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!
Asset Information
Asset Lifecycle

Crossrail Programme

Acquire
Operate
Lifecycle Delivery
Dispose
Maintain
Asset Information timeline

Crossrail compared to Traditional:

- **Crossrail**:
  - Start
  - Finish
  - On time
  - Good quality
  - Efficient

- **Traditional**:
  - Start
  - Finish??
  - Late?
  - Poor quality?
  - Inefficient?
Key Concepts

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

**Location**
*Where is the asset?*

**Function**
*What is the asset designed to perform?*

**Classification**
*What type of asset is it?*

*Collection of Asset Tags*

1. Royal Oak Portal
   - Royal Oak Portal Level 1
     - ROP - L1 - Access Corridor
     - ROP - L1 - Communications Equipment Room
     - 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

2. Crossrail Functional Breakdown
   - 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

3. L - Construction Products
   - L1 - Ground treatment and retention products
     - L11 - Ground anchorages
     - L12 - Ground improvement
     - L13 - Land/field drainage
     - L14 - Sheeting, revetments
Defines Crossrail’s overall approach to asset information
Specifies governance approach
Lists key supporting documents and links to other documents/standards
Defines:
- Asset ID format
- Asset name formats
- Asset labelling requirements

Datamatrix bar codes laser engraved on label
Works Information 2B Section 13.5

Clarifies requirements for Contractors

Good practice, but not novel, approaches
 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

HVAC Functional AD4:
- Defines System
- Lists applicable Assets Classes
- Generic functional naming conventions
- Generic labelling
- Worked examples

Chiller Class AD4:
- Defines Asset
- Visual examples
- Specific naming conventions
- Lists performance data requirements
- Lists attribute requirements
What’s the Procedure?

- **Stage A - Awareness and Mobilisation**
  - Stakeholders identified
  - Team aware of process and their responsibilities
  - Bulk Asset Tag creation

- **Stage B – Design Information**
  - 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
Smart Railway

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

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

User Applications

Central Data Hub

Asset Information

Intelligent Assets that manage themselves and require minimal human intervention

SERVICE

Predictable 24/7
Seamless - Stn to train
Comfort
Safely to your destination

PEOPLE

Customer Service
Operations & Control
Asset Technicians

ASSETS

Stations
Rolling Stock
Infrastructure
BIM in Asset Management
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….
BIM in Action…

Mapping
(Spatial)

3D Models
(Object Orientated)

Documentation
(Relational Database)
3D Information Models

Tottenham Court Road Station
Managing Interfaces
Visualising Interfaces
Delivering the Asset Model
Performance Assurance Scoring

Indicative average compliance line
Indicative cross-functional WI line - note this is only an average and should not be used as a literal WI compliance line

What you do - how you approach management

Performance Level

OUTPUTS

What you achieve - how effective is your management

INPUTS

Performance Risk

World Class

Major Improvement Zone

Potential Improvement Zone

Value Added Zone

World Class Zone

Aspirational Zone
Between **round 2** and **round 3** there has been a change in performance resulting in a **14% improvement in average scores**.

Total improvement from **round 1** to **round 3**: **44% improvement in average scores**.

Examples of world class performance

Examples of non-compliant performance

Cross functional contractor average

Individual contractor or JV cross functional performance
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
Safety Glove Messages
Tunnel Energy Segments

Rehau Ltd
Ultra Low Carbon Concrete

[Logos of VINCI, David Ball Group plc, and Cemfree]

[Images of concrete samples]
Light Weight Aggregates

Nustone Ltd
Bluetooth Low Energy Beacons

I see 2 iBeacons

Here I am!

Dedicated hardware

iOS device

iOS device
Augmented Reality
Model Based Work Packaging

**Sub-Construction Packages**

- i-model composer

**Field Supervisor App**

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

**Navigator Mobile App**

- 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!