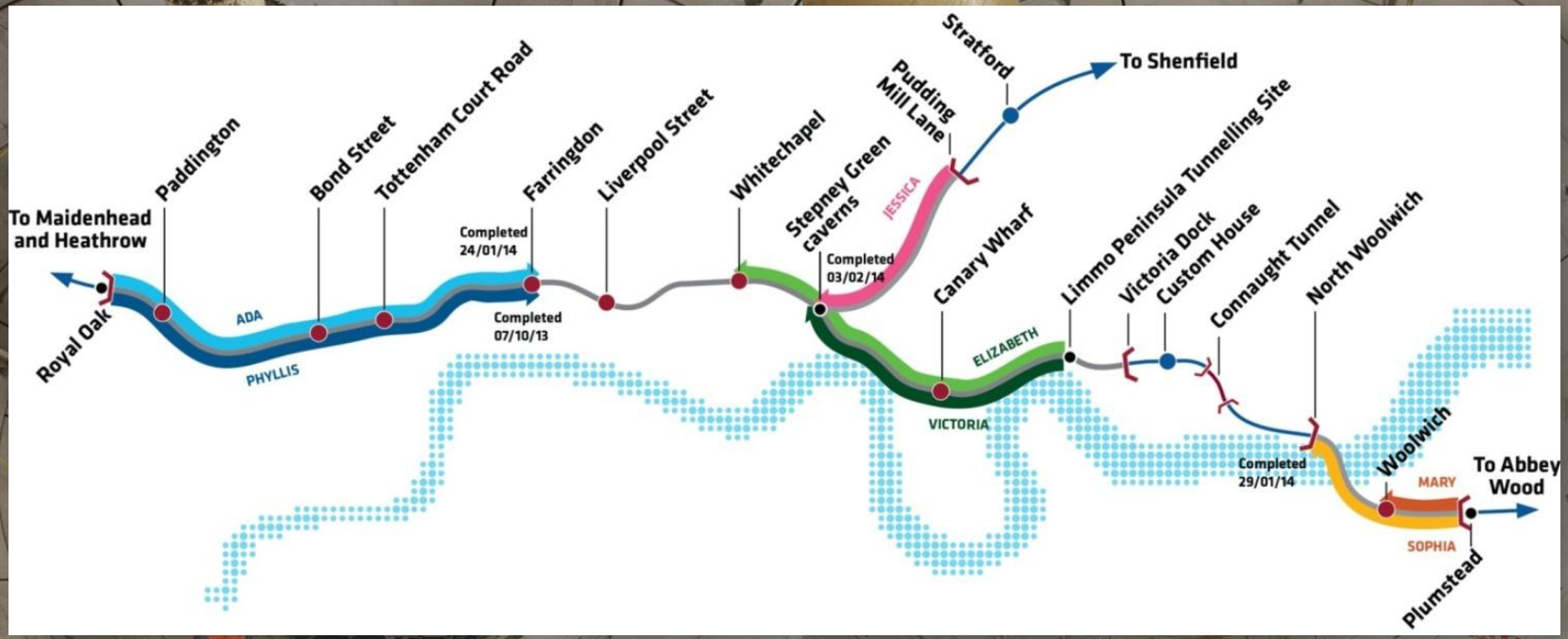
- Using Crossrail as a ‘worked example’



Where are we up to?

Halfway There

Western Tunnels Complete



Many breakthroughs!

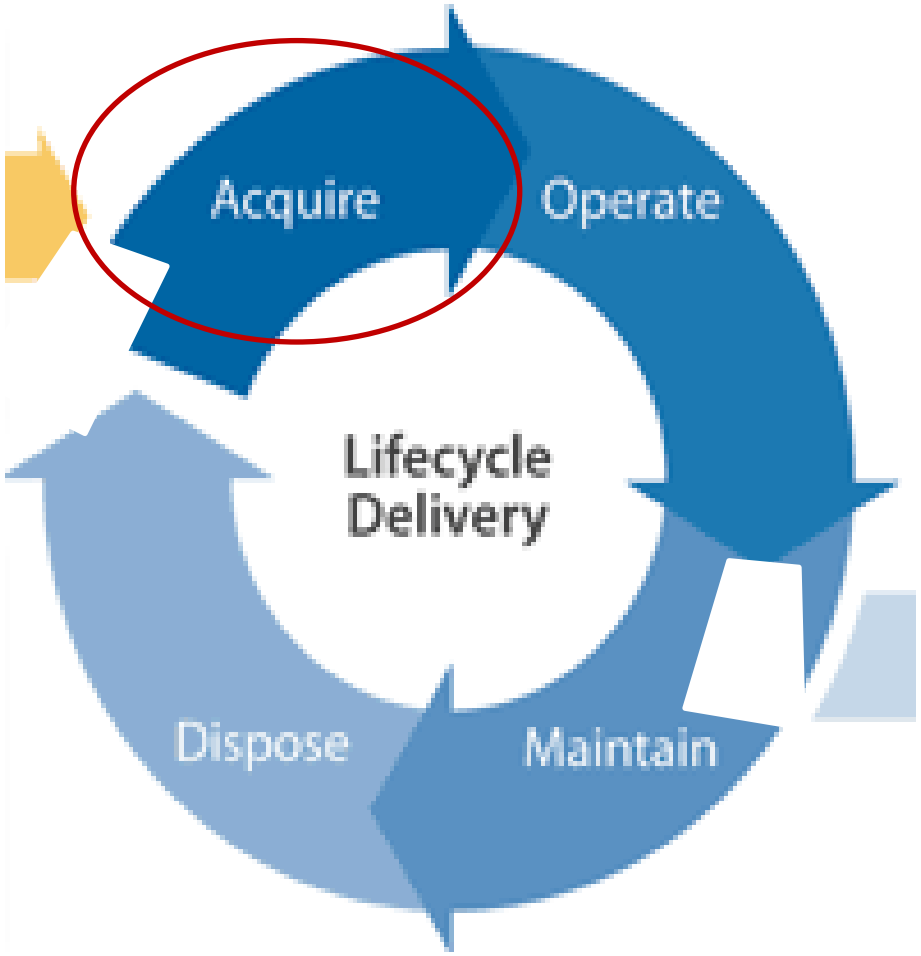
Miles of SCL

The new rolling stock

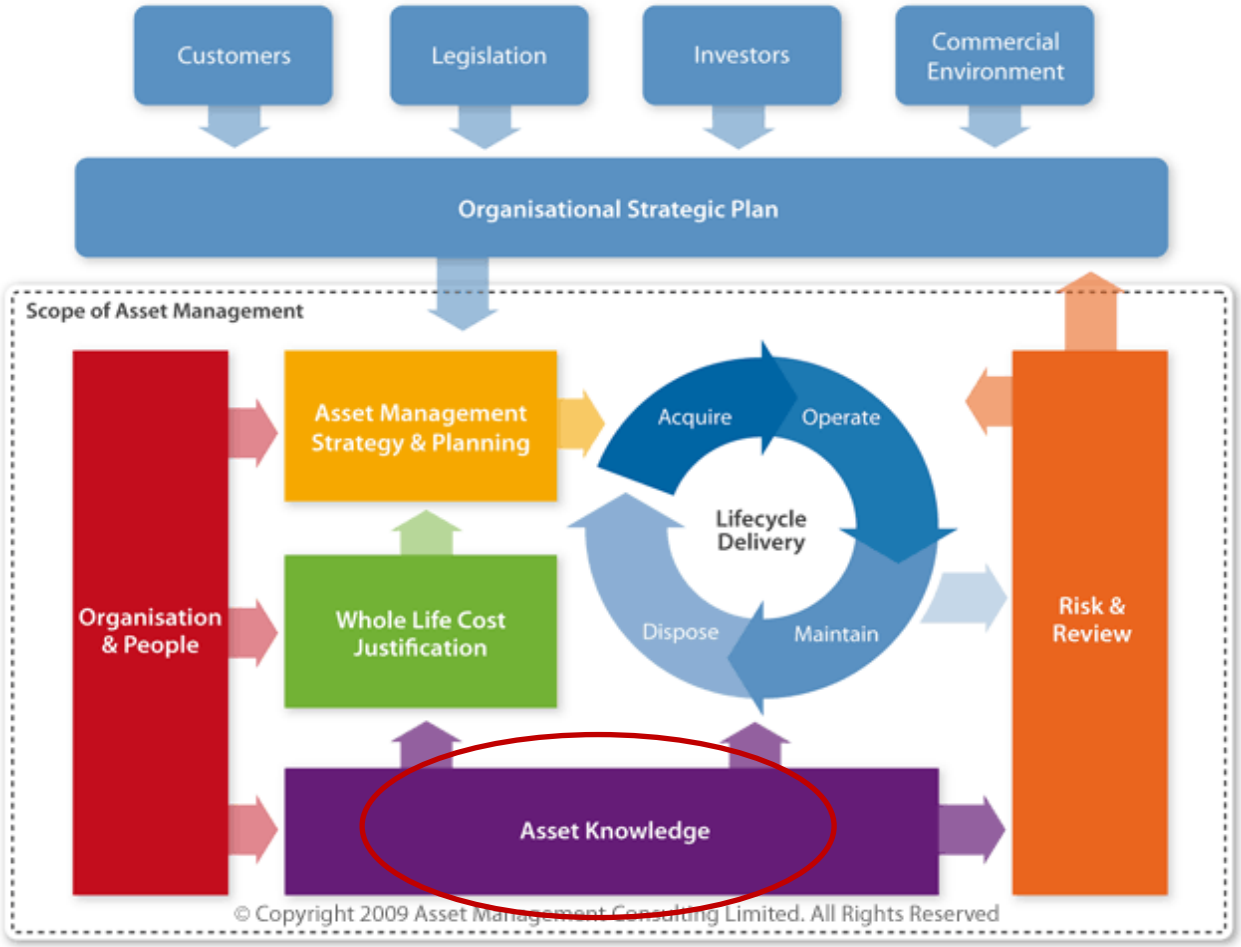
Asset Information

Asset Lifecycle

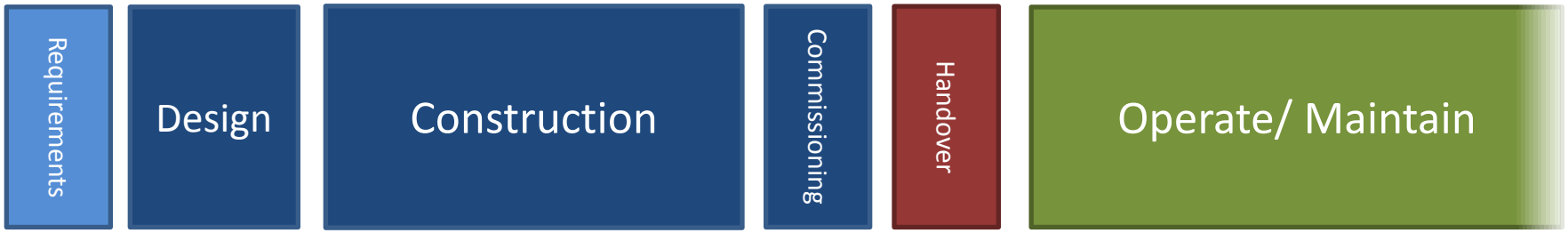
Crossrail Programme



Asset Management Landscape



Asset Information timeline



Traditional

Start → Finish??

Late?

Poor quality?

Inefficient?

Crossrail

Start → Finish

On time

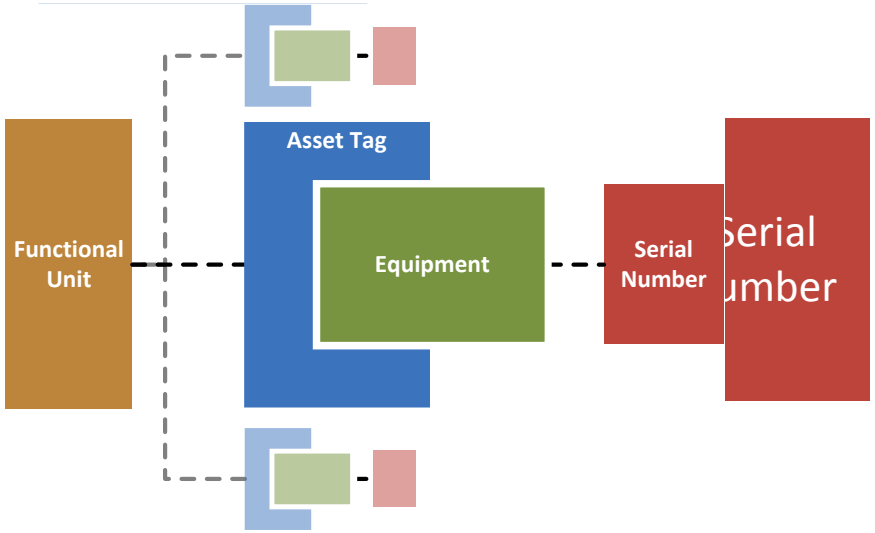
Good quality

Efficient

Key Concepts

- Asset
- AIMS
- Asset Tag
- Equipment
- Serialised Items
- Functional Units

How does AIMS represent an asset?



- Tag – a specific duty or role on the railway
  - e.g. Drainage Pump 1
- Equipment – the actual physical item performing the duty of a Tag
  - e.g. Acme Model B Pump
- Serial – The serial number of an individual instance of Equipment
  - e.g. 12345
- Functional Unit – A number of Tags that work together as a system
  - e.g. Drainage Pumping Station

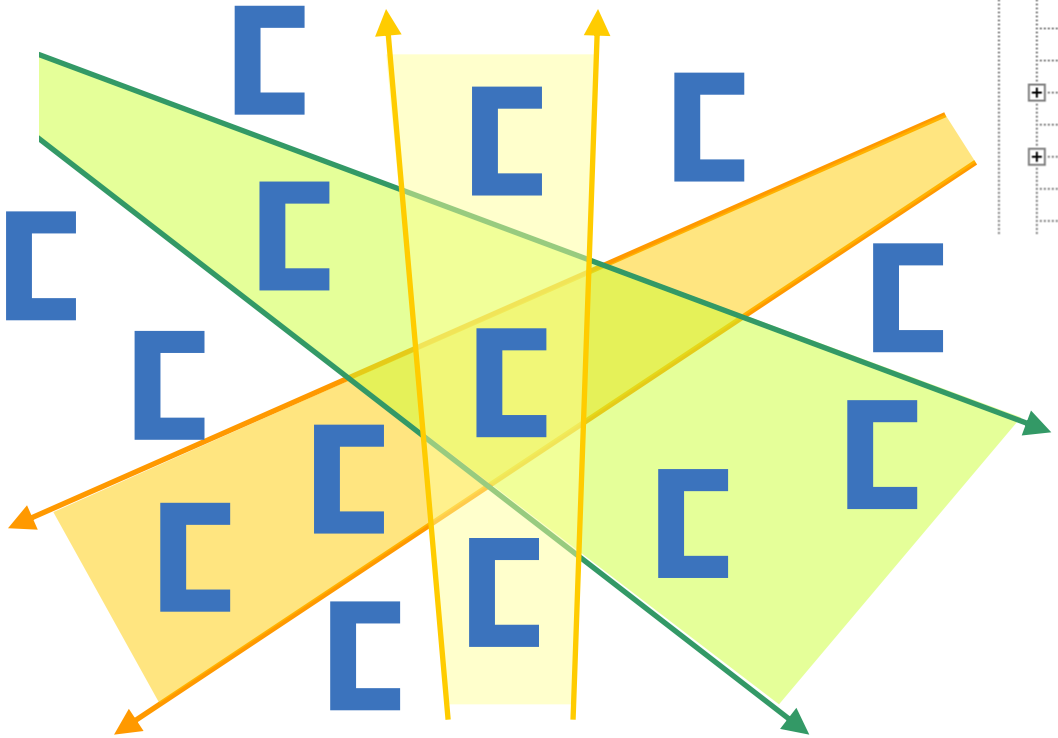
Asset Tad Definition

- Royal Oak Portal
  - Royal Oak Portal Level 1
    - ROP - L1 - Access Corridor
    - ROP - L1 - Communications Equipment Roor
    - ROP - L1 - Emergency Switch Room
    - ROP - L1 - Escape Landing
    - ROP - L1 - Fan Room
    - ROP - L1 - Fire Equipment Room
    - ROP - L1 - Fire Suppression Room 1
    - ROP - L1 - Fire Suppression Room 2
    - ROP - L1 - HV Switch Room 1
    - ROP - L1 - HV Switch Room 2
    - ROP - L1 - Intervention Corridor
    - ROP - L1 - Intervention Stairs
    - ROP - L1 - LV Switch Room 1
    - ROP - L1 - LV Switch Room 2
    - ROP - L1 - Motor Control Centre

Location

Where is the asset?

Collection of Asset Tags



- Crossrail Functional Breakdown
  - FB-BS - Building Systems
    - SB-BS-C - Cable Routing
    - SB-BS-DR - Drainage rain water
    - SB-BS-DW - Drainage waste water
    - SB-BS-E - Electrical
    - SB-BS-EL - Emergency Lighting
    - SB-BS-ES - Escalator
    - SB-BS-FD - Fire Detection
    - SB-BS-FS - Fire Suppression
    - SB-BS-H - HVAC
    - SB-BS-L - Lift
    - SB-BS-LG - Lighting

Function

What is the asset designed to perform?

Classification

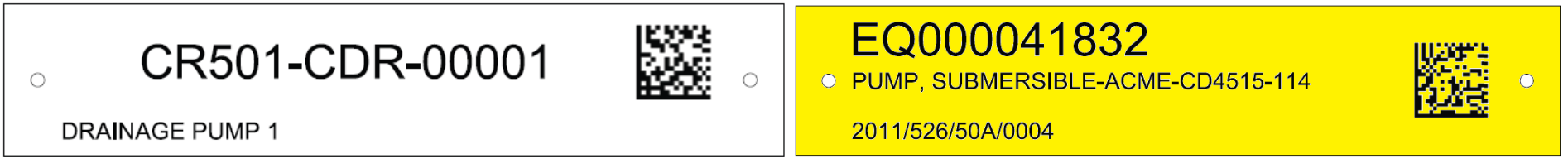
What type of asset is it?

- L - Construction Products
  - L1 - Ground treatment and retention products
    - L11 - Ground anchorages
    - L12 - Ground improvement
    - L13 - Land/field drainage
    - L14 - Sheeting, revetments

Asset Information Management Plan

- Defines Crossrail's overall approach to asset information
- Specifies governance approach
- Lists key supporting documents and links to other documents/standards

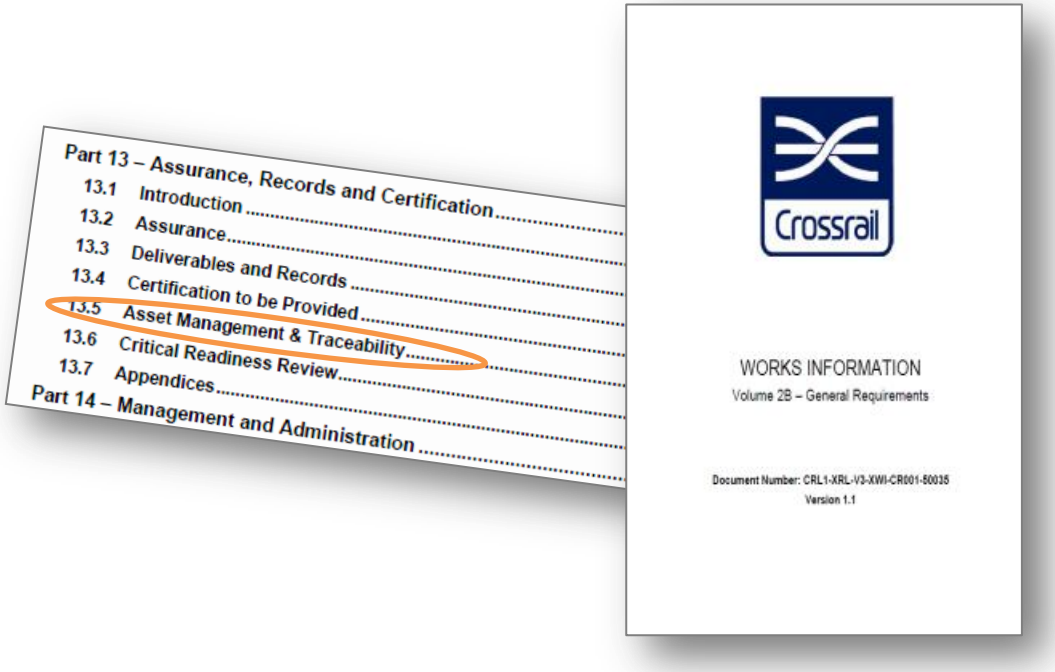
Asset Identification Standard



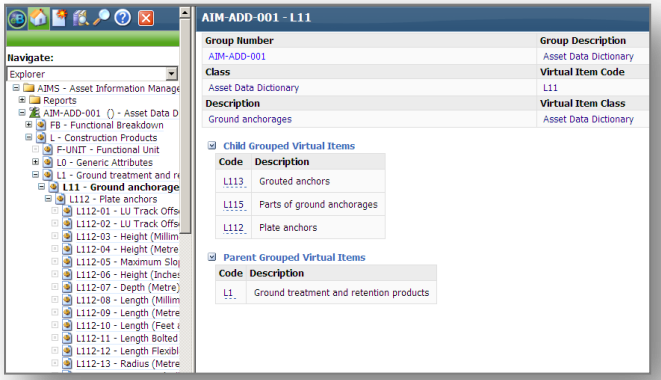
- Defines:
  - Asset ID format
  - Asset name formats
  - Asset labelling requirements
- Datamatrix bar codes laser engraved on label

Contract Clauses

- Works Information 2B Section 13.5
- Clarifies requirements for Contractors
- Good practice, but not novel, approaches



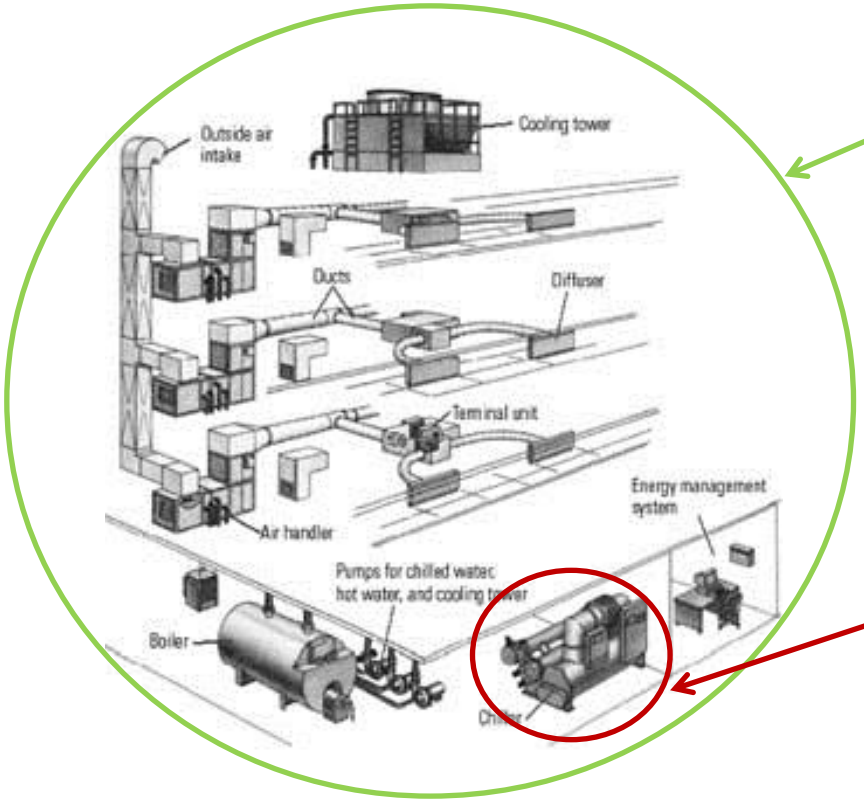
Asset Data Dictionary

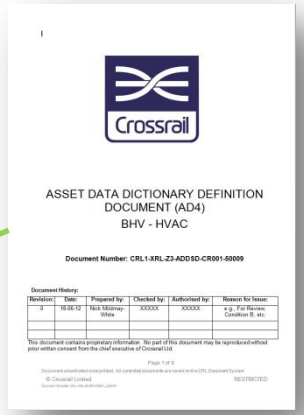


- Defines the types of assets of interest to Crossrail
- Asset Data Dictionary Definition Documents (AD4) define:
  - Functions and the Classes that relate to them
  - Classes and the Attributes relevant to them
  - What an Attribute means e.g. Length
- Demonstrates how to define an asset for a specific class

Asset Data Dictionary Example

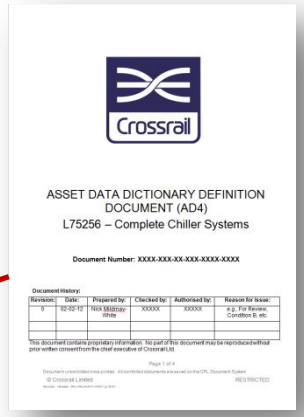
Air Conditioning System




ASSET DATA DICTIONARY DEFINITION DOCUMENT (AD4)
BHV - HVAC

HVAC Functional AD4:

- Defines System
- Lists applicable Assets Classes
- Generic functional naming conventions
- Generic labelling
- Worked examples

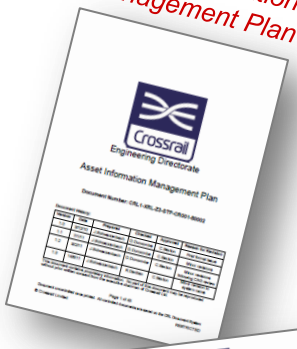

ASSET DATA DICTIONARY DEFINITION DOCUMENT (AD4)
L75256 – Complete Chiller Systems

Chiller Class AD4:

- Defines Asset
- Visual examples
- Specific naming conventions
- Lists performance data requirements
- Lists attribute requirements

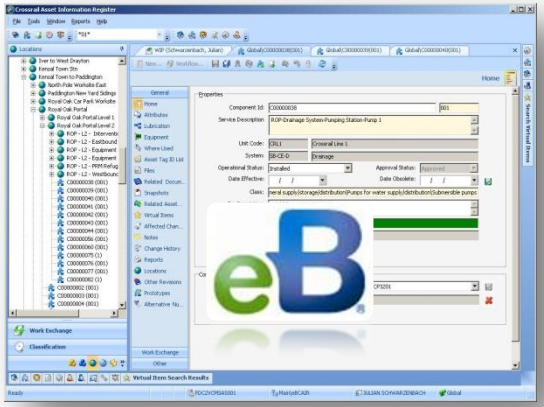
Enablers

Asset Information Management Plan

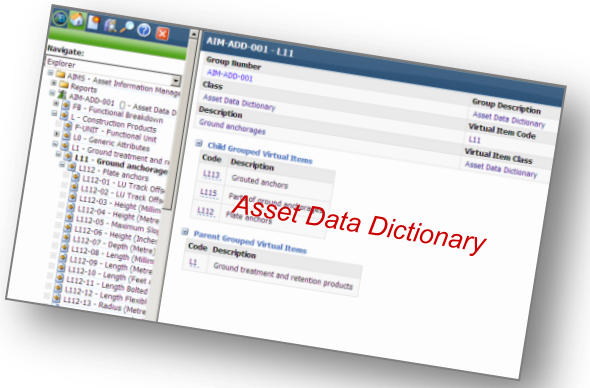


Asset Identification Standard

Asset Information Management System

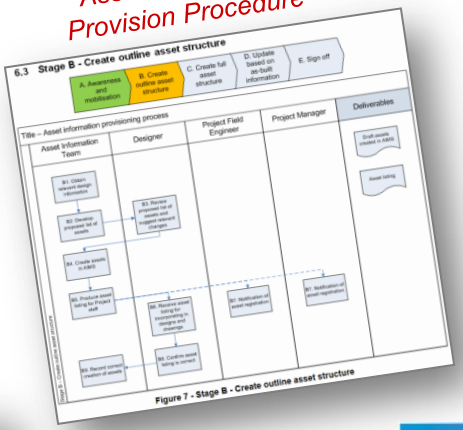


Asset Data Dictionary



Asset Information Contract Clauses

Asset Information Provision Procedure



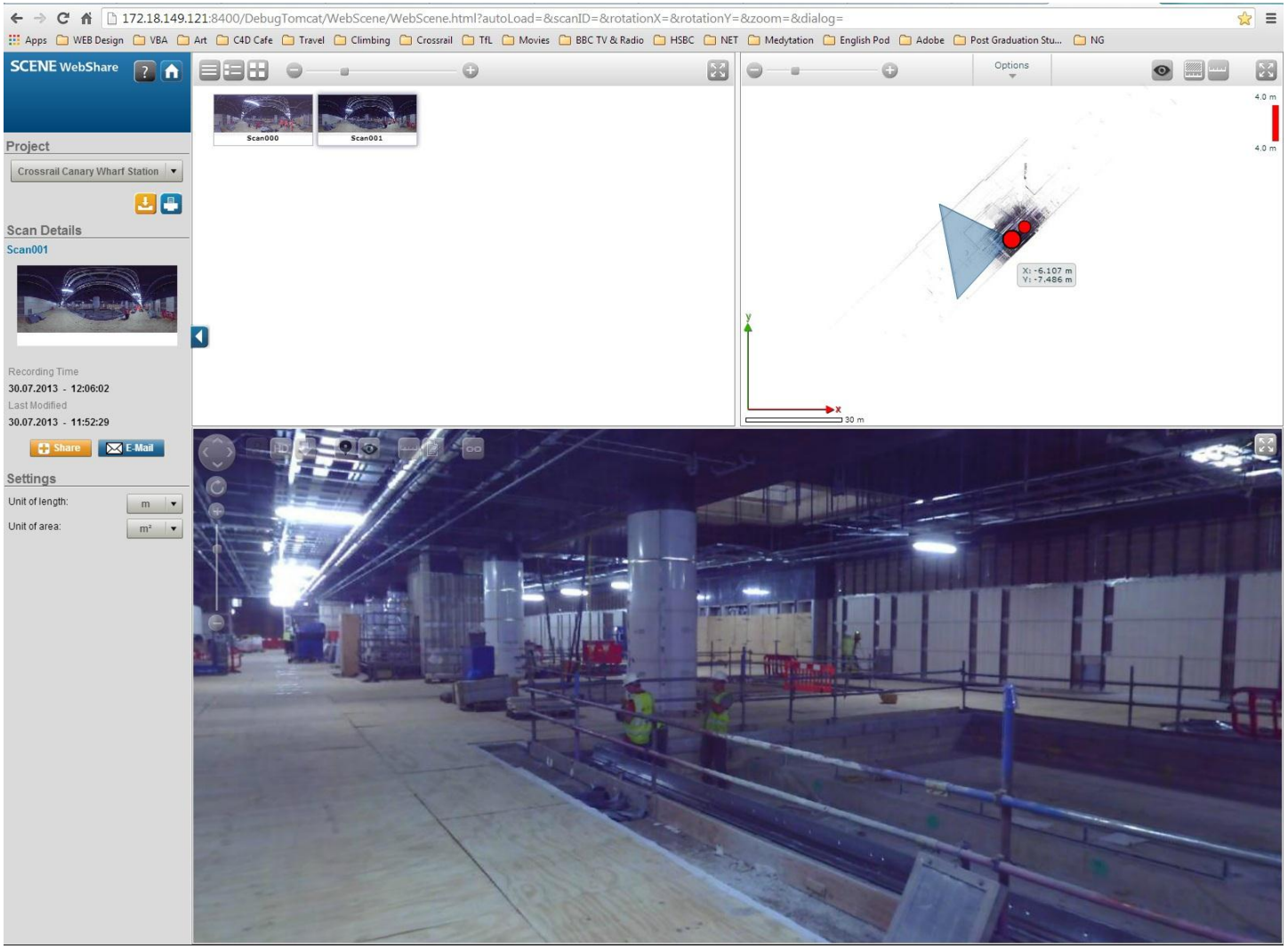
AIMS

What's the Procedure?

- **Stage A - Awareness and Mobilisation**
  - Stakeholders identified
  - Team aware of process and their responsibilities
- **Stage B – Design Information**
  - Bulk Asset Tag creation
  - Asset Tags named
  - Design attributes recorded
  - Designs marked up with Asset Tag IDs
- **Stage C – Construction Information**
  - Equipment and Serial Numbers provided
  - Construction attributes recorded
  - As built drawing changes made
- **Stage D – Review and Data administration**
  - Data quality checked
  - Surplus Asset Tags deleted
- **Stage E – Approvals**
  - Approval of asset information

Station Scanning

Trimble Webshare



Smart Railway

SERVICE

Predictable 24/7

Seamless - Stn to train

Comfort

Safely to your destination

A responsive, efficient, flexible railway that adapts to variations in demand and perturbations

PEOPLE

Customer Service

Operations & Control

Asset Technicians

Engaged motivated, valued people with tools to diagnose, predict and advise

User Applications

Central Data Hub

Asset Information

ASSETS

Intelligent Assets that manage themselves and require minimal human intervention

Stations

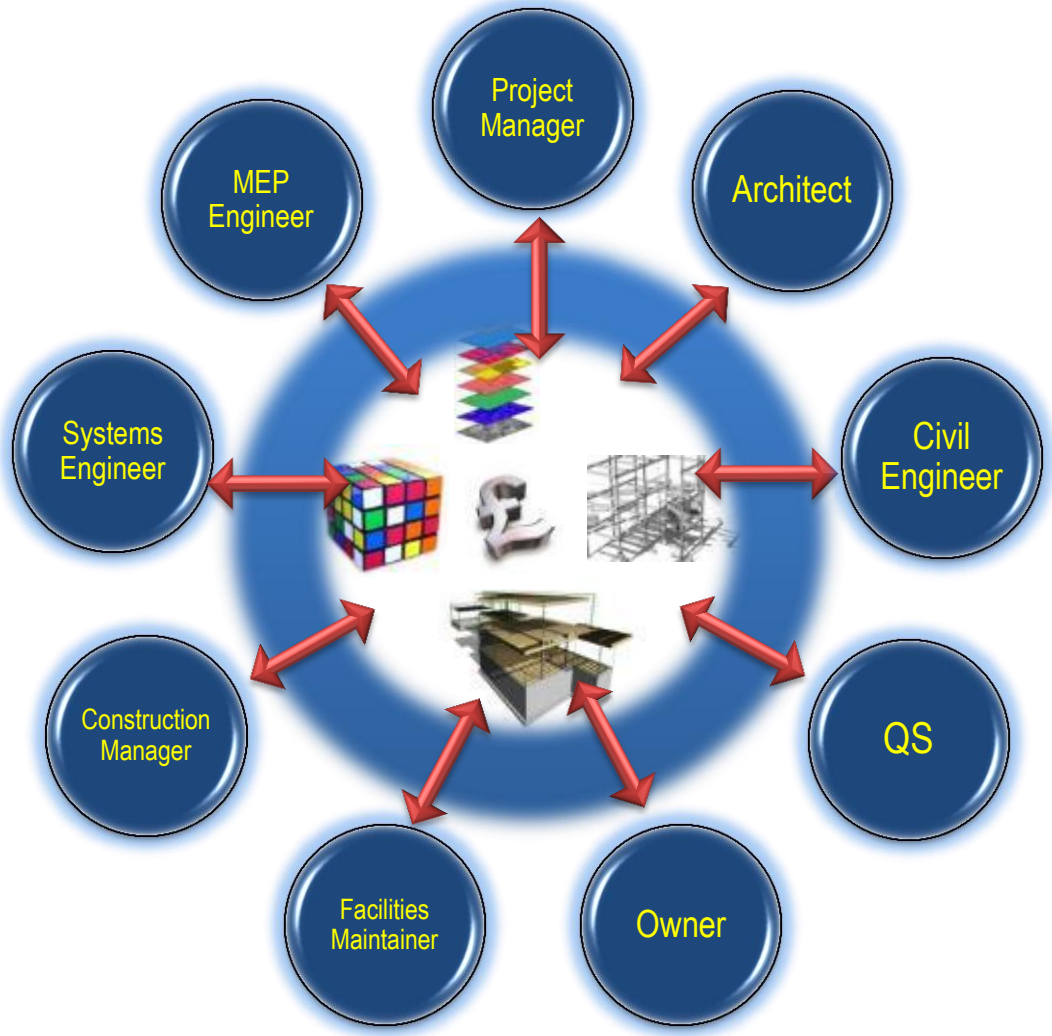
Rolling Stock

Infrastructure

BIM in Asset Management

Project Delivery with BIM

Role of Crossrail – "Enabler" of BIM



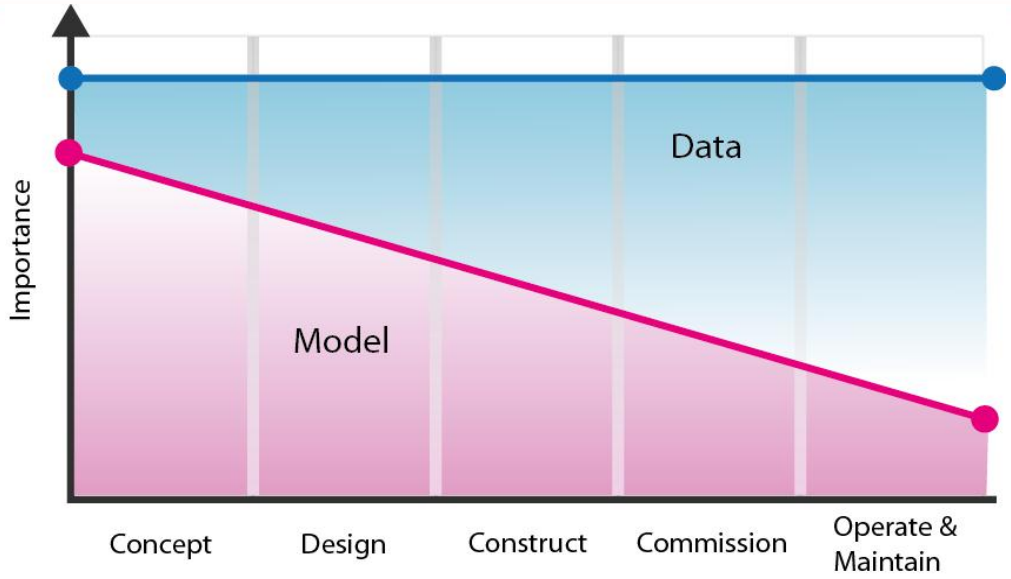
Embracing new technologies:

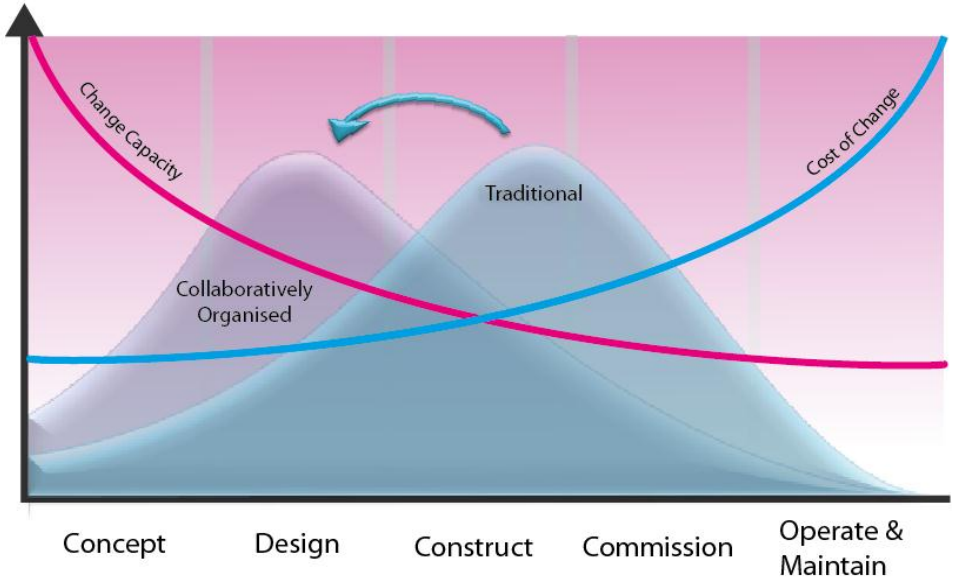
…. the process of generating and managing building information during its life-cycle.

…. model-based technology linked with project information databases.

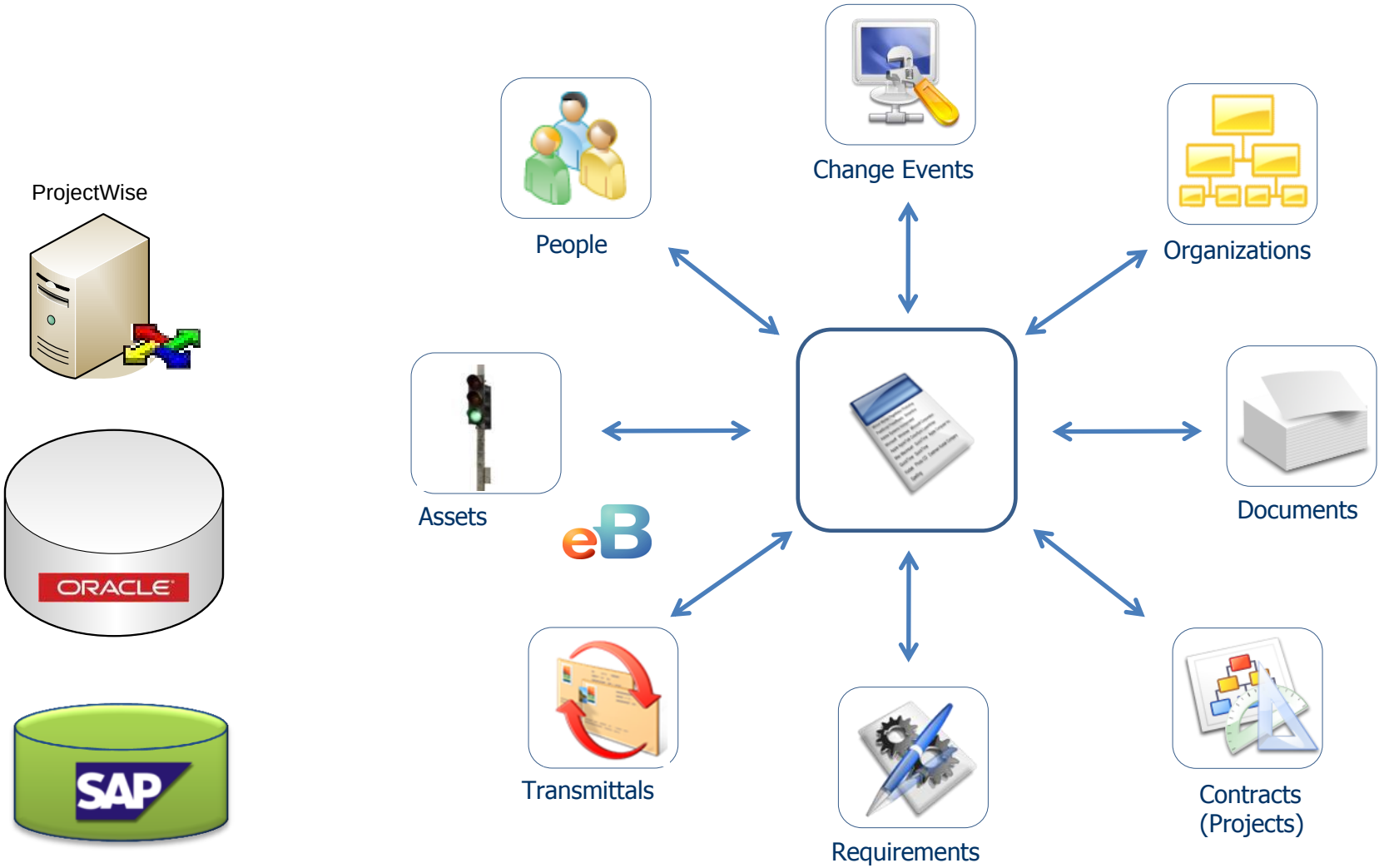
….a common data environment.

First Principles….





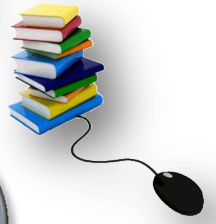
Storing Information



BIM in Action…

Mapping

(Spatial)

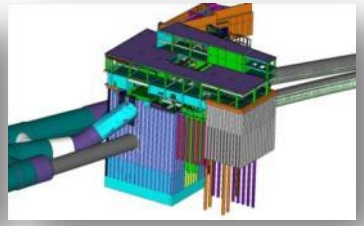


Documentation

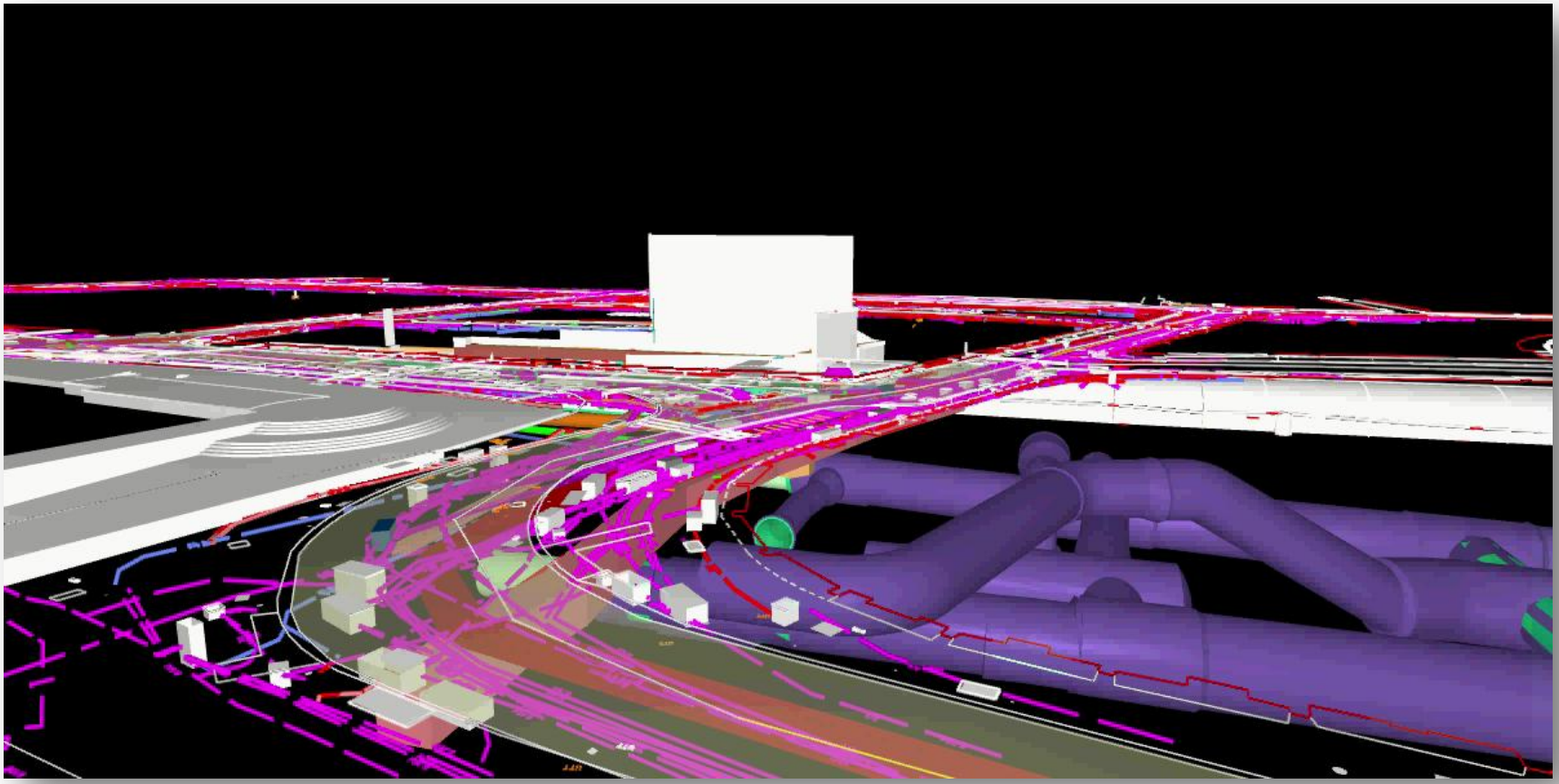
(Relational Database)

3D Models

(Object Orientated)

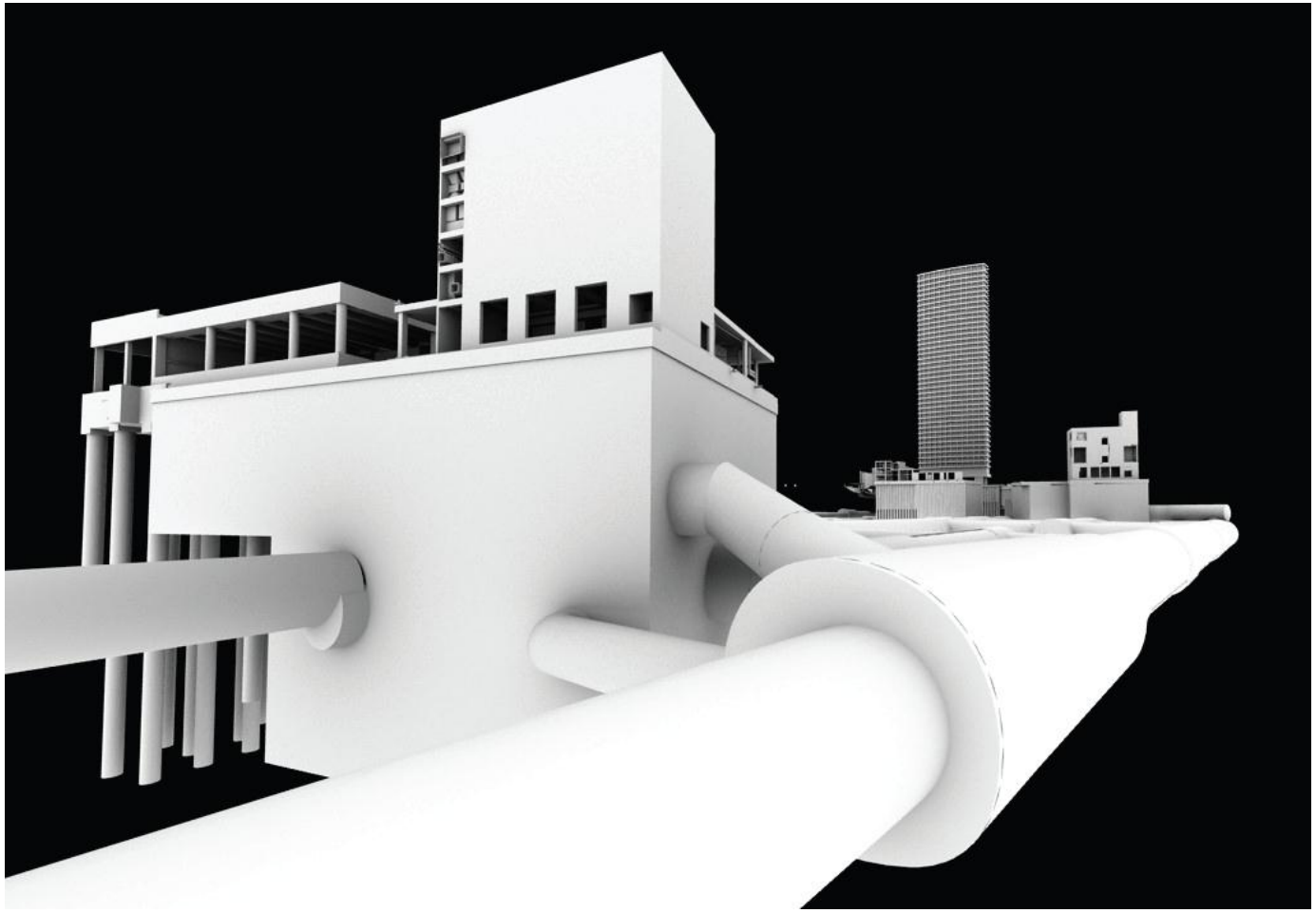


BIM & Utilities

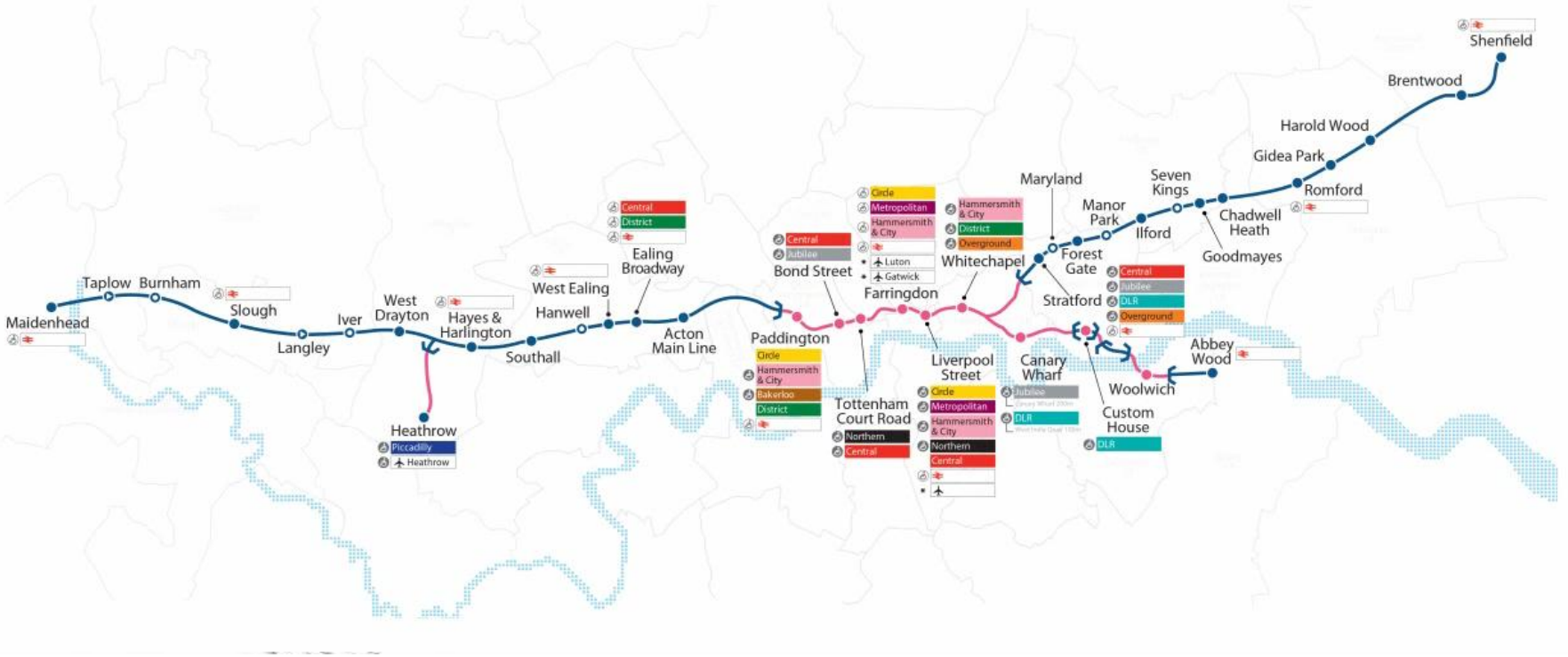


3D Information Models

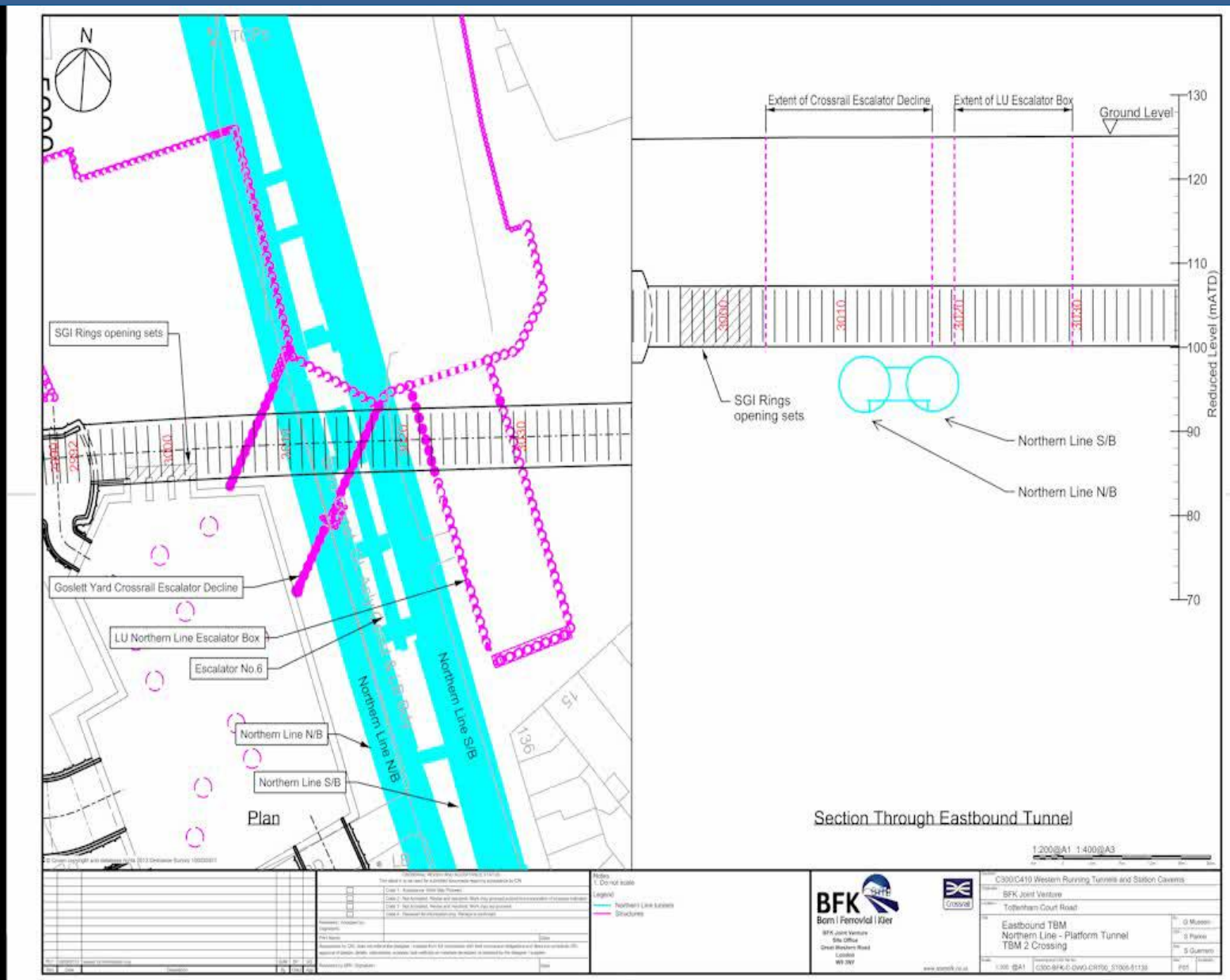
Tottenham Court Road Station



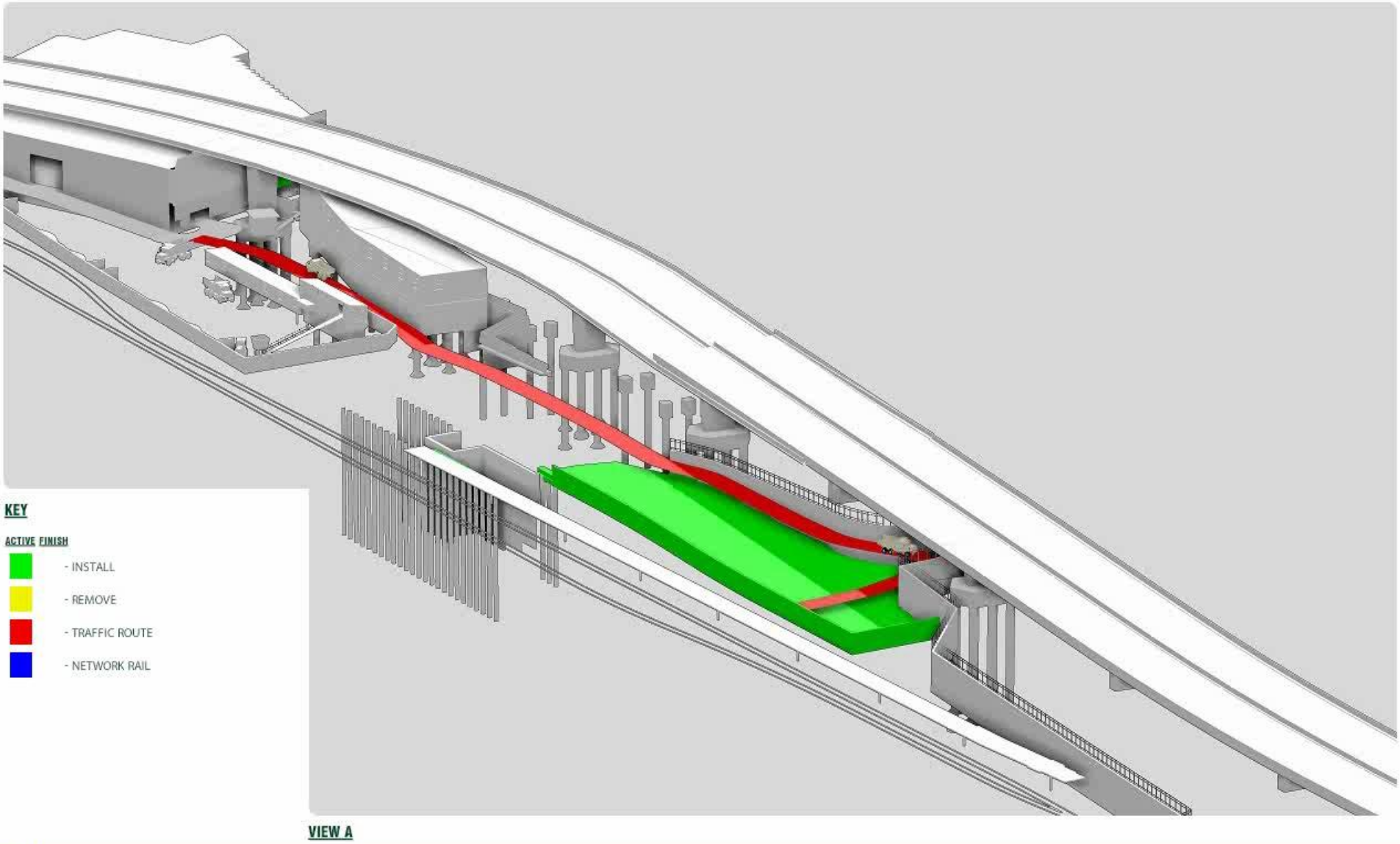
Managing Interfaces



Visualising Interfaces

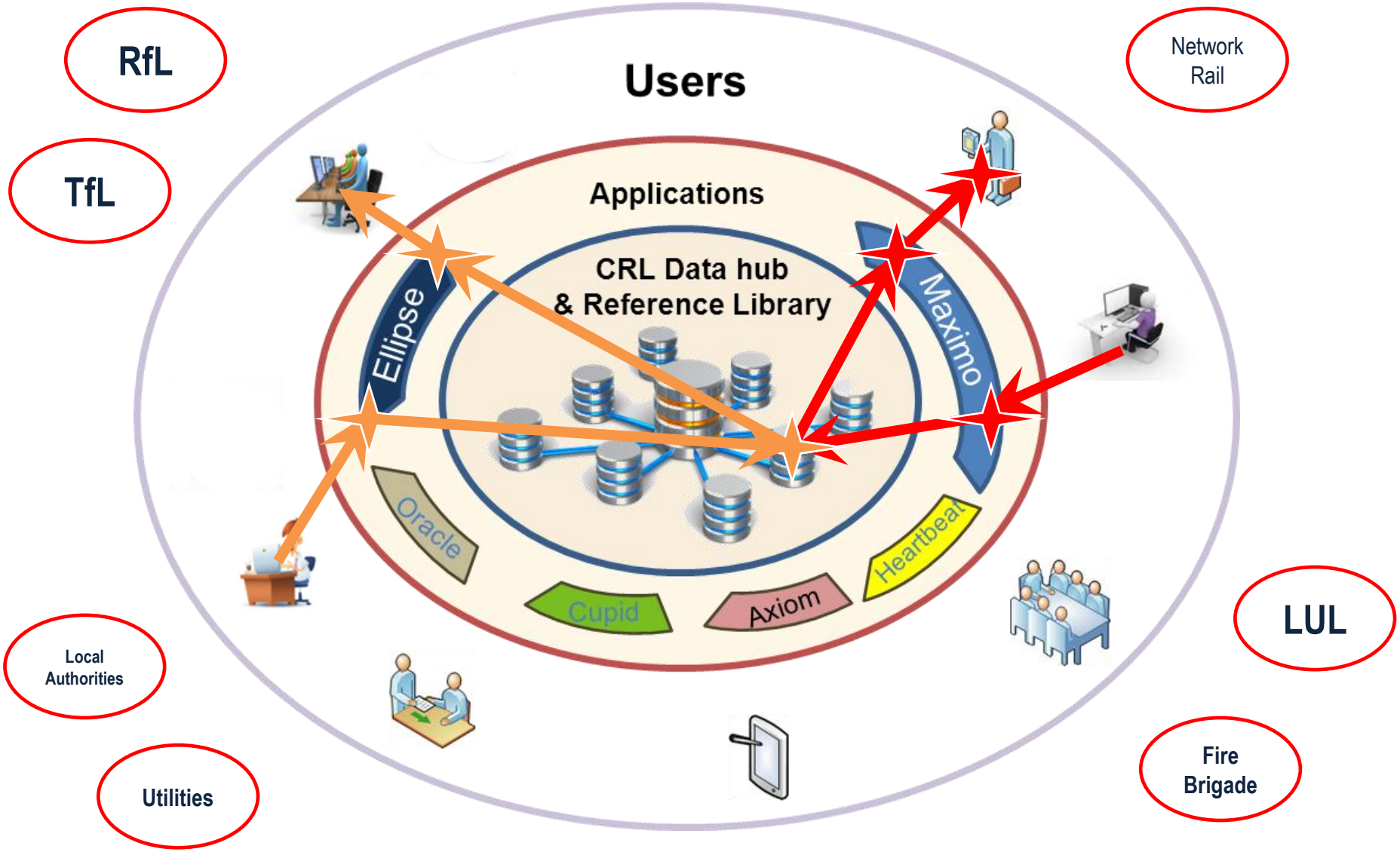


Managing Risk

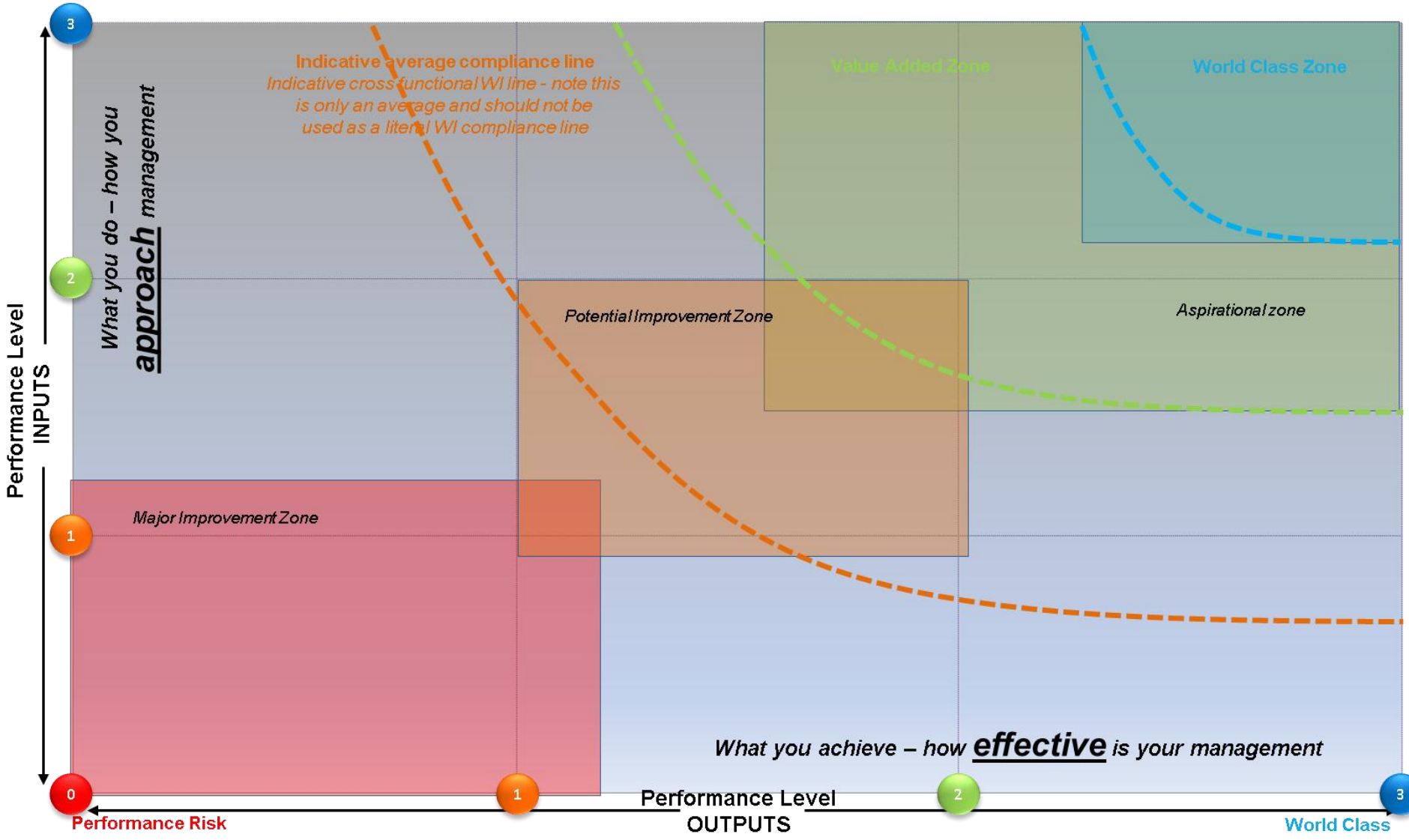


Delivering the Asset Model

Railway Data Hub



Performance Assurance Scoring



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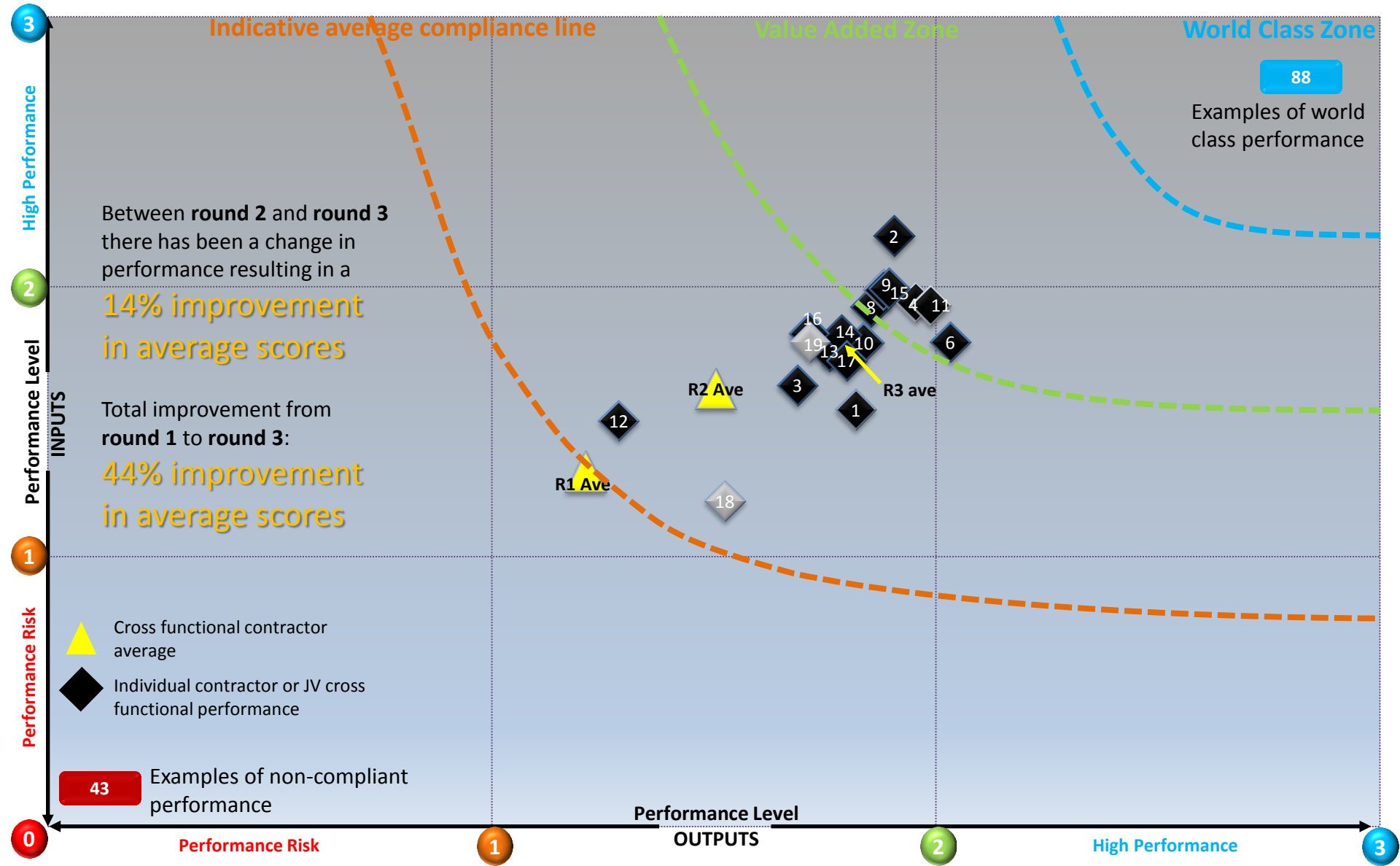


Innovation

Innovation Programme Objectives

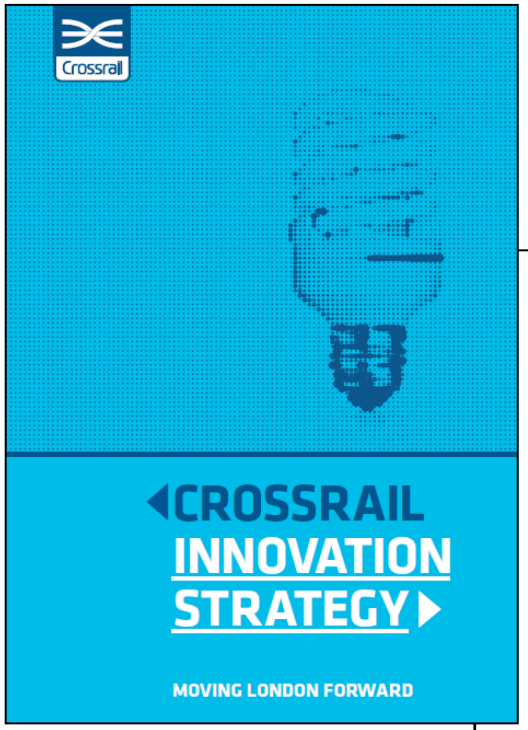
- To draw up and share innovation already happening within Crossrail
- Identify challenges and collaborate to find innovative solutions
- Develop innovations that will raise the bar across industry

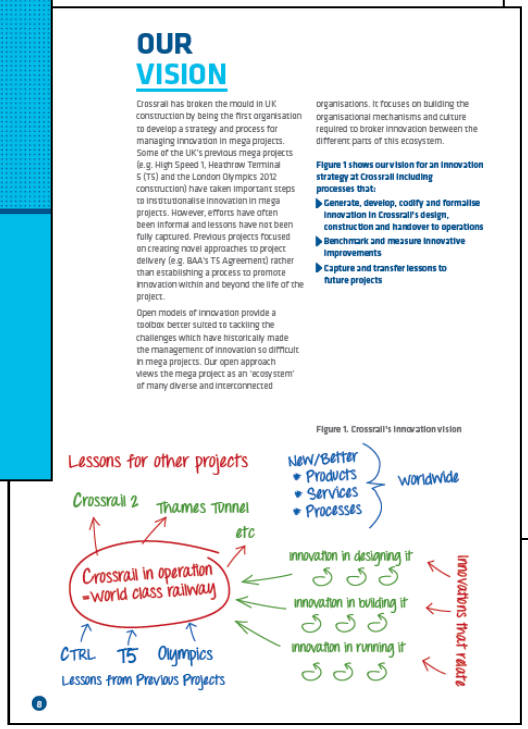
Crossrail

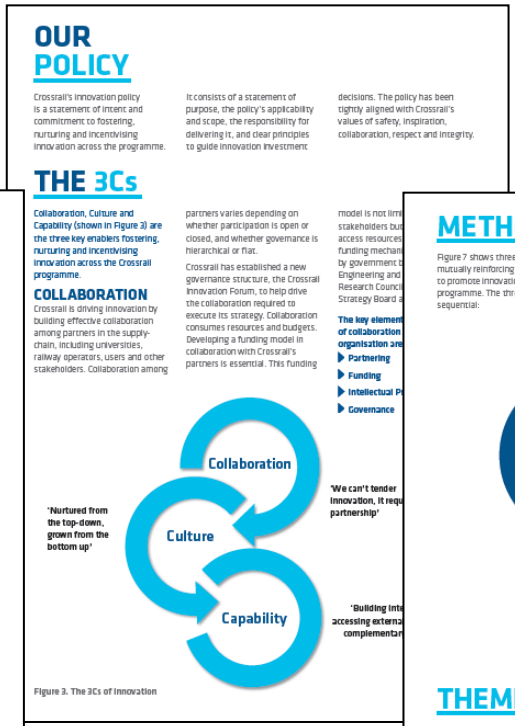
INNOVATE 8

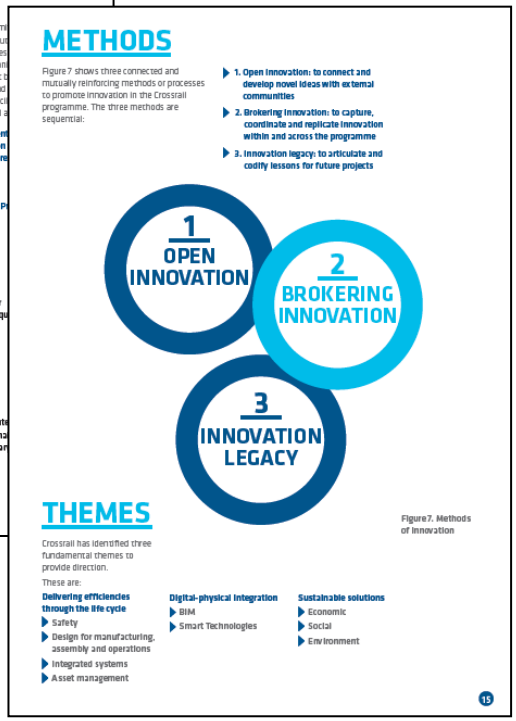
Imperial College London

Crossrail Innovation Programme









Smart Construction in Practice

Safety Glove Messages

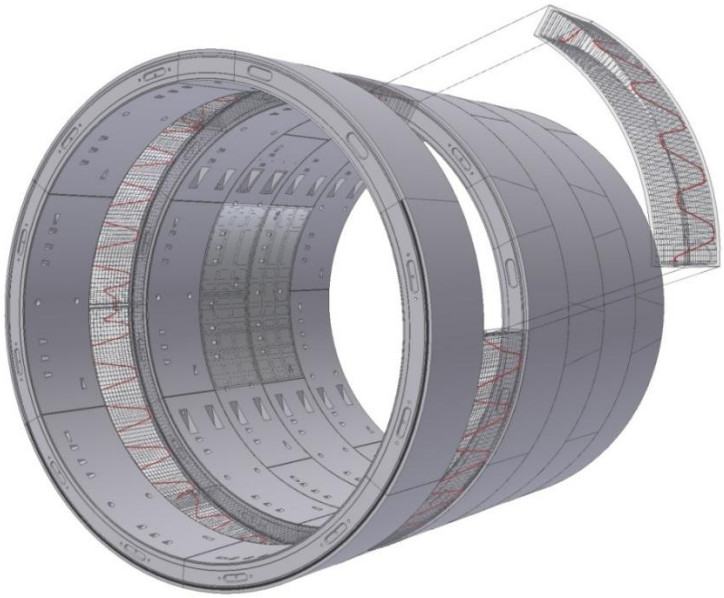
COSTAIN

SKANSKA

Smart Construction in Practice

Tunnel Energy Segments

Rehau Ltd



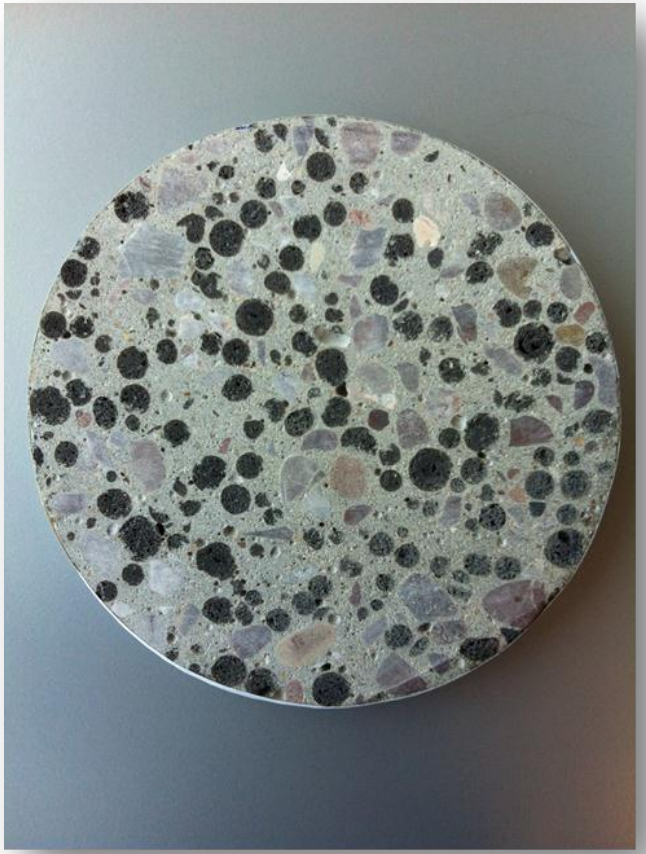
Smart Construction in Practice

Ultra Low Carbon Concrete

Smart Construction in Practice

Light Weight Aggregates

Nustone Ltd



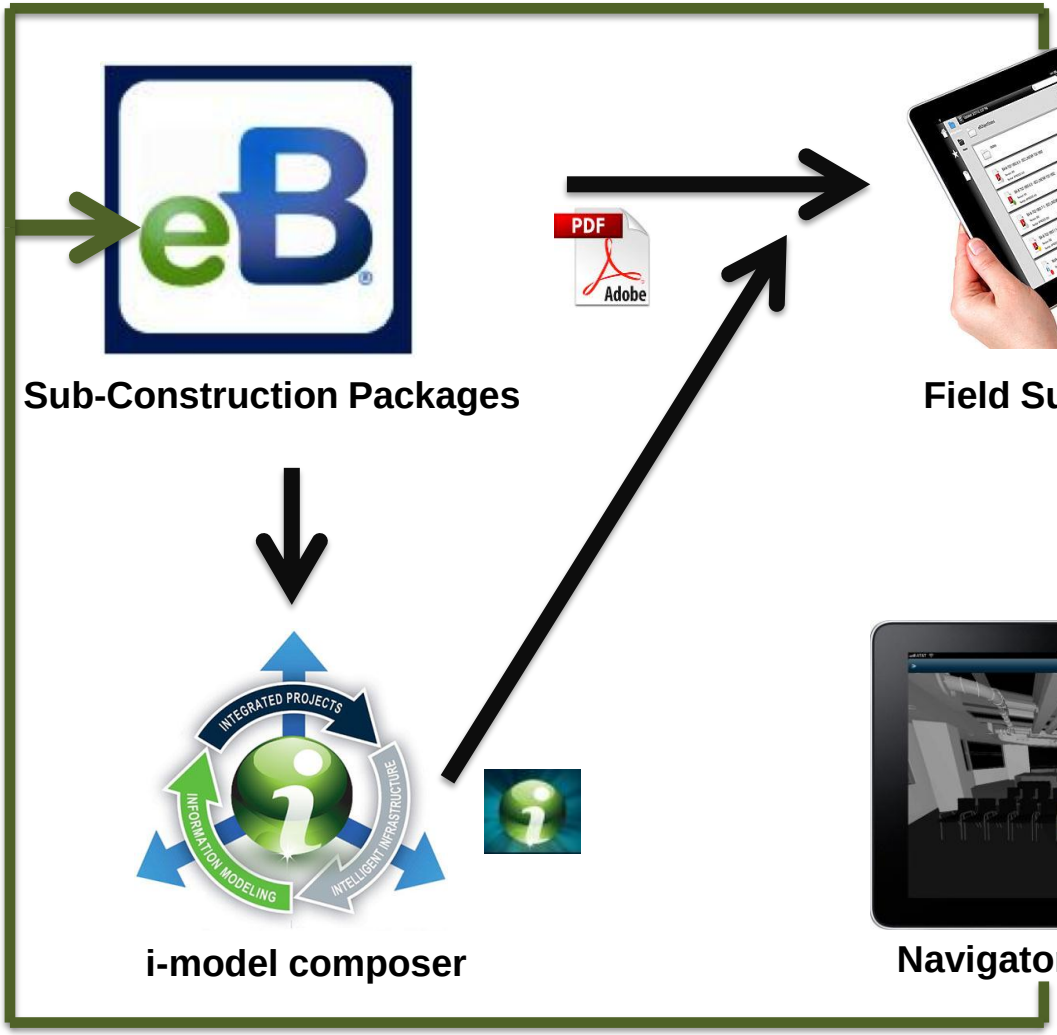
Smart Construction in Practice

Bluetooth Low Energy Beacons

Smart Construction in Practice

Augmented Reality

Model Based Work Packaging



Access to

- construction packages - drawings, specs, ITP's
- Forms to make field notes
- Annotate/red line documents

Access to

- construction packages – 3D Model View
- Filter model by attribute
- Annotate/red line model
- Construction status updates in model

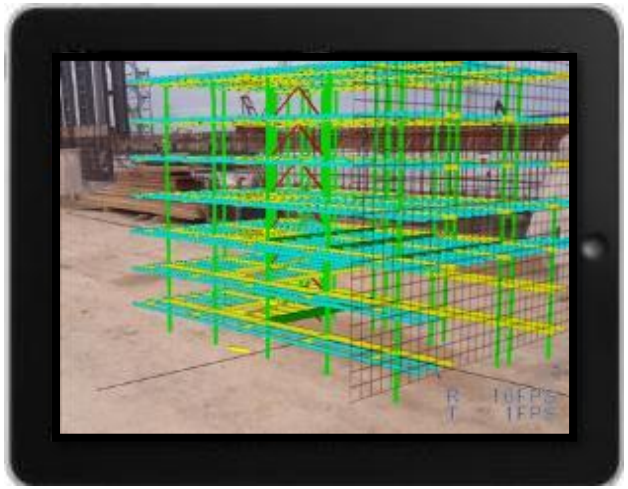
Augmented Reality

Access to

- 3D Model
- Line-of-site & location specific data in real-time

Update

- As Built records
- RFI's



… All Managed Electronically

Thank you!