Importance of Confidence in the information

Common Data Environment

8-5-14
Andy Rhoades - Head of Service protection
Equates to a 20% year on year improvement since 2003

We’re Heathrow Safe. And proud of it
Heathrow Development
Number of Significant Incidents
January 2013 – September 2013

We’re Heathrow Safe. And proud of it
For example, on January 10, 1996, a routine capital improvement project caused damage to an electrical cable at Newark International Airport, resulting in more than $1 billion of impacts, including hundreds of canceled and re-routed flights, disruption of travel to tens of thousands of people, and complete closure of the airport for more than 24 hours. This accident was the direct result of not knowing where the electrical cable was located. Unfortunately, this is not an isolated incident. This study found that some major airports experience almost daily utility damages caused by construction activities.
Heathrow Through the Years - 1999
Heathrow Through the Years - 2009
Heathrow Through the Years - 2013
Heathrow Works Years Jan 2011- Date

6886 locations
Would you like to dig here?

Knowing What, Where and the Status of quality data is critical for our business.
Heathrow Services

- Heathrow has 13 different service types, some of which are unique to the airport environment, with over 50 different owners.
- There are more than 45,000 manholes at Heathrow.
- There is 72 miles of high pressure Fire main network.
- There are power cables ranging from 9v up to 400 Kva. Both AC & DC.
- There is 81 miles of Aviation Fuel network ranging between 1.5” to 20” in diameter and between 3 and 115 bar in pressure.
1994 - Out of Crisis Comes Investment
(3) Where did we start?
“BIM…is seen as having the greatest potential to transform the habits and eventually the structure of the industry”

Paul Morrell – UK government chief construction advisor
Information Modelling not Building Information Modelling

At Heathrow it’s Information Modelling rather than BIM, defined as:-

“a co-ordinated set of processes and information requirements that add value by creating, managing and sharing the properties of an asset throughout its lifecycle.”

The same principles apply whether it is a building, a gas main or an AGL light fitting on a runway.
To get this all round view of an asset today would require going to all of these places and more

And even if we did visit all of these systems and talk to all of these people, the information would be...

INCOMPLETE — CONFLICTING — DIFFICULT TO PULL TOGETHER
If we join up our data we could deliver real business value

- Visualise our assets and work orders on a map and use this to inform work allocation and resource planning.
- Provide our engineers with the correct safety data and repair instructions on our assets.
- Ensure that our fixed assets register is updated in a timely manner when assets are added/removed.
- Know the current status of an asset and improve our prediction of when it might fail.
- Allow us to visualise at any one time which permits are active on the airport.
Object showing Business uses

Location

Construct

Programme

Operate Safely

Object

Maintain

Coordinate

Environment / Carbon
Our Approach

Imagine…..

• A world where we know around the whole of the Asset Lifecycle the questions we will need answers to and collect the information to be able to answer them along the way.
• A world where everyone involved works collaboratively sharing information in a common way.
• That the transition from architect, to designer to constructor to client within the Acquire phase happens seamlessly.

“Information Modelling provides a platform to make this a reality…..”
Making Information Visible

- Heathrow Map Live is a brand that has educated the business in accessing live model based information
- Business user now expect a graphical interface to query asset information
Where We Are Now

- Models as deliverables since 2003
- Delivery of Asset Information to a defined structure since 2008 when the Common Language was contracted across all projects.
- Simplified enabling IT landscape
- 2012 Employer's Requirements and Gateway process giving clarity and contracting in progressive delivery

- Heathrow Map Live giving the business visibility to model information

Model information in one place
As Built Models

Terminal 5B

Terminal 5C

< Back

Next >
Construction Models
Design Models

T2A Car park

< Back
Deliverables

How
• Deliverables are progressive through the project gateways
• All information is delivered into two databases
• Document Management
• Asset Management System

What
• Infrastructure and Building Models
• Drawings
• Health & Safety file, Operation & Maintenance Manual
• Assets Maintenance Information Integrated
Consolidating our Geometry Information

A number of other information solutions all use the base data from Heathrow Map Live. Currently a snapshot of the base information is used as a background. This information goes out of date very quickly.

**Resilience, Situation Awareness** – in times of snow or other situations the stand status is captured and displayed. This allows the business to plan an effective activation.

**ACDM (Airport Collaborative Decision Making)** – Live feed from aircraft movements allows stand occupancy times to be calculated and helps plan the efficient movement of aircraft around our taxiways and stands.

**Airside Works Approval** – Linking in a business management system, locations where work is due or taking place monitored.
Noise Mitigation

As part of a new European law, Heathrow is required to publish a noise action plan every 5 years. The plan sets out how Heathrow will manage the impacts of aircraft noise over the next 5 years. It was produced following a four month public consultation in 2009 and adopted by the UK Government in May 2011.

Calculated noise zones are added to Heathrow Map Live to enable the business to visualise affected properties. Post code information can be extracted and used for calculations.

Traditional workflows used suppliers to prepare drawings for the business. This has always been time consuming and expensive. Now using the Map adjustments to the banding can be made by utilizing red line capabilities.
Situations Awareness
Situation Awareness
Airport Collaborative Decision Making
Welcome to the A-CDM Portal

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<th>Reg</th>
<th>Status</th>
<th>LDT (E/A)</th>
<th>IBD (E/A)</th>
<th>SBT</th>
<th>Linked Flight</th>
<th>Rwy</th>
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Last Updated: 28/3/2012 14:23:05 UTC
Airport Works Approval

Application for Heathrow works

Create New Works Application

Schedule:
- Start Date: 28/03/2012
- Completion Date: 28/03/2012
- Completion Time: 17:00
- Working Days:
  - Mon: Yes
  - Tue: Yes
  - Wed: Yes
  - Thu: Yes
  - Fri: Yes
  - Sat: No
  - Sun: No

Project Details:
- Project Name: Test
- Type of Work: Hot Works
- Emergency: Yes
- Contact Name: Test
- Phone Number: 0123

Contractor and HAL Sponsor Details:
- Company Name: Please select a Contractor...
- HAL Sponsor Name: Please select a HAL Sponsor...

Create
Dream or Reality

- Business Users
- Geometry
- Maintenance Operation
- Documents
- Common Language
External View

Government Construction Strategy - Deliver level 2 BIM by 2016

- Hypothesis

"Government as a client can derive significant improvements in cost, value and carbon performance through the use of open sharable asset information"

We are here

Government goal

Level 0

Level 1

Level 2

Level 3
Why Maintain Information about our Assets

• Operate our airport safely
• Make informed decisions

Also…
• CDM (Construction Design Management) regulations
• Corporate manslaughter act
Incidents and incidents etc....

2011
Piling Rig
What does a Split Second Looks Like?
What’s next?

All of this relies on good information.
Going forward we have set up a Base Station at Heathrow.
We will contract its use and not accept “As built” information that was not created using it.
We will lock it down so only those approved to work at Heathrow and meet our standards can use it.
• We will review each company and user’s competence project by project.
We are working on PAS128.
We helped with HSG47.
We helped develop NVQ’s and mandated them.
Heathrow Services
Confidence Codes

Confidence codes are a measure in how confident the surveyor is that he has pinpointed the service they are surveying.

- As Cable Avoidance Tools need interpreting the surveyor will assign a confidence code to each service or part there of.

Underground utility detection, verification and location shall be undertaken by one, or any combination of, the following survey methods:

- Survey type D – Desk top survey followed up with site reconnaissance.
- Survey type C – Use of Cable Avoidance Tools to locate services to Quality Code 2, with a reasonable degree of confidence of what has been located.
- Survey type B – Detection; Use of 2 techniques to verify the location of the service Cable Avoidance Tools from different ends and settings/frequencies, Ground Penetrating Radar to a high degree of confidence the service has been located confirming position found with Cable Avoidance Tool.
- Survey type A – Verification; Trial hole using vacuum excavation/air pick or hand tools to expose the service and then survey position and extents to 25mm accuracy.
Confidence Codes

A3 – Exposed service measured depth below ground
B1 – Good strong consistent signals from multiple techniques
B2 – Inconsistent signals from multiple techniques
B3 - 1 technique used but with inconsistent signal
B4 – Untraceable service but EMS markers located and read
C4 – From drawings as accurate but unable to verify
## Survey Report

<table>
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<tr>
<th>Quality Level</th>
<th>Detection accuracy actually achieved</th>
<th>Length of utility detected in each quality level in m</th>
<th>Percentage of total</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Horizontal</td>
<td>Vertical</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>+/- 25mm</td>
<td>+/-/25mm</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>+/- 200mm</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>+/- 200mm</td>
<td>10%</td>
<td></td>
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<tr>
<td>B3</td>
<td>+/- 500mm</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>B4</td>
<td>+/- 500mm</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>B5</td>
<td>Unable to detect</td>
<td></td>
<td>H ave the surveyor repeat the work if we find a discrepancy</td>
</tr>
</tbody>
</table>

Total length of underground utilities within survey area (m)

<table>
<thead>
<tr>
<th>Area of survey (m²)</th>
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<tbody>
<tr>
<td>Average utility density : factor = length/area</td>
</tr>
</tbody>
</table>

This will enable us to ensure we get the survey we paid for. **Eliminate disclaimers.** Have the surveyor repeat the work if we find a discrepancy. **Hold the surveyor accountable**
Validation Life Cycle

Any Fuel that fell into the pink will drain to Eastern Outfall, any that falls into the green will go to the Southern Outfall.
Service Strikes due to poor information.

![Graph showing Service Strikes as a percentage caused by inaccurate information from 2002 to date.](image)
Just as we have an airport masterplan we have recognised the need for a masterplan for joining up our data and the technology which supports it

- We are developing a masterplan which will allow us to join up all of our asset data and then make decisions based upon a single view.
- This masterplan will:-
  - Be driven by the requirements of the customers of information.
  - Be informed by the experiences of other asset intensive industries
  - Be implemented piece by piece with a clear case for each investment
  - Allow expansion to include asset registers from other areas of the business e.g. IT, Property and HEX when the time is right.
- We have just started a project to validate our approach and further define the masterplan
Our destination - Informed decisions supported by joined up data which is of a known quality.
Any questions?