Heathrow's BIM Journey

Importance of confidence in the information

11-11-15

Andy Rhoades – Head of Service Protection

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Heathrow is a unique airport for the UK

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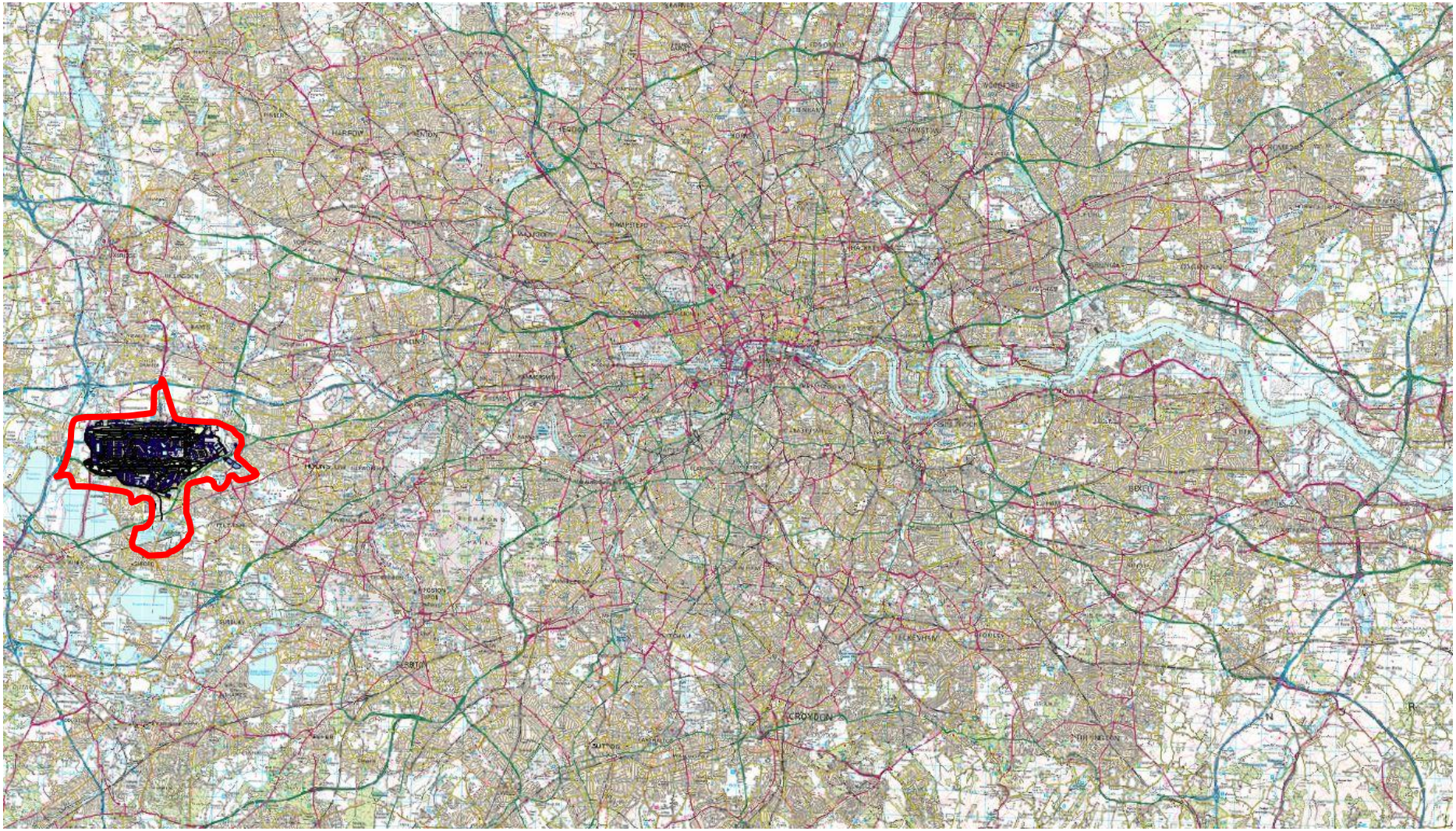

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Would you like to dig here?

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

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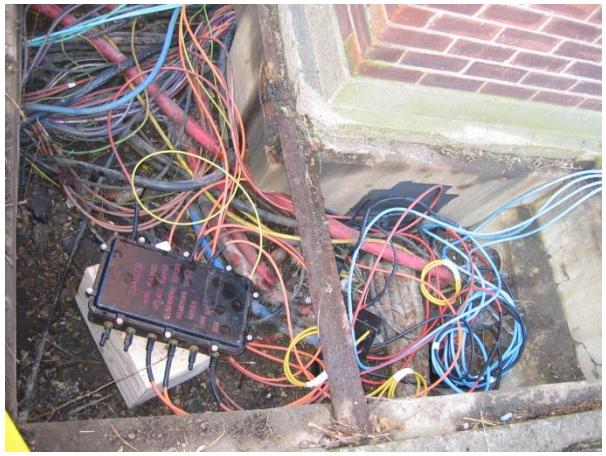
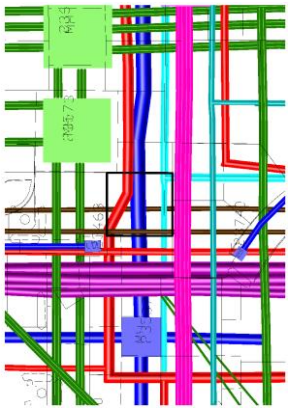
Heathrow Services

- 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 man holes 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.





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Heathrow Through the Years - 1993

0% Accuracy of Service Information

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Heathrow Through the Years - 2002

40% Accuracy of Service Information +/- 500mm or better

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Heathrow Through the Years - 2013

74% Accuracy of Service Information +/- 500mm or better

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Heathrow Through the Years - 2014

Heathrow adopts PAS128 for all Utility Surveys

- 49,558 km of known services when PAS128 adopted
- 62,223 km of known services to date
  - A 25% increase

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The Vision

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2035

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2035

New T6

Extended T2
& new CTA

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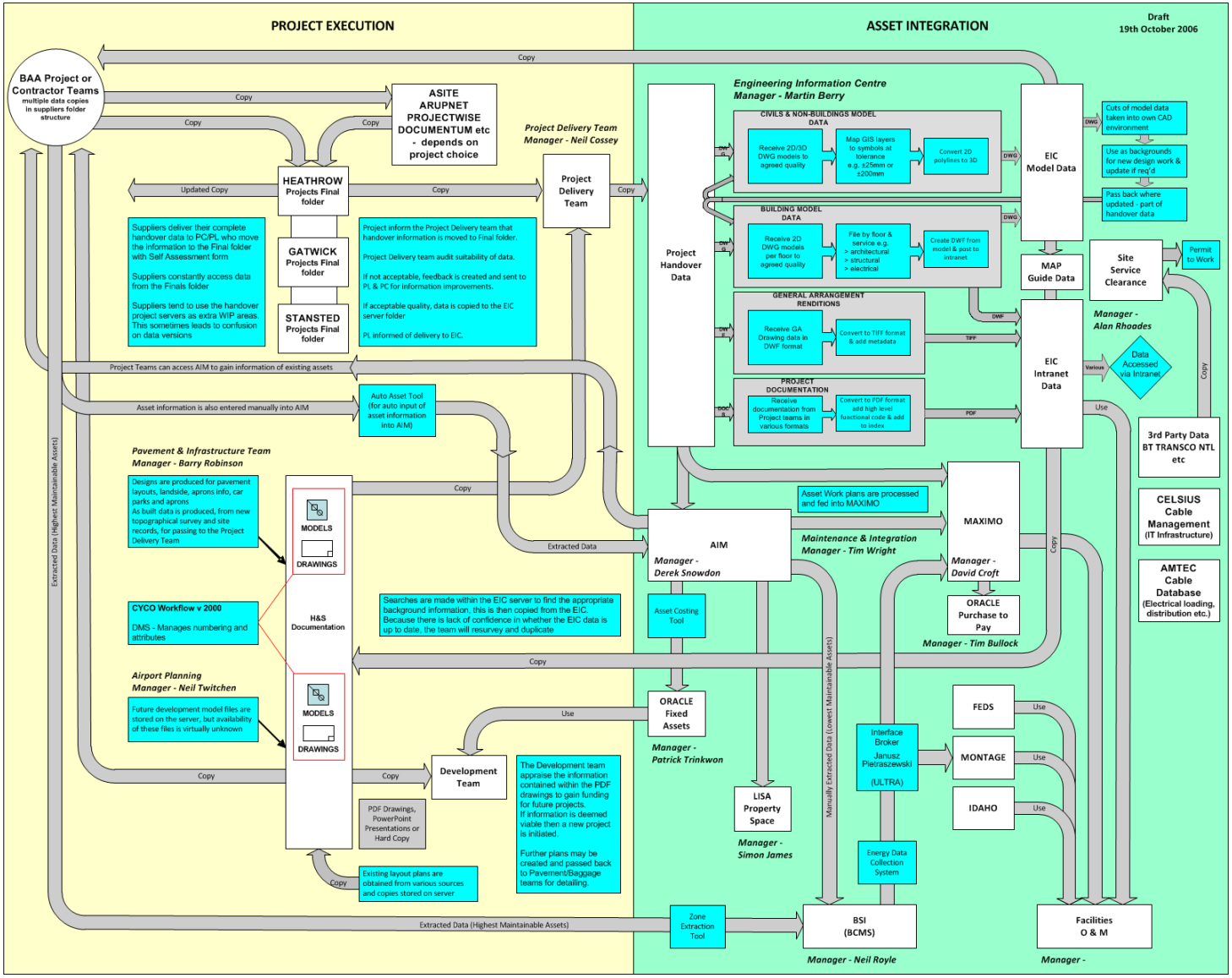
1994 - Out of Crisis Comes Investment

Where did we start?



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2006 – Maximo 5.2 implemented and T5 becoming a reality

- The T5 way and the Heathrow way
- More information than had ever been delivered before
- How could we make it happen?

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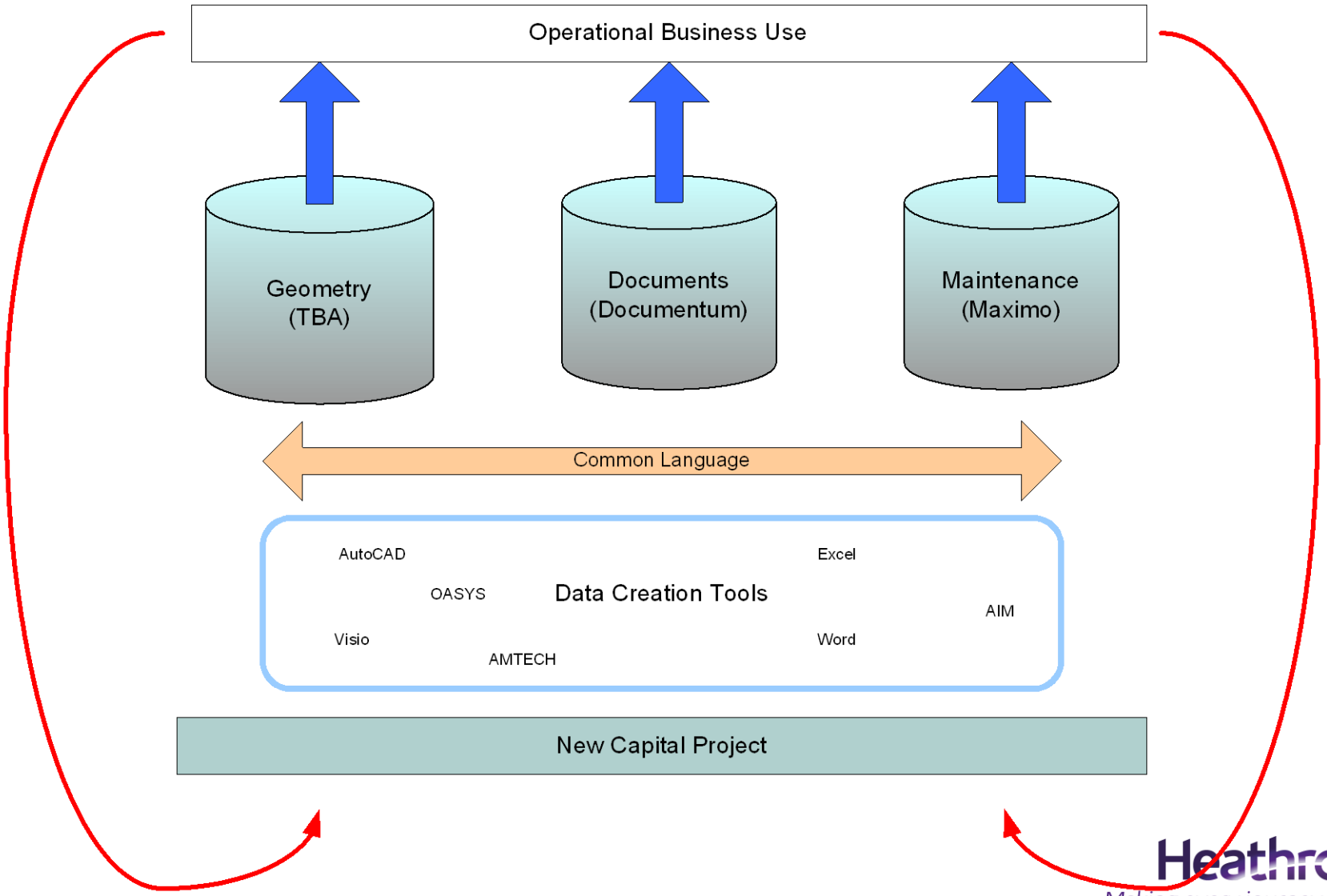
Asset Technical Data Vision



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2007 – Common Language Mandatory

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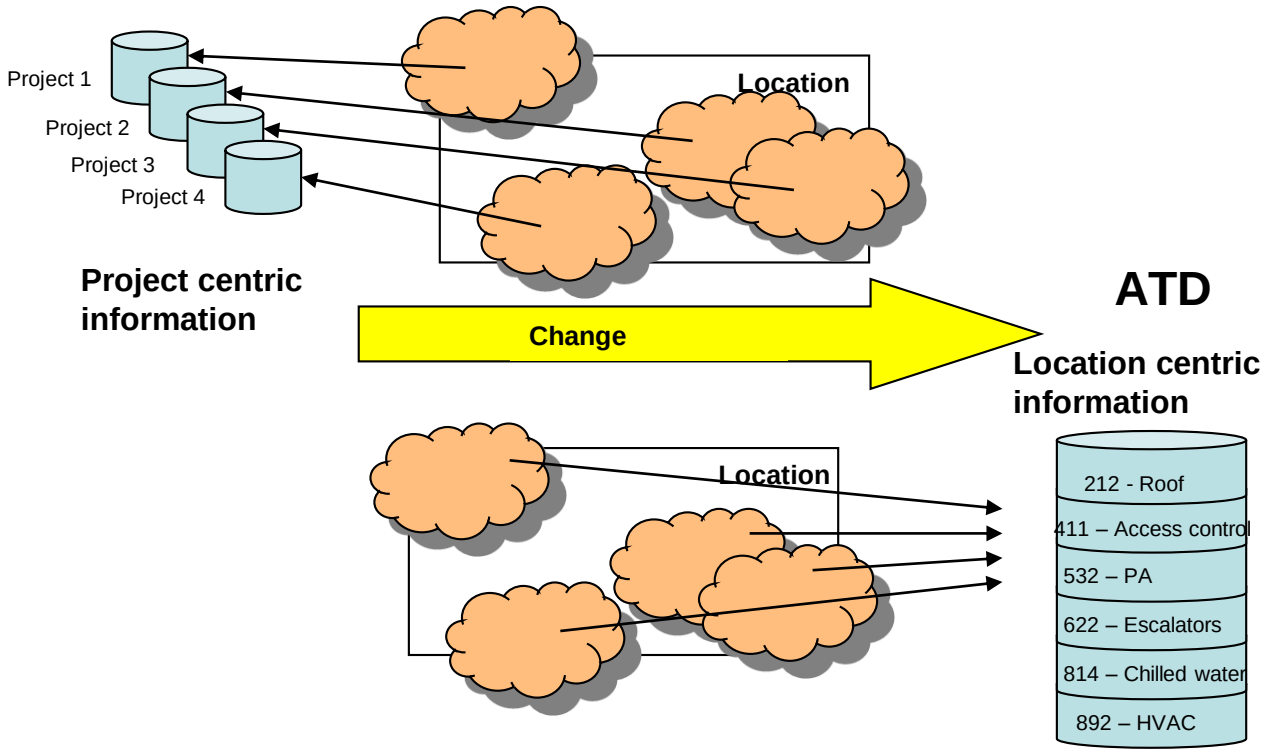
2008 – Project Information Delivery

- Formalised Asset Technical Data requirements in contracts
- Information moves to being location centric rather than project centric
- New philosophy to update exiting information rather than create new
- Plan information deliverables from the start of a project
- Progressive handover of information during the project

Change from project information stacking to location information management



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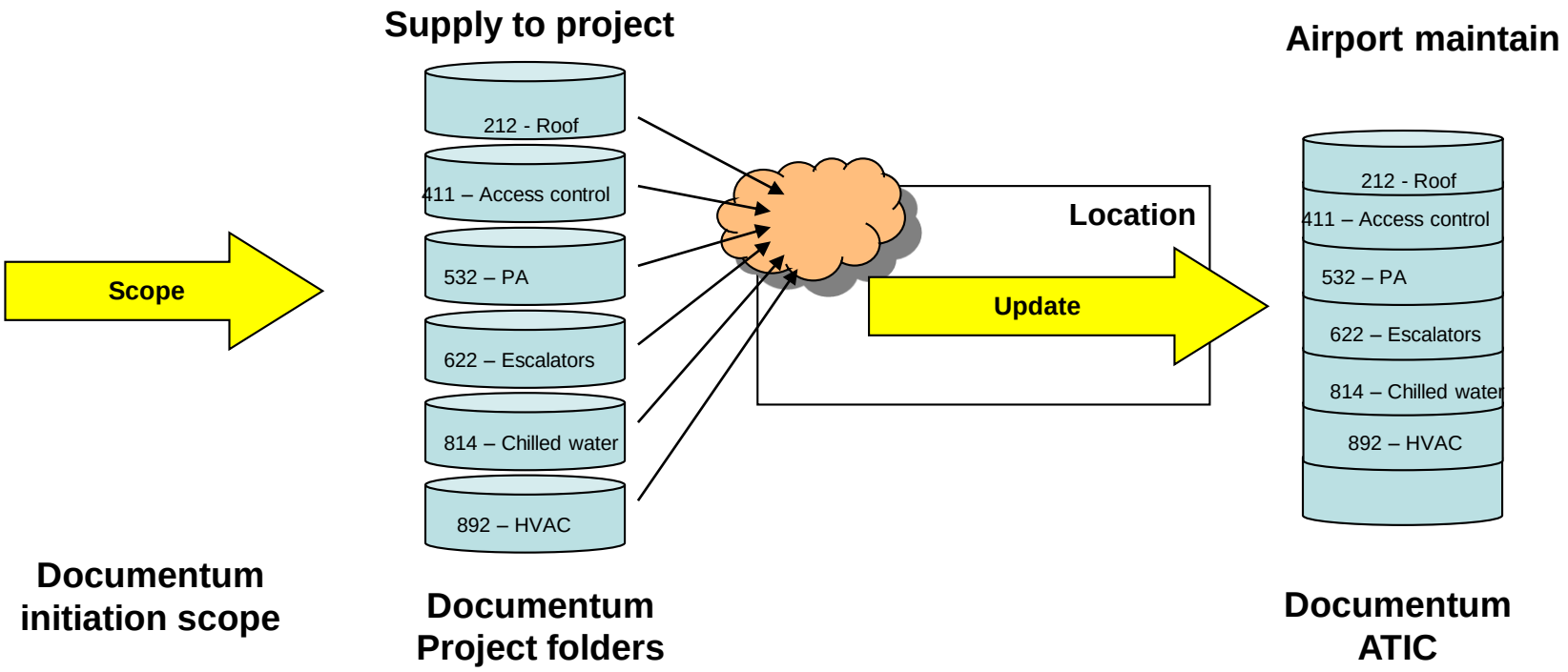
H&S File - supply and update principles



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H&S File compilation and delivery

Project document status report

- List of all project documents in Documentum
- Red/green flag for format & status if handover
- Visibility of Part C by filter of location/system to review

Create Virtual Excel H&S File Part C

- Project supplied empty virtual Part C template in Documentum
- Project cut & paste accepted content into virtual Part C
- Client reviewers review content

Non conformance report - NCR

- List of non-compliance issues
- Issue, supplier response, reviewer accepted
- Filter location/system to confirm complete & accepted

Use Master Excel H&S File Part C

- Accepted content moved to master part C
- Location/system centric
- Hyperlinks to documents to ease of use
- One version of the truth

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Industry and Government View

"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

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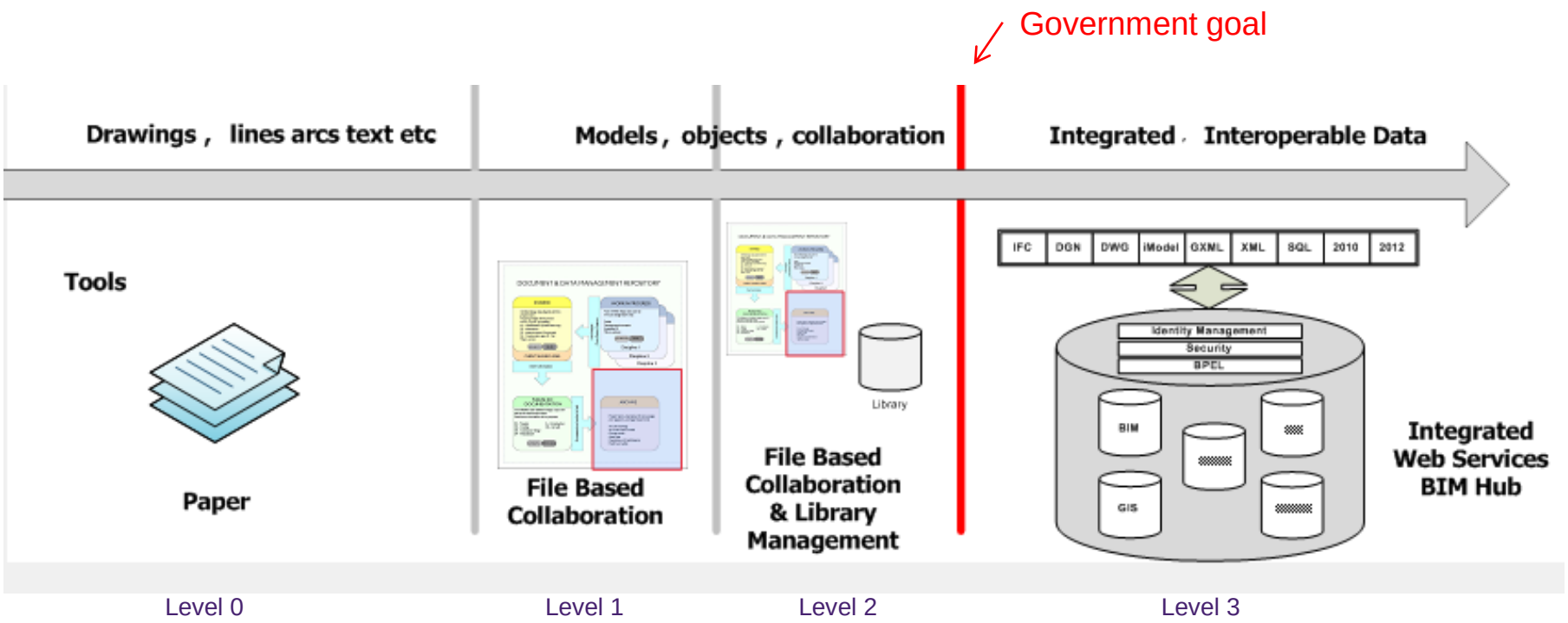
External View

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 us of open sharable asset information"



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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.

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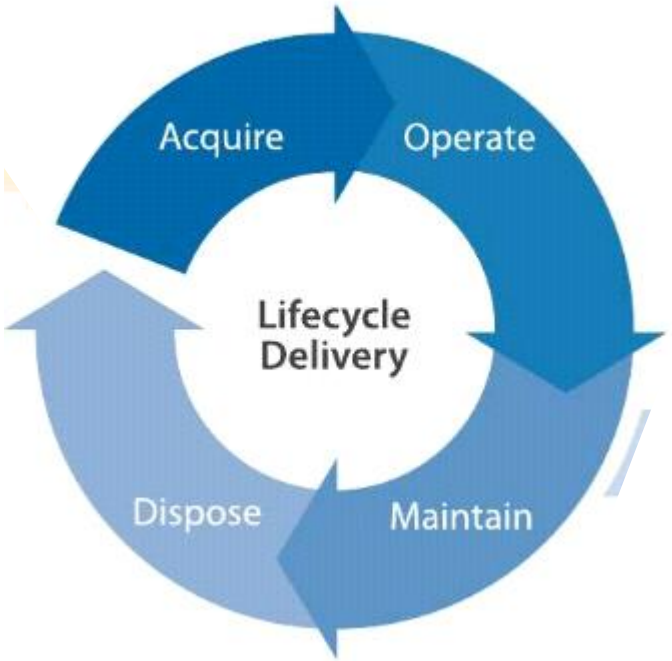
Our Approach

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….."

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We all see our assets from different perspectives and have different questions to answer

1. How much money do we need to invest in our assets to deliver the required level of performance?
2. If we don't invest as planned what are the consequences likely to be?
3. How can we demonstrate to the shareholder and regulator that every £ invested in this escalator is delivering a benefit?
4. Can we evidence compliance with our legal obligations?
5. If I have one pound to spend should I spend it on this escalator or somewhere else?

1. Where is the asset?
2. What parts do I need?
3. What tools do I need?
4. Is there a method statement?
5. Are there drawings/schematics?

1. Does the escalator do what it was intended to do?
2. How often does it break down or fail to meet the required performance level?
3. What is the engineering life of this asset?
4. Is it more cost effective to extend the life of this asset rather than replacing it?
5. What is the best maintenance strategy?
6. What competencies are required to maintain this?

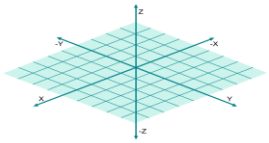
1. How many safety incidents have we had relating to this escalator?
2. Do we have the same escalator elsewhere?
3. Are there any differences between the same asset in different contexts?
4. If so, what has made the difference?
5. Does this asset contain hazardous materials?
6. If we were buying another one should we buy the same again?

1. How much did this escalator cost to buy?
2. What is the total cost of ownership?
3. What is its current book value?
4. If we replace it before it is depreciated what is the write off value?
5. Is the escalator correctly categorised for Tax?
6. When is the optimum time to replace this asset using whole life cost principles?

1. How critical is this escalator to the operation of Heathrow?
2. What is the risk if this escalator stops working?
3. How likely is this to happen?
4. How is this risk being mitigated?
5. Do we have a contingency plan for this asset in case the worst happens?

1. How much energy does this escalator use?
2. Is this in line with forecast?
3. What can we do to reduce this and sti maintain the required level of performance?

Object showing Business uses



Location

Maintain

Construct

Object

Operate Safely

Programme

Environment / Carbon

Coordinate

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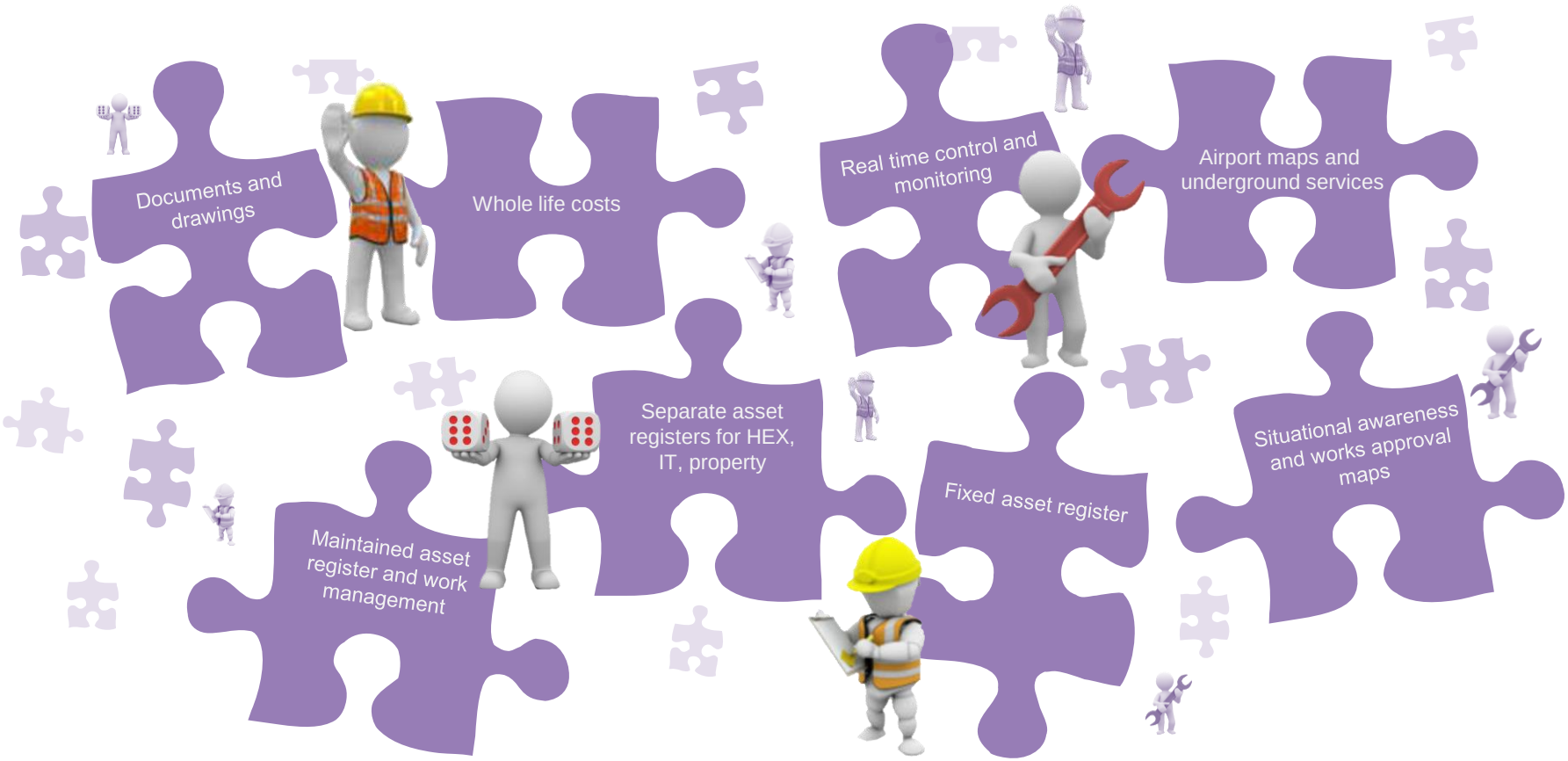
To get this all round view of an asset today would require going to all of these places and more



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

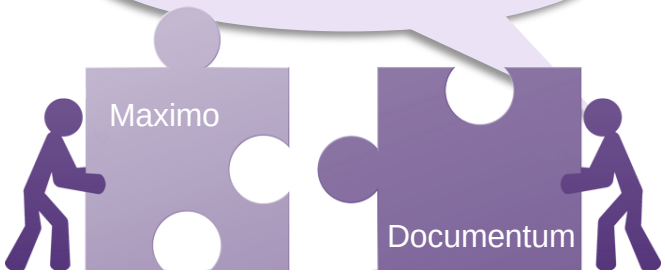
INCOMPLETE — CONFLICTING — DIFFICULT TO PULL TOGETHER

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.

Ensure that our fixed assets register is updated in a timely manner when assets are added/removed.

Provide our engineers with the correct safety data and repair instructions on our assets



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

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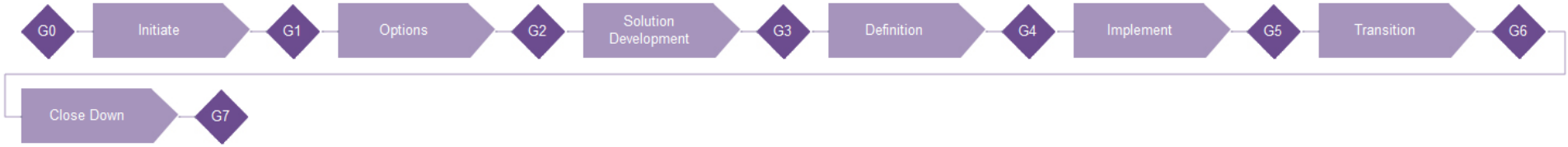
Where We Are Now

- 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

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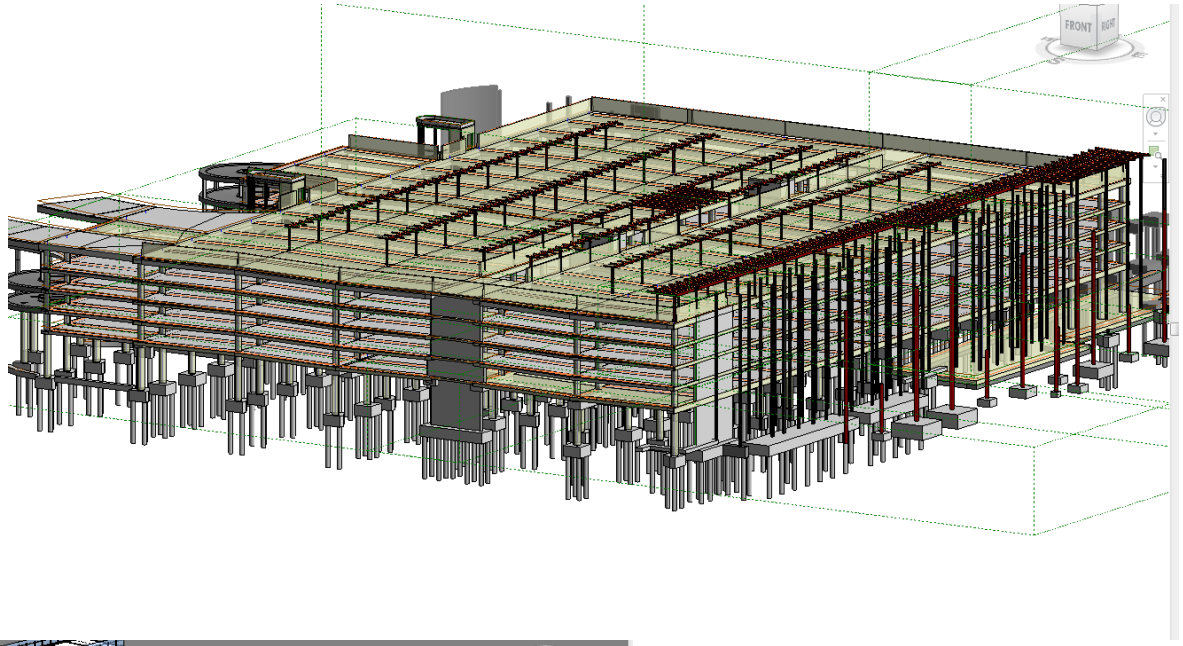
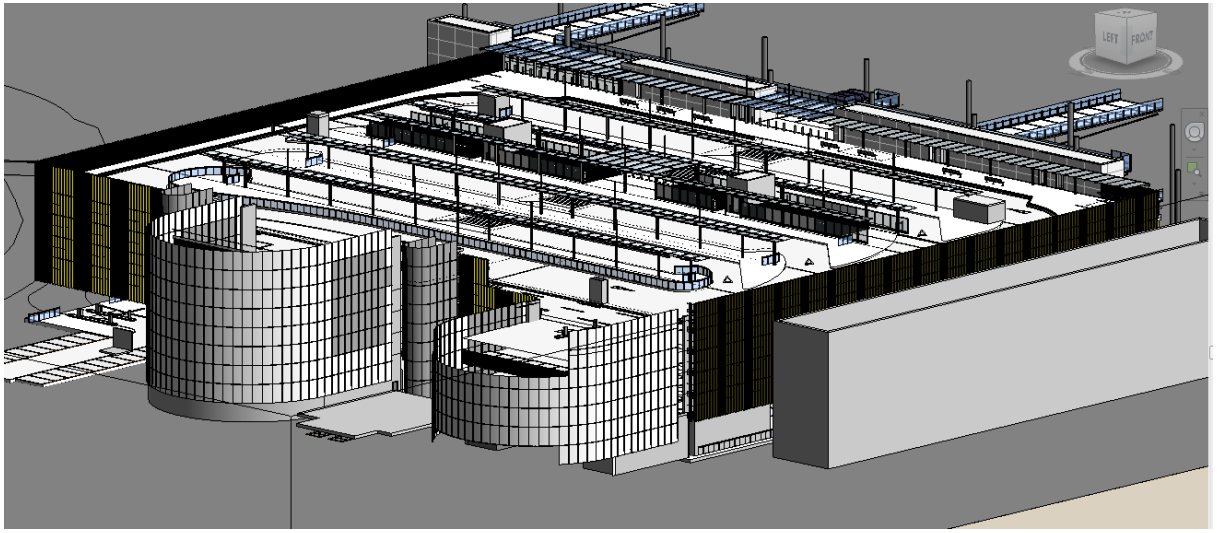
Design Models

T2A Car park





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2010 – 2015

2010 AssetNet launched

2011 Heathrow Map Live is born

2014 APOC goes live

2015 Mobile Maximo & External access to Heathrow Map Live

2015 SSoW licenses including survey

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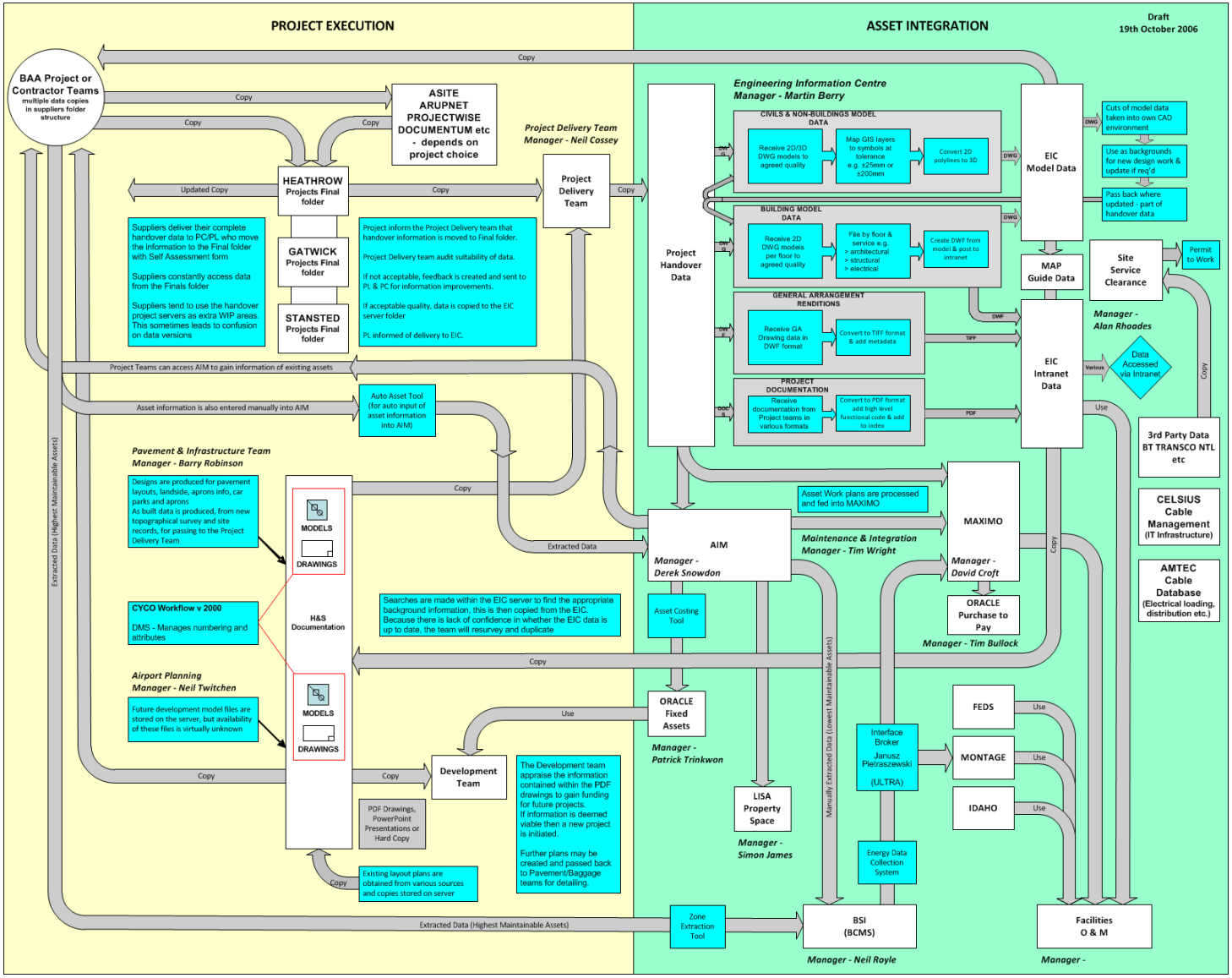
Where did we start?



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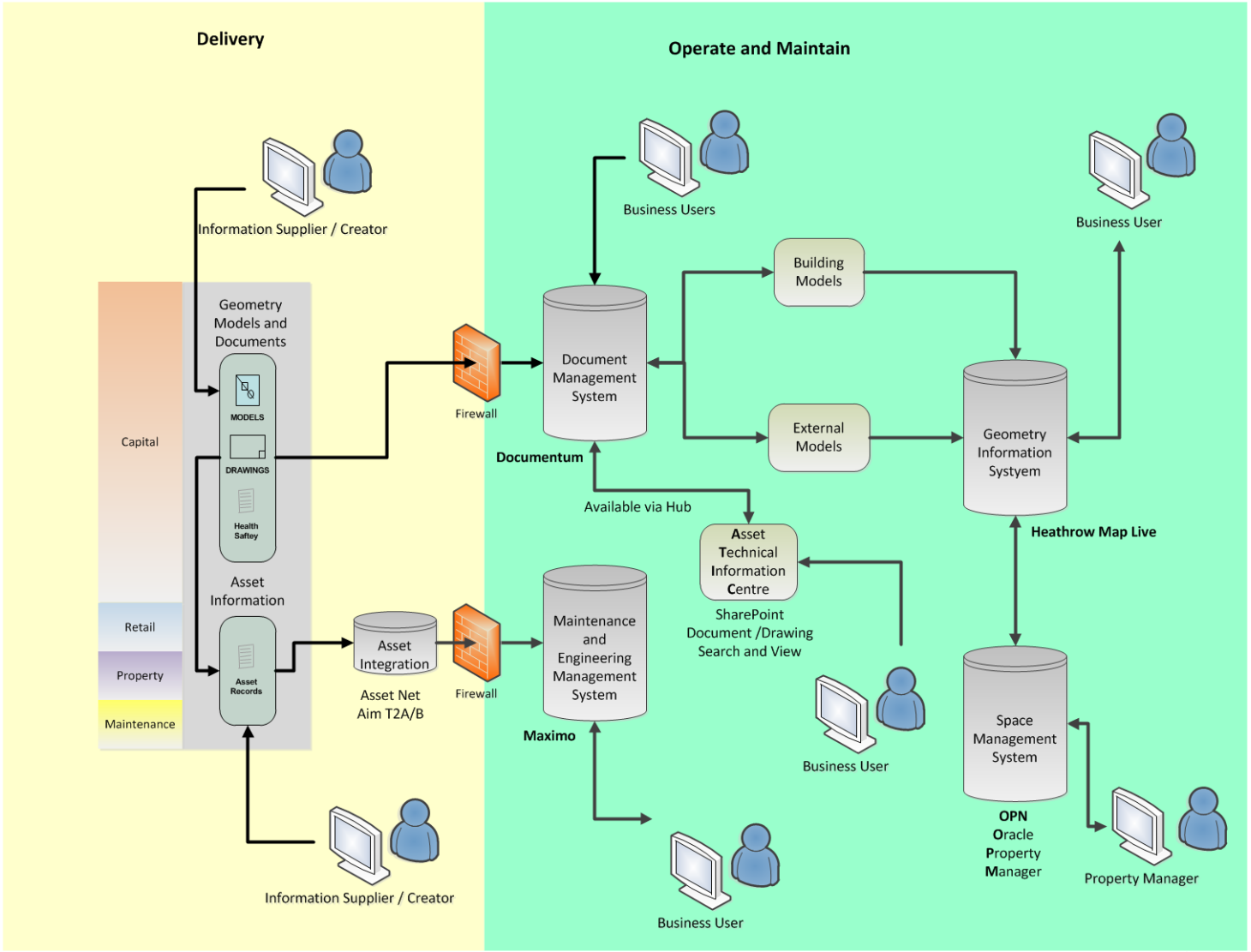
Information Flows 2013



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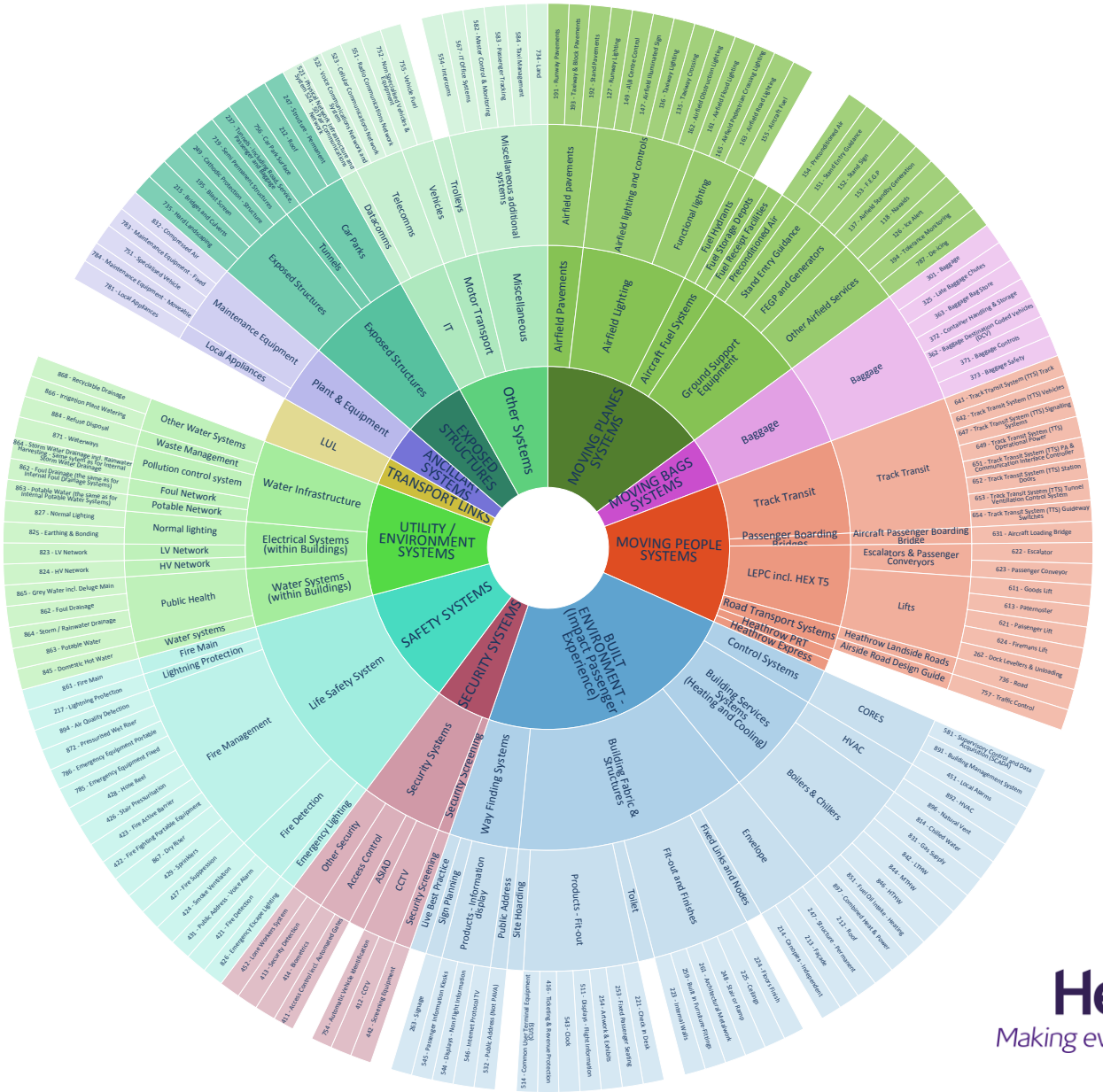
2007 – Common Language Mandatory



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Why Maintain Information about our Assets

- Operate our airport safely
- Make informed decisions

Also…

- CDM (Construction Design Management) regulations
- Corporate manslaughter act

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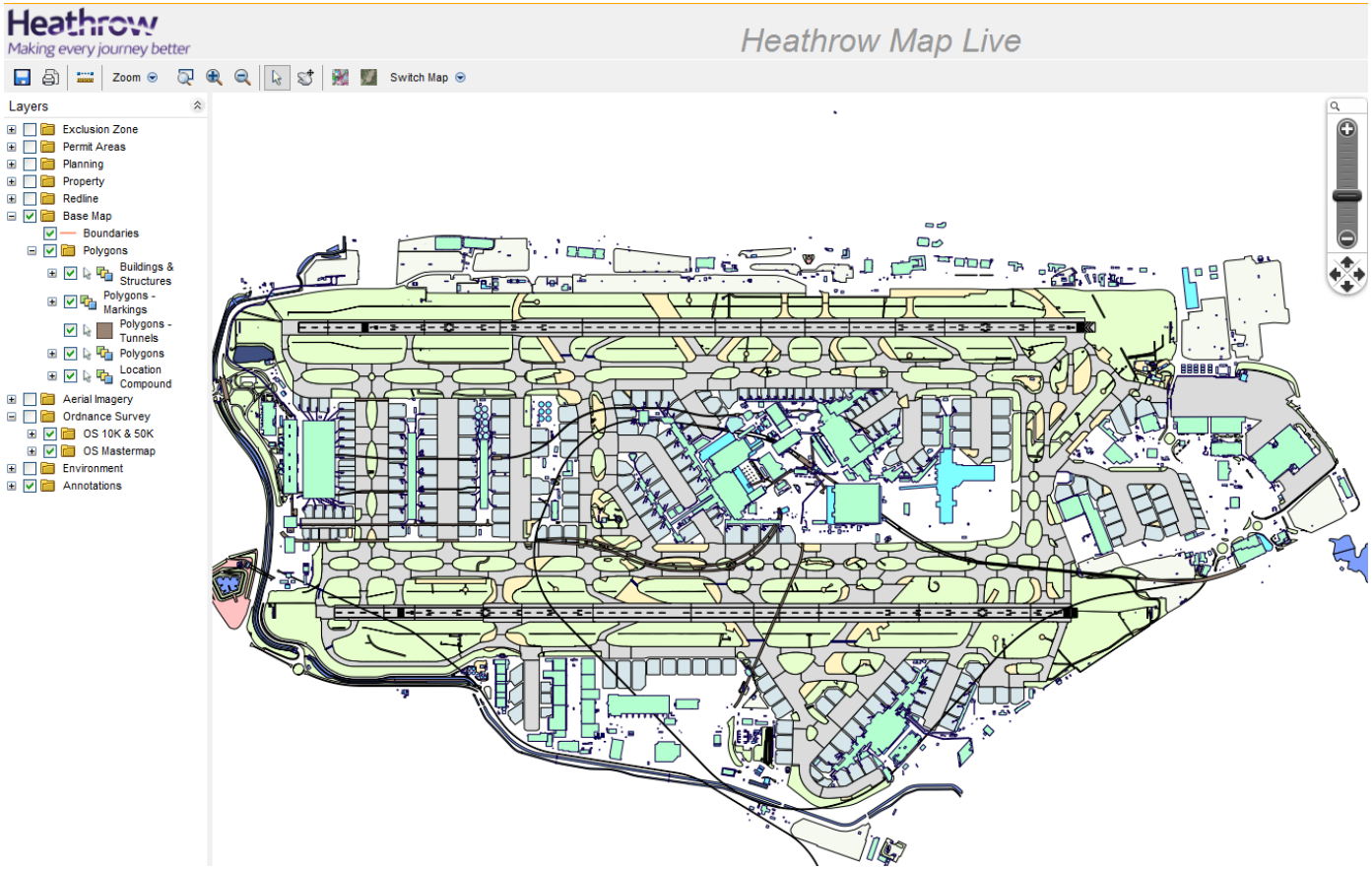
Making Information Visible

- 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



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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

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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

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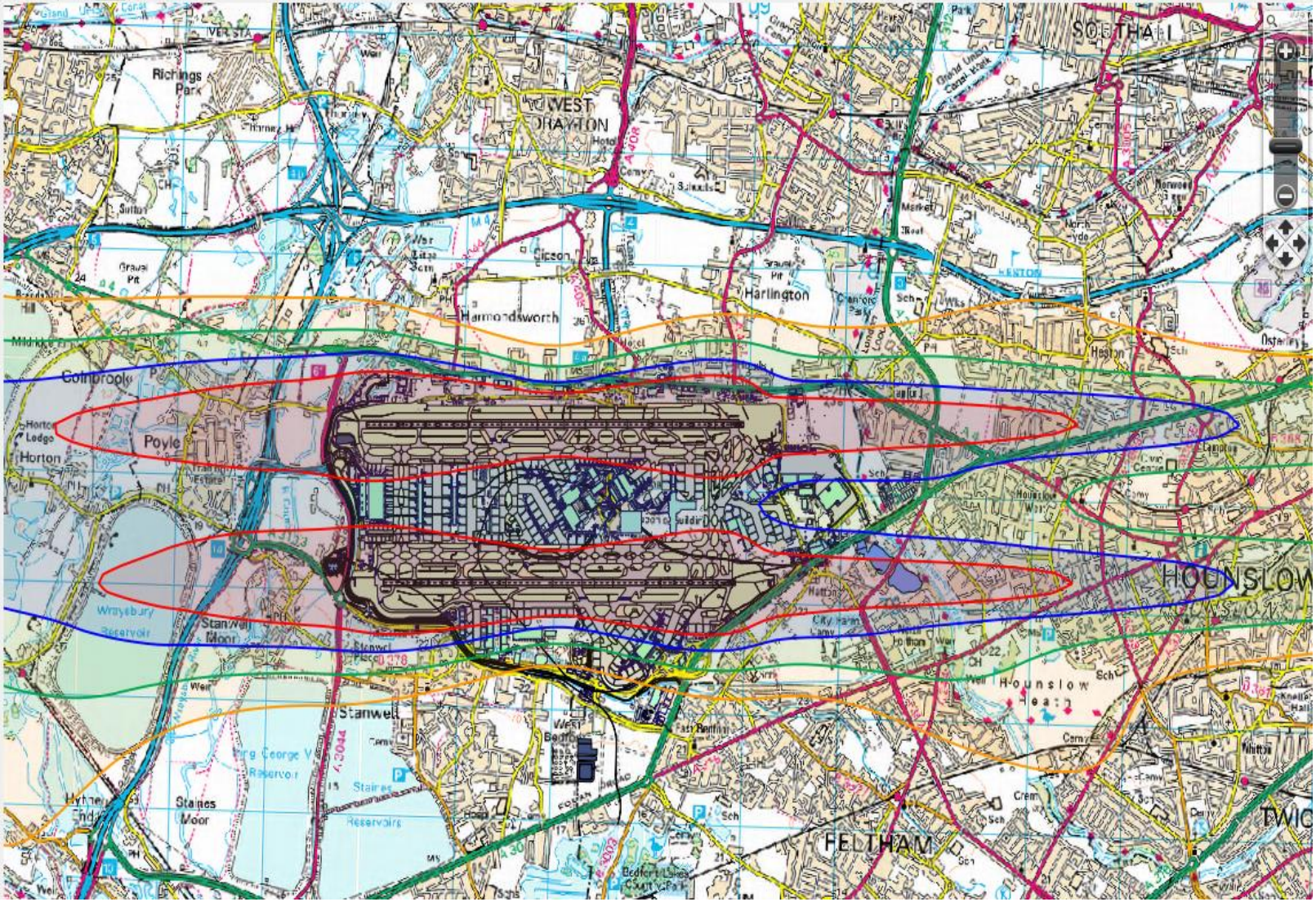
Heathrow Map Live

Zoom | Switch Map

Layers

- Planning
  - Noise Contour
  - NOISE_CONTOUR_Adjusted
  - PROXIMITY_BOUNDARY
- Redline
- Base Map
  - Boundaries
  - Buildings & Structures
  - Polygons - Markings
  - Polygons - Tunnels
  - Polygons
- Ordnance Survey
  - OS 10K & 50K
- Annotations



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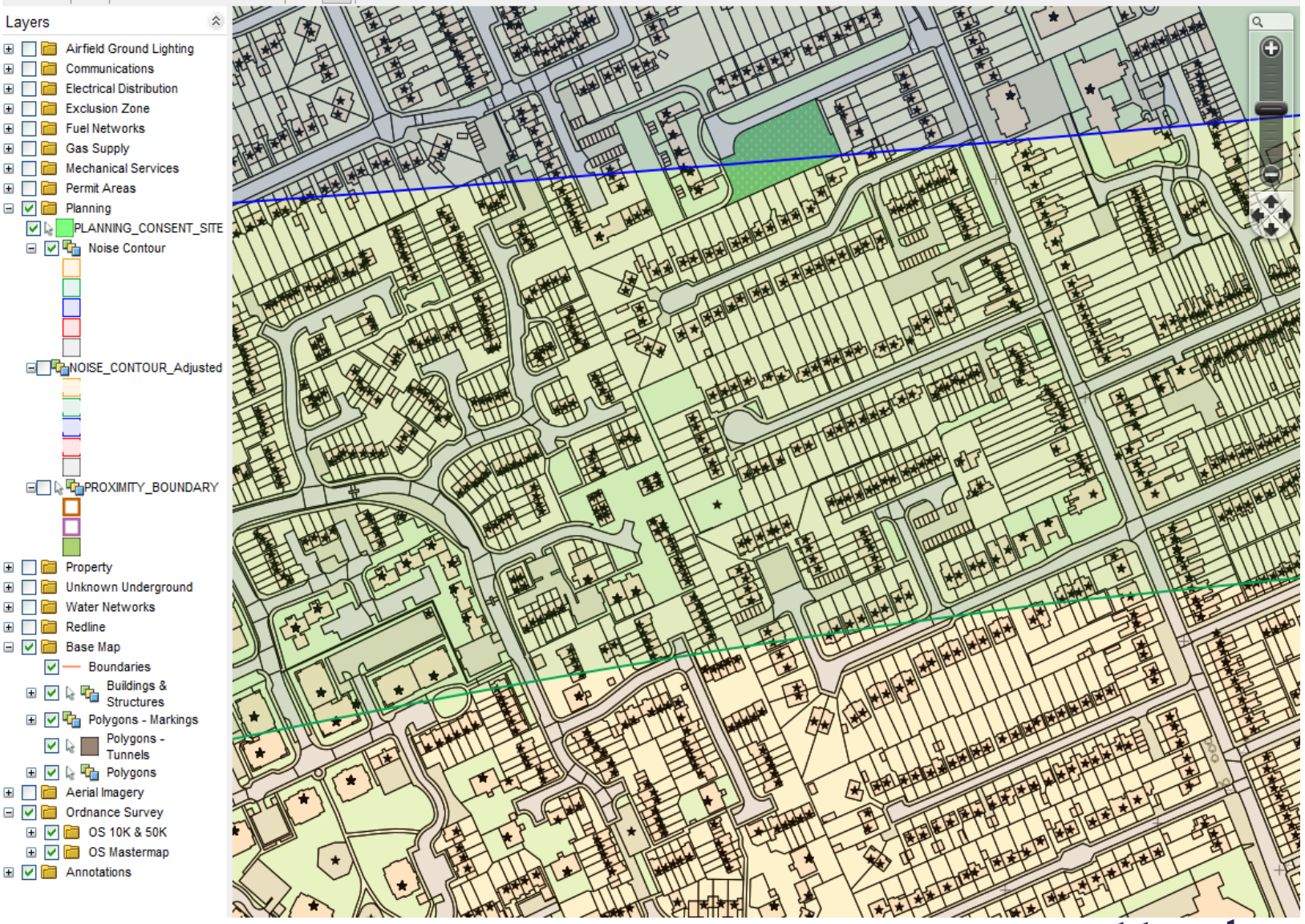
Heathrow Map Live

Zoom | Switch Map



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APOC

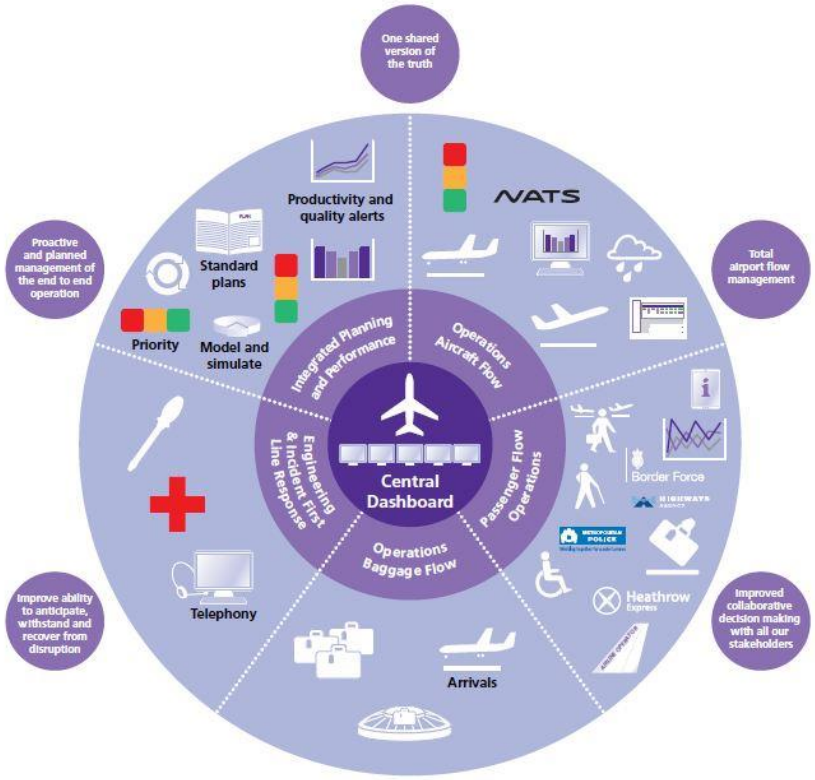
Managing airport operations collaboratively

Proactive not reactive

The Airport Operations Centre (APOC) will be able to see the complete Heathrow picture. It seeks to avert problems before they happen, and it manages airport performance in a collaborative way. With multiple stakeholders contributing to the decision-making process, APOC produces results that are best for the airport as a whole. Instead of islands of potentially conflicting decision-making, there's one over-arching process that balances the business priorities and strategies of all airport stakeholders.

APOC keeps the airport flowing by matching resources and facilities to changes in demand or schedule. It does the job in real time, and the process is completely transparent.

APOC managing the airport collaboratively



Layers and triggers

A new feature of APOC is an integrated series of indicators and trigger points that flag issues that lead to deviations from the airport plan. The diagram opposite is a simplified example of the events which are indicators of queue times at security.

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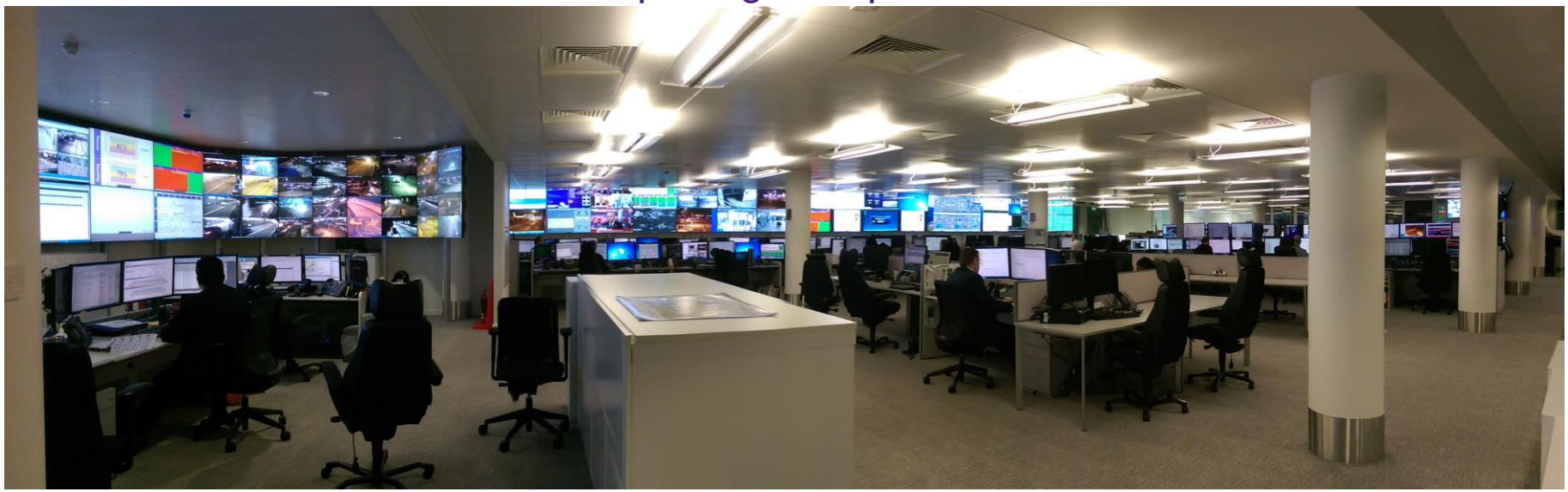
APOC

Landside Roads & Terminals

999 & Fault reporting

Engineering Ops

Air Traffic Control



CCTV & Security

Command

MET Office

Ground Movements

Baggage Ops

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APOC

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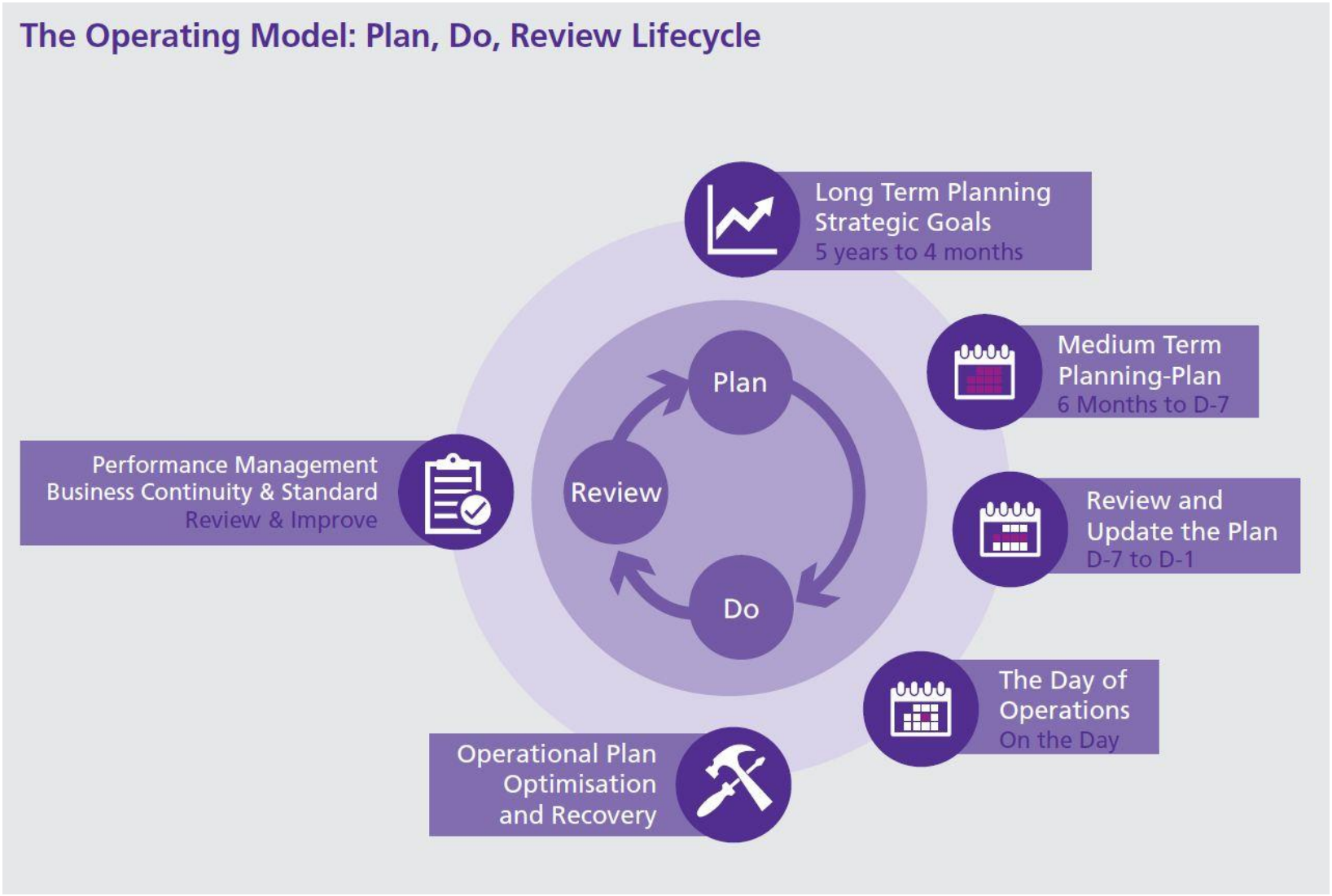
APOC



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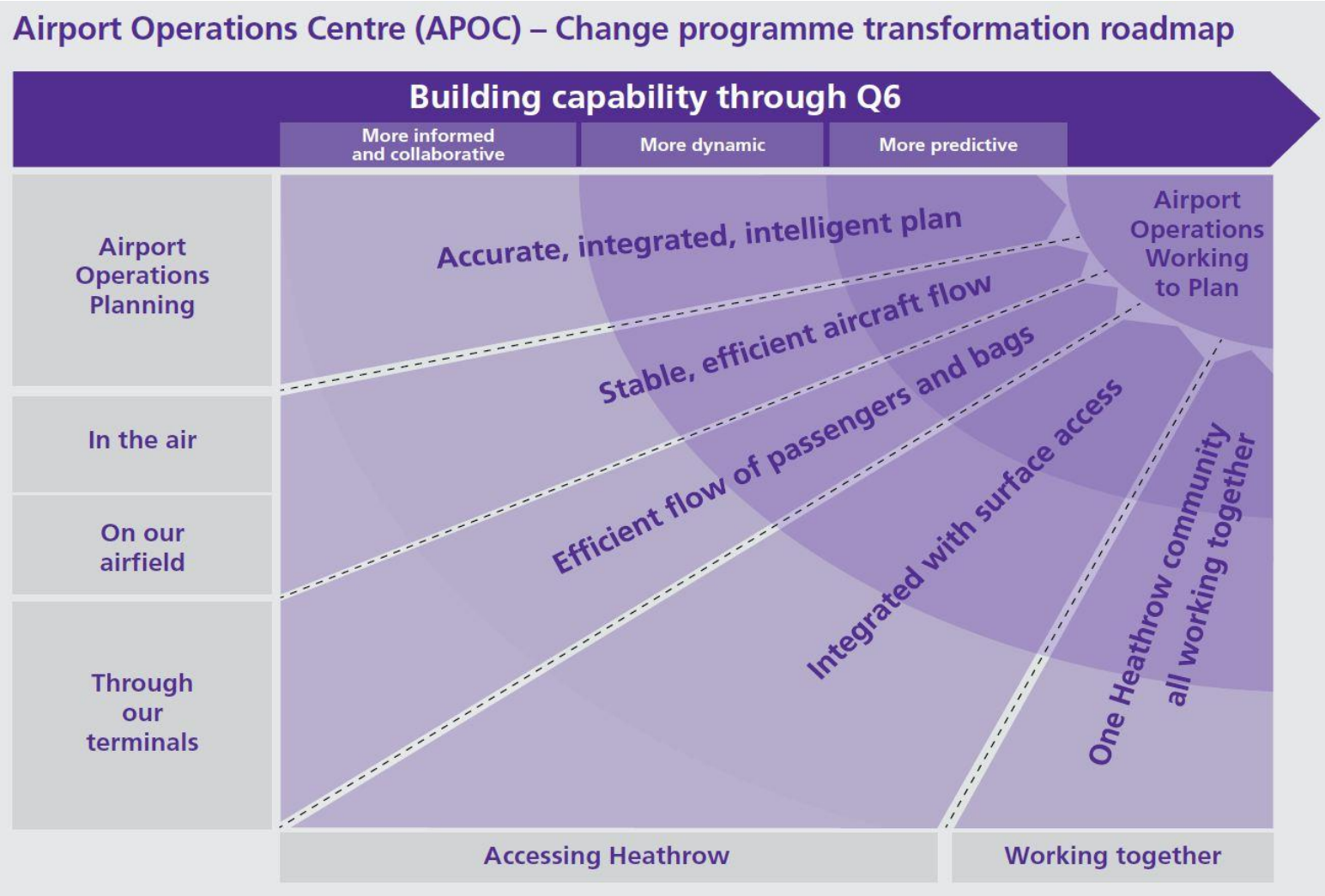
APOC



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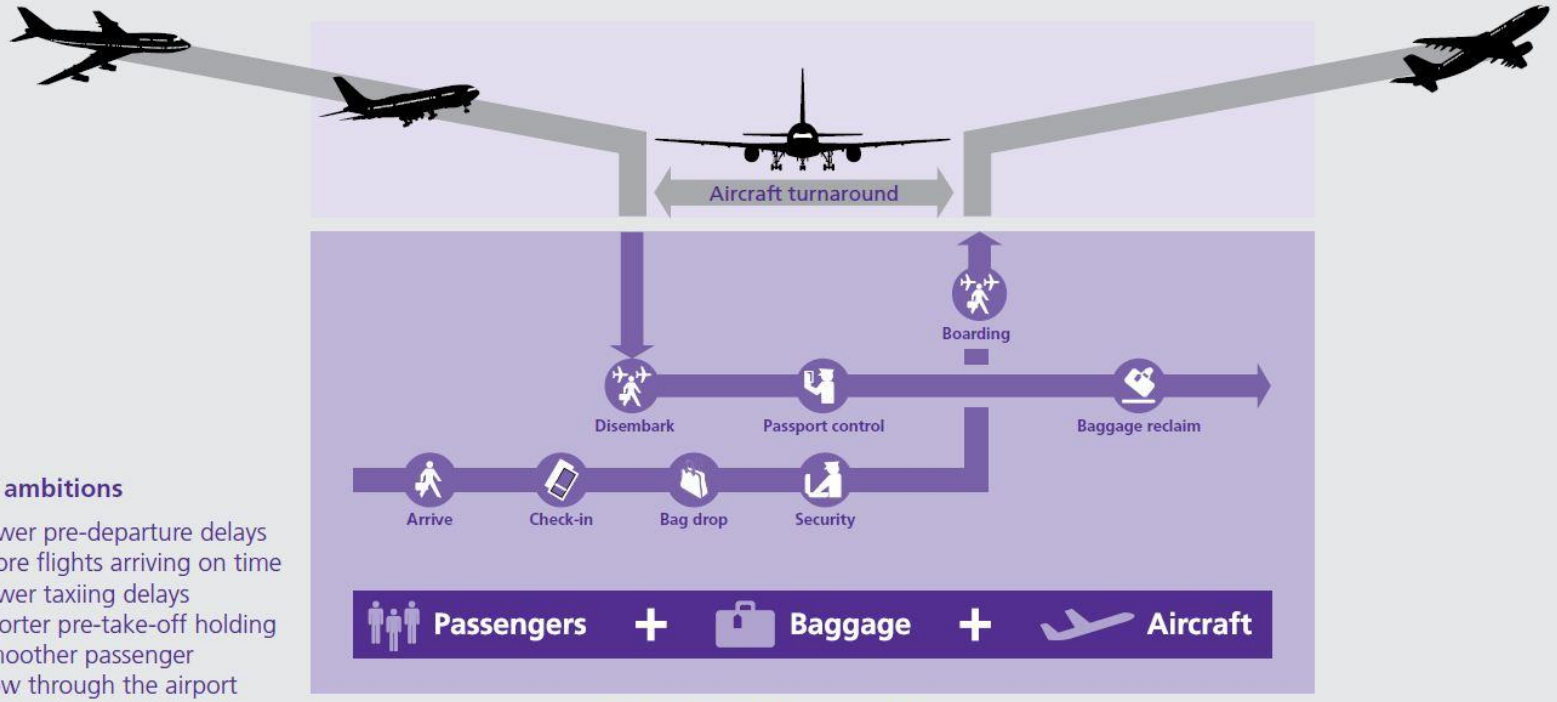
APOC

Operating to plan to reduce delay and improve flow



Our ambitions

- Fewer pre-departure delays
- More flights arriving on time
- Fewer taxiing delays
- Shorter pre-take-off holding
- Smoother passenger flow through the airport

The Intelligent Airport

APOC Management scans the wider horizon continually for optimum course of action and, if necessary, rebalances the Airport Operations Plan for example by issuing 'required time of arrival'.

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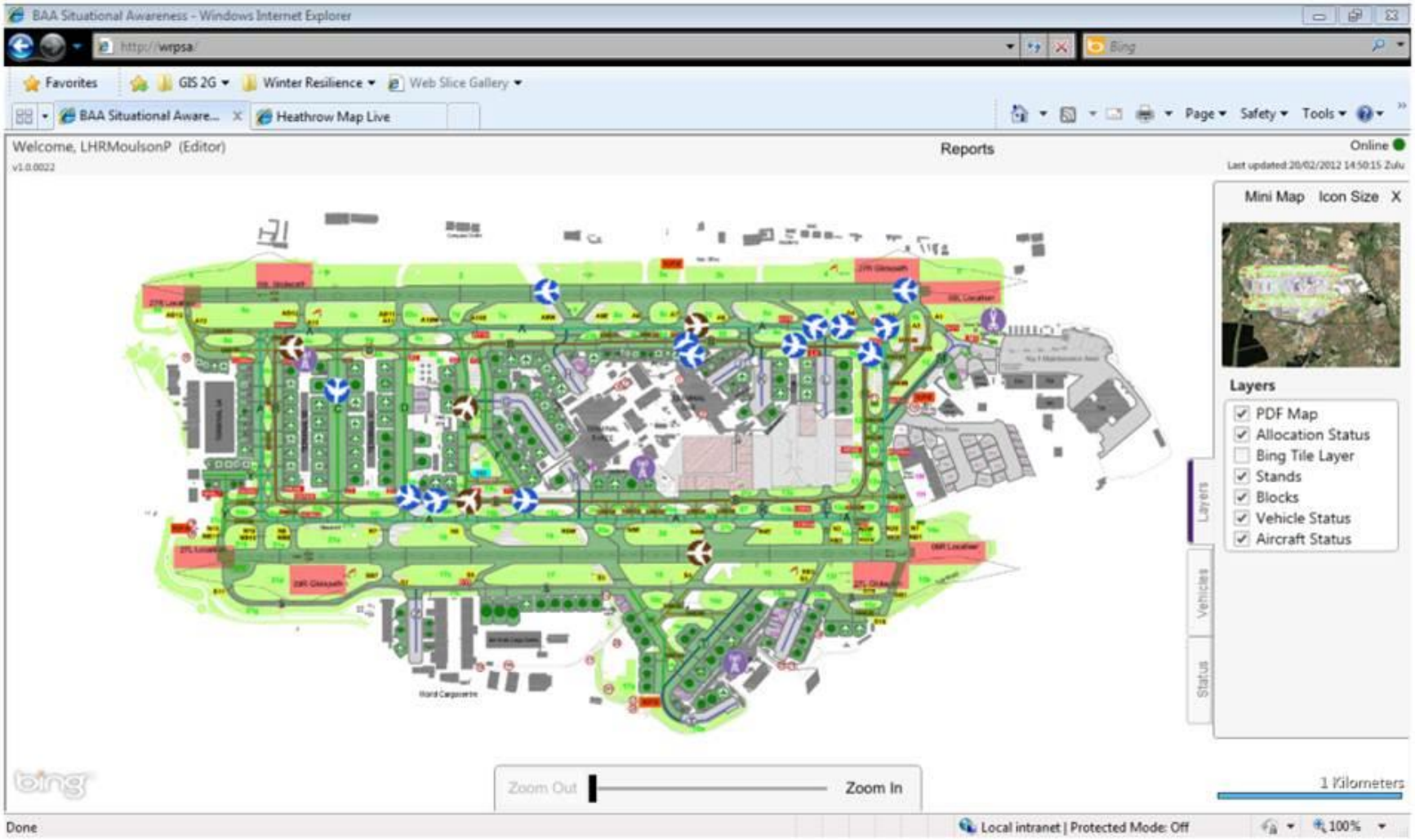
Situations Awareness



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Situation Awareness

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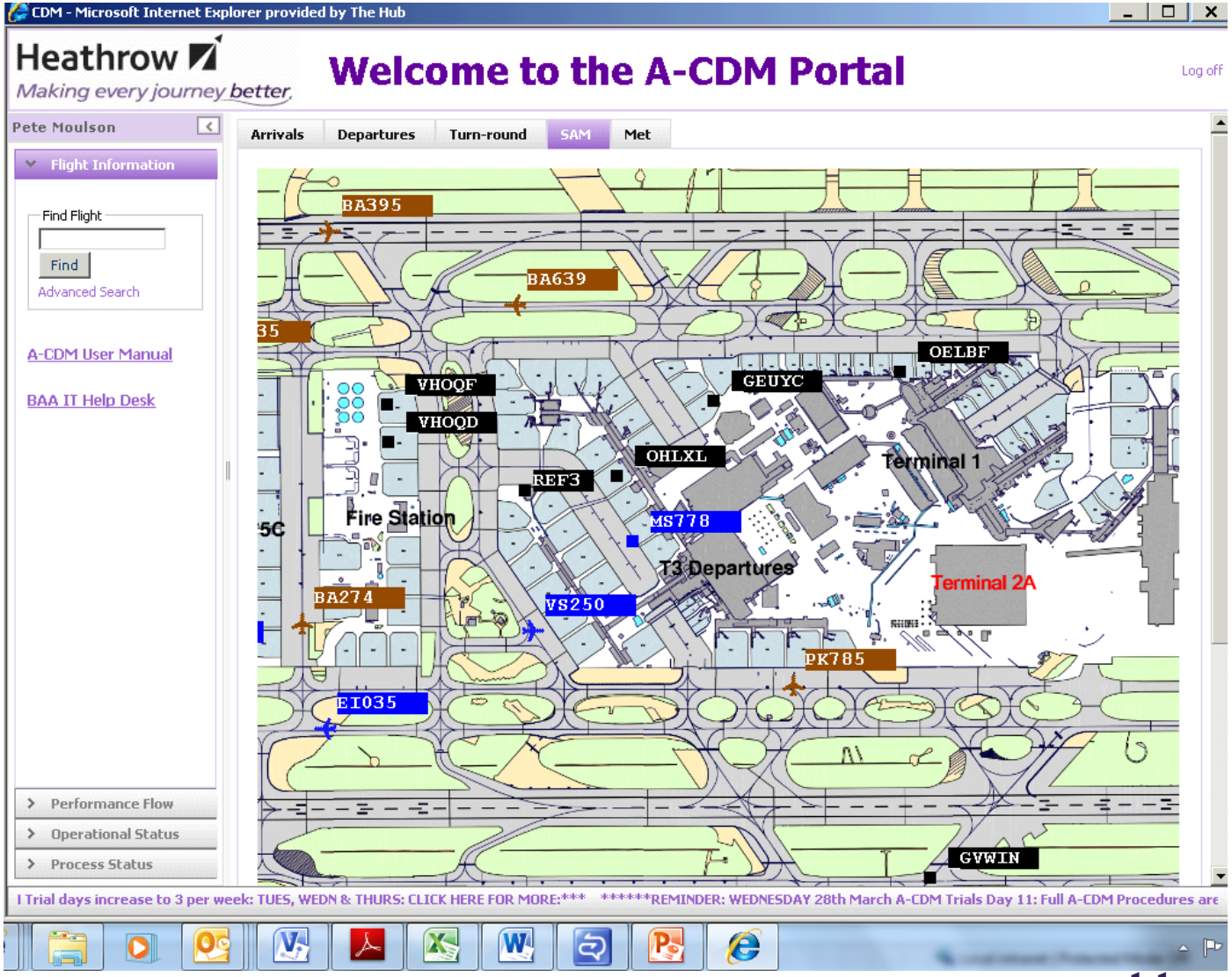
Airport Collaborative Decision Making



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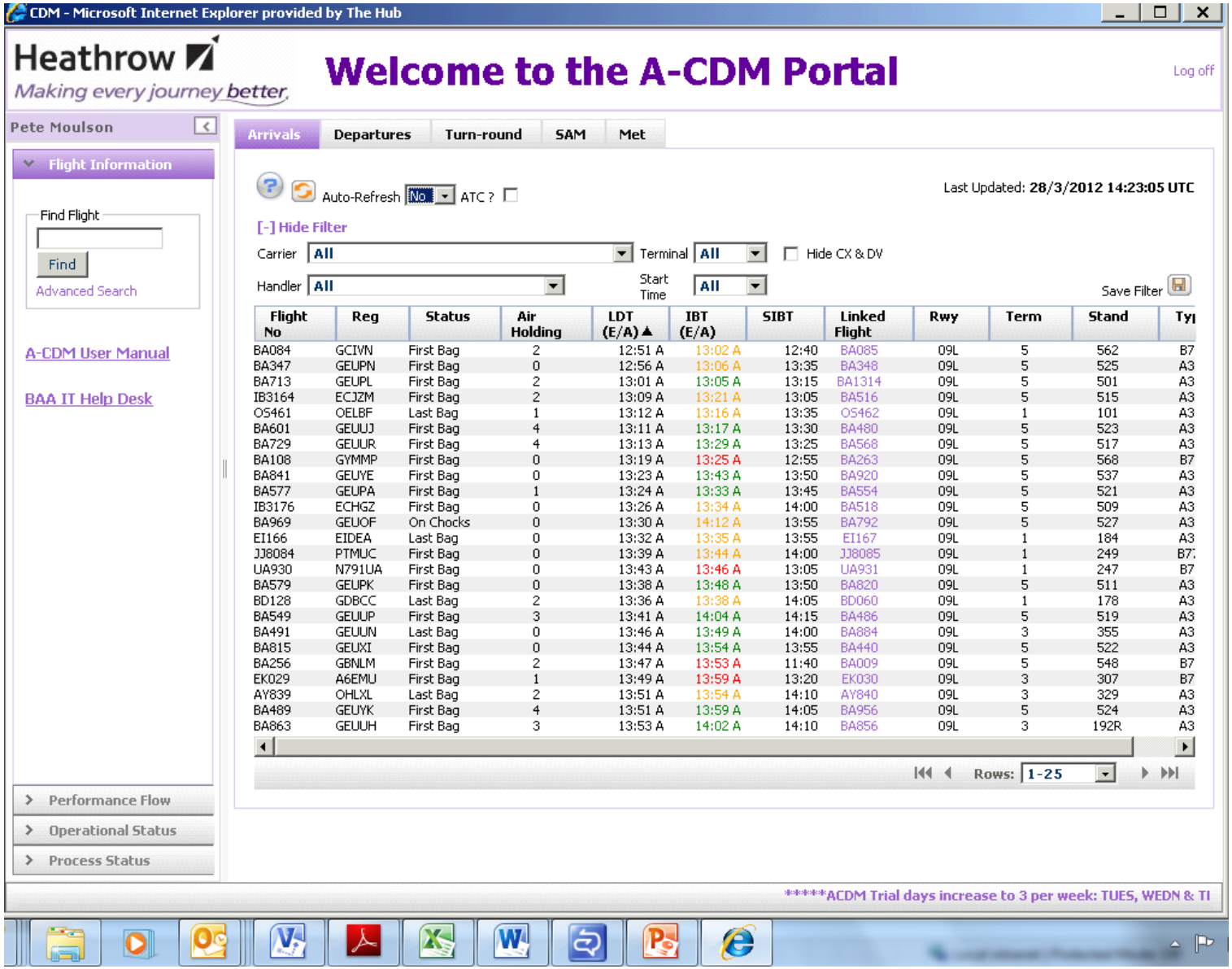

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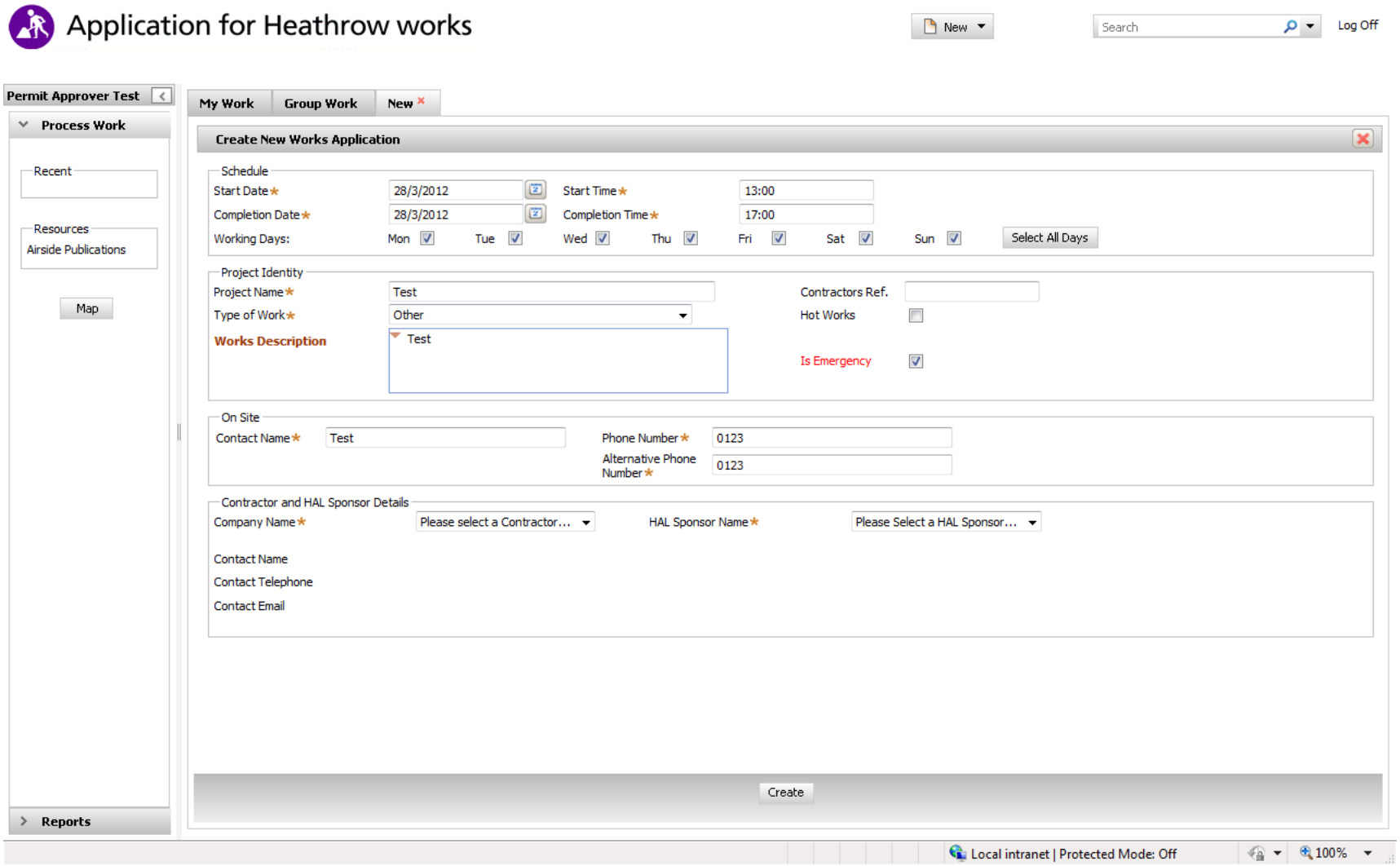
Airport Works Approval



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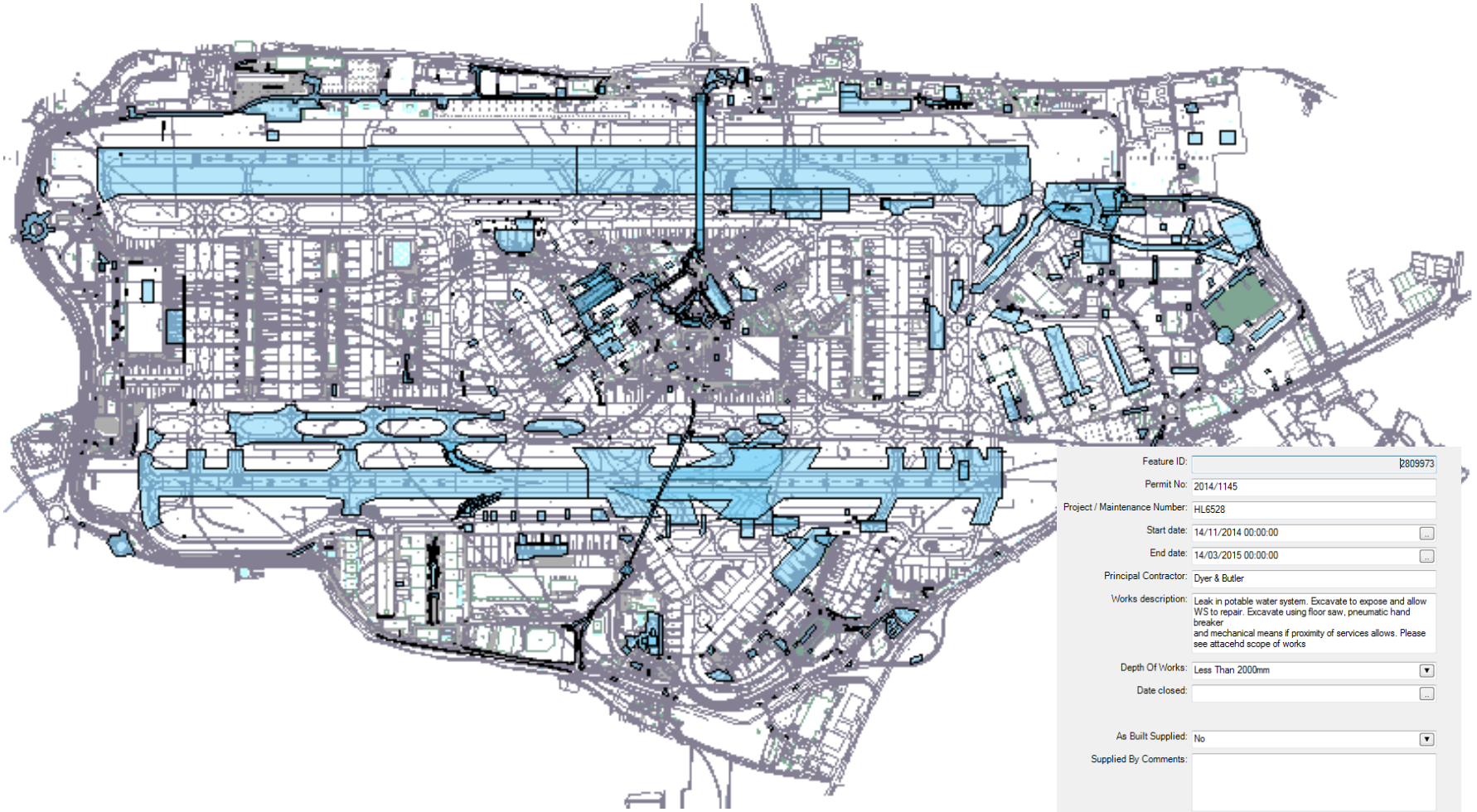
Heathrow current works – 1328 locations



Feature ID:	2809973
Permit No:	2014/1145
Project / Maintenance Number:	HL6528
Start date:	14/11/2014 00:00:00
End date:	14/03/2015 00:00:00
Principal Contractor:	Dyer & Butler
Works description:	Leak in potable water system. Excavate to expose and allow WS to repair. Excavate using floor saw, pneumatic hand breaker and mechanical means if proximity of services allows. Please see attacehd scope of works
Depth Of Works:	Less Than 2000mm
Date closed:	
As Built Supplied:	No
Supplied By Comments:	

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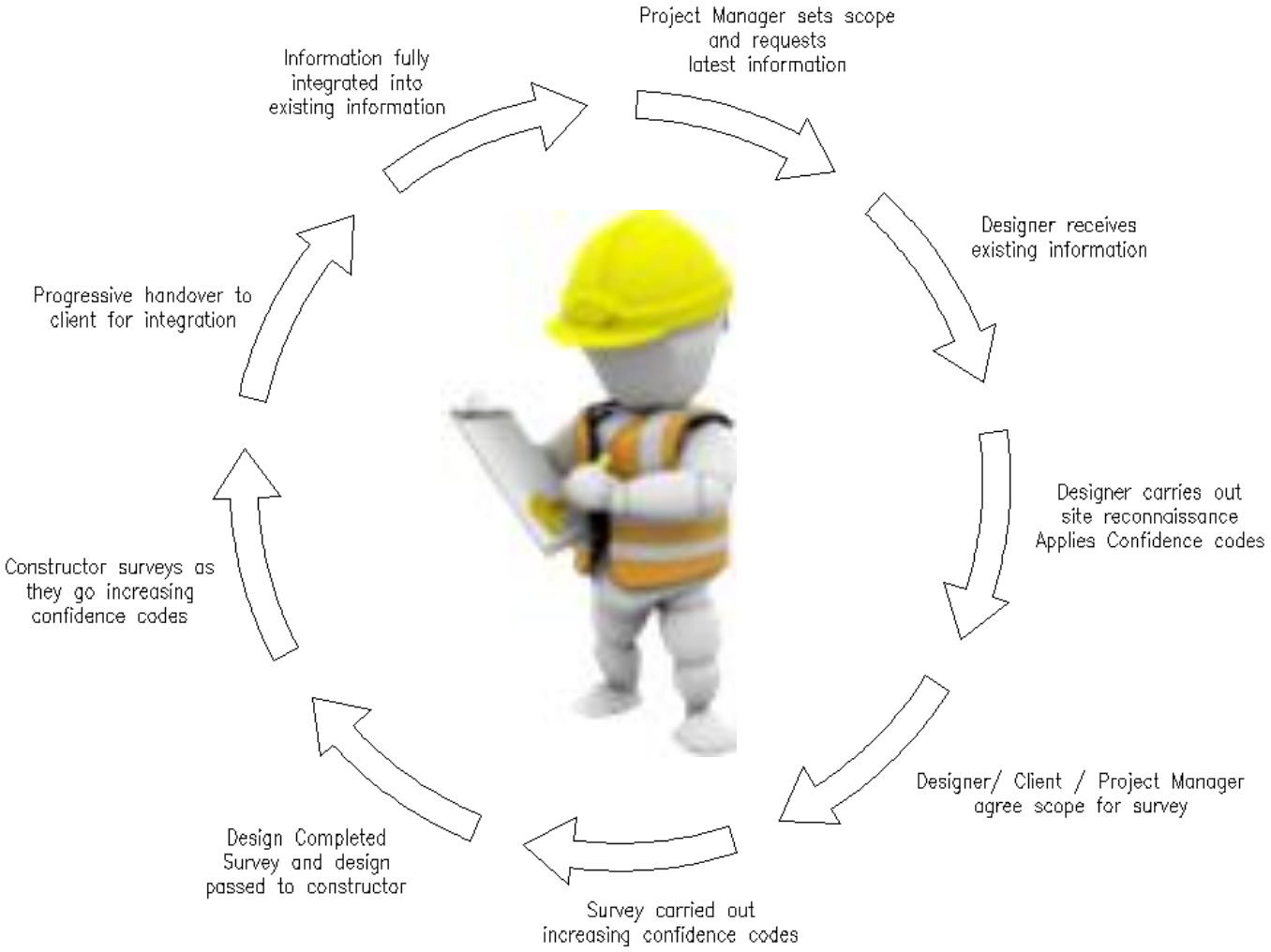
Validation Life Cycle



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External View

Government Construction Strategy - Deliver level 2 BIM by 2016

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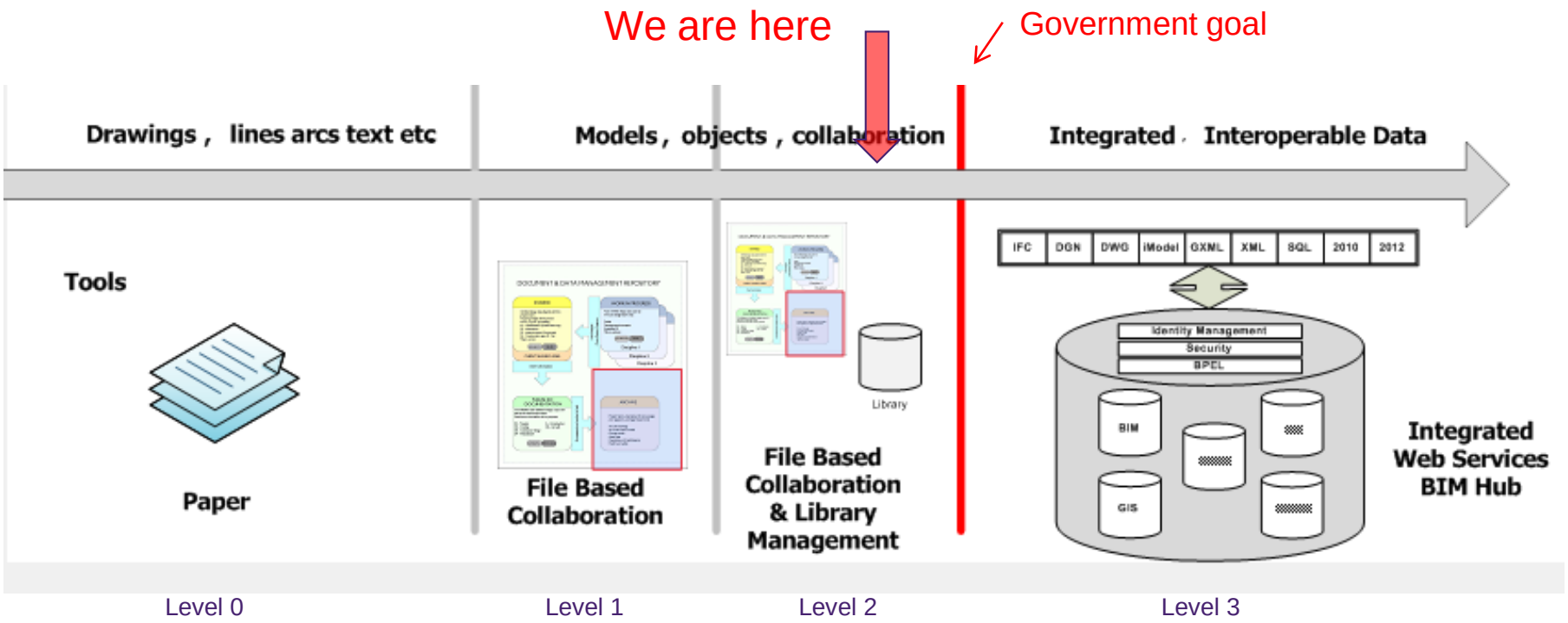

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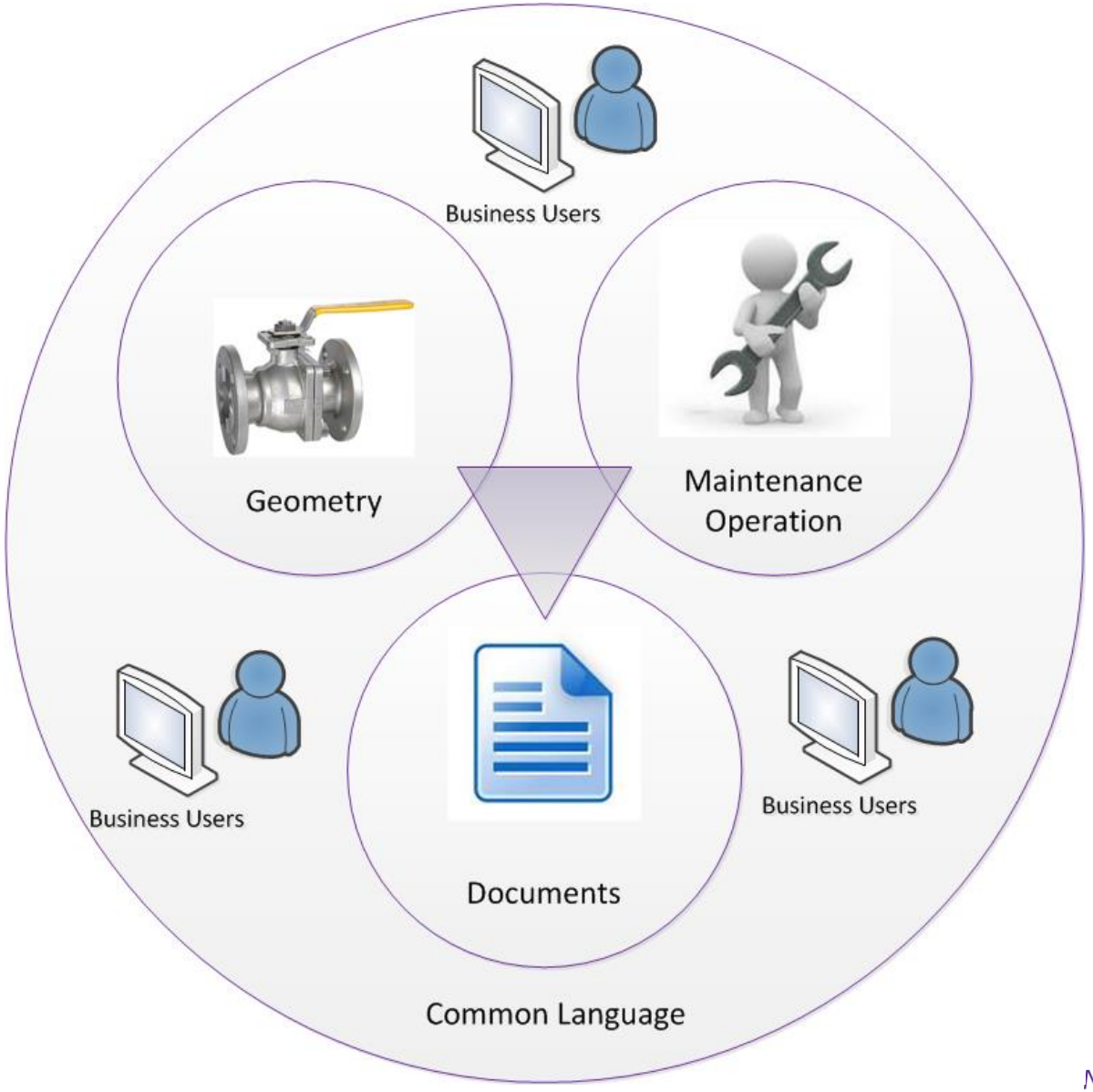
Proof of Concept

- As part of this piece of work we will build a prototype for a key asset system(s) to test our thinking and help us to visualise what a joined up view of our assets could look like and where the value is.

Dream or Reality



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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

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Our destination - Informed decisions supported by joined up data which is of a known quality

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Any questions?


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