

# Heathrow's BIM Journey

## Importance of confidence in the information

11-11-15

Andy Rhoades – Head of Service Protection

**Heathrow**  
Making every journey better

# Heathrow is a unique airport for the UK

World's busiest international airport

>70% of UK's long haul flights,  
>50% of all UK air freight

Employs 76,500 people,  
c. 100,000 indirect jobs

UK's fifth largest shopping venue

c.72 million passengers and 471,341 flights in 2013

181 destinations in 87 countries

Top European airport for A380s

Top routes

- New York
- Dubai
- Dublin
- Frankfurt
- Amsterdam

35% of passengers are transfers,  
30% business







# Would you like to dig here?



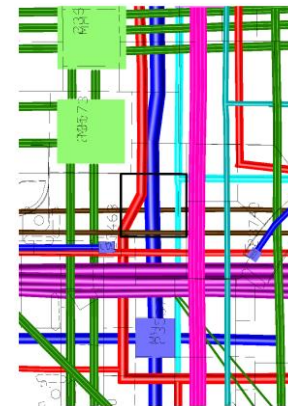
September 2013

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 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.





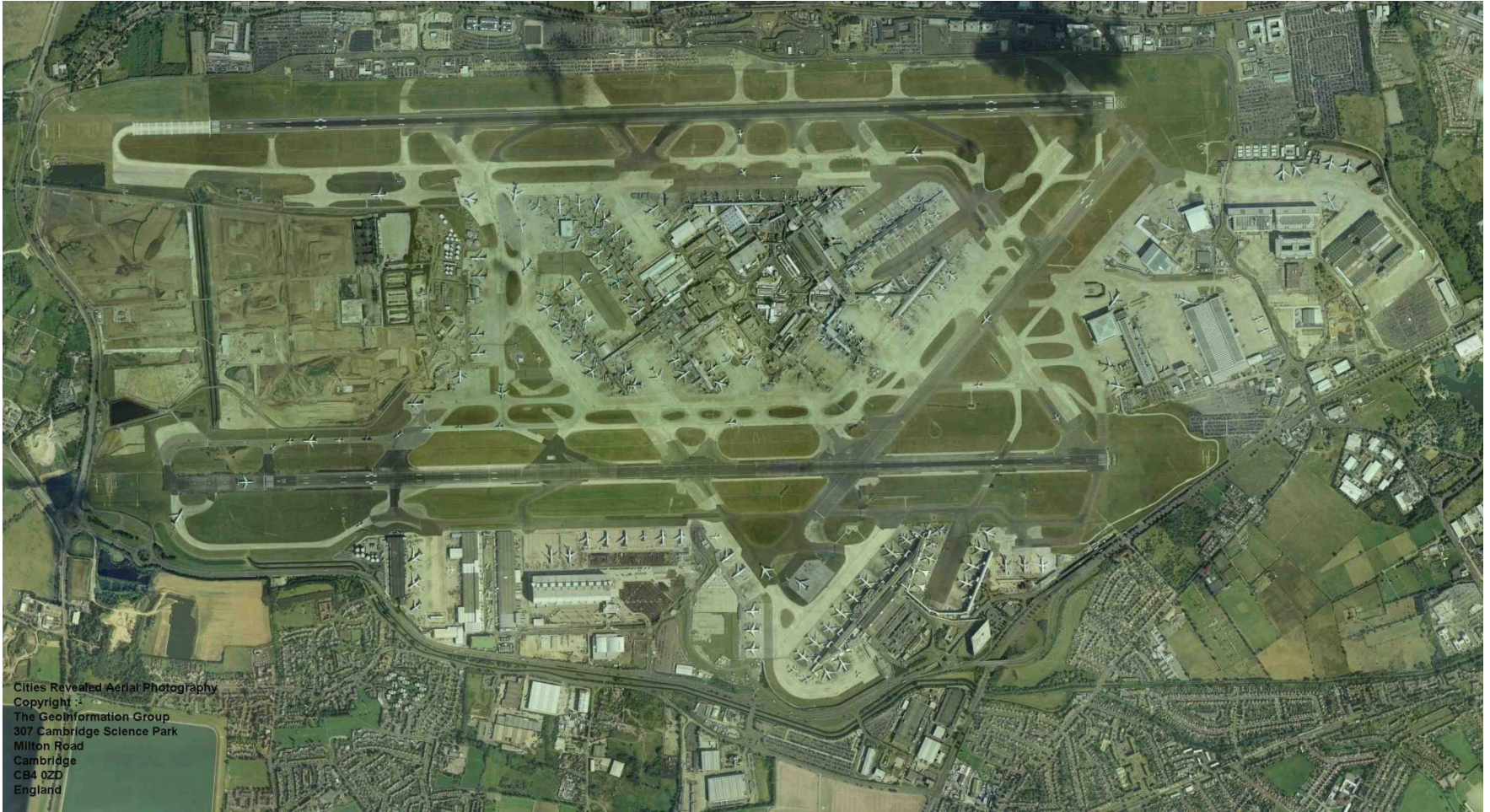
# Heathrow Through the Years - 1993



0% Accuracy of Service Information



# Heathrow Through the Years - 2002

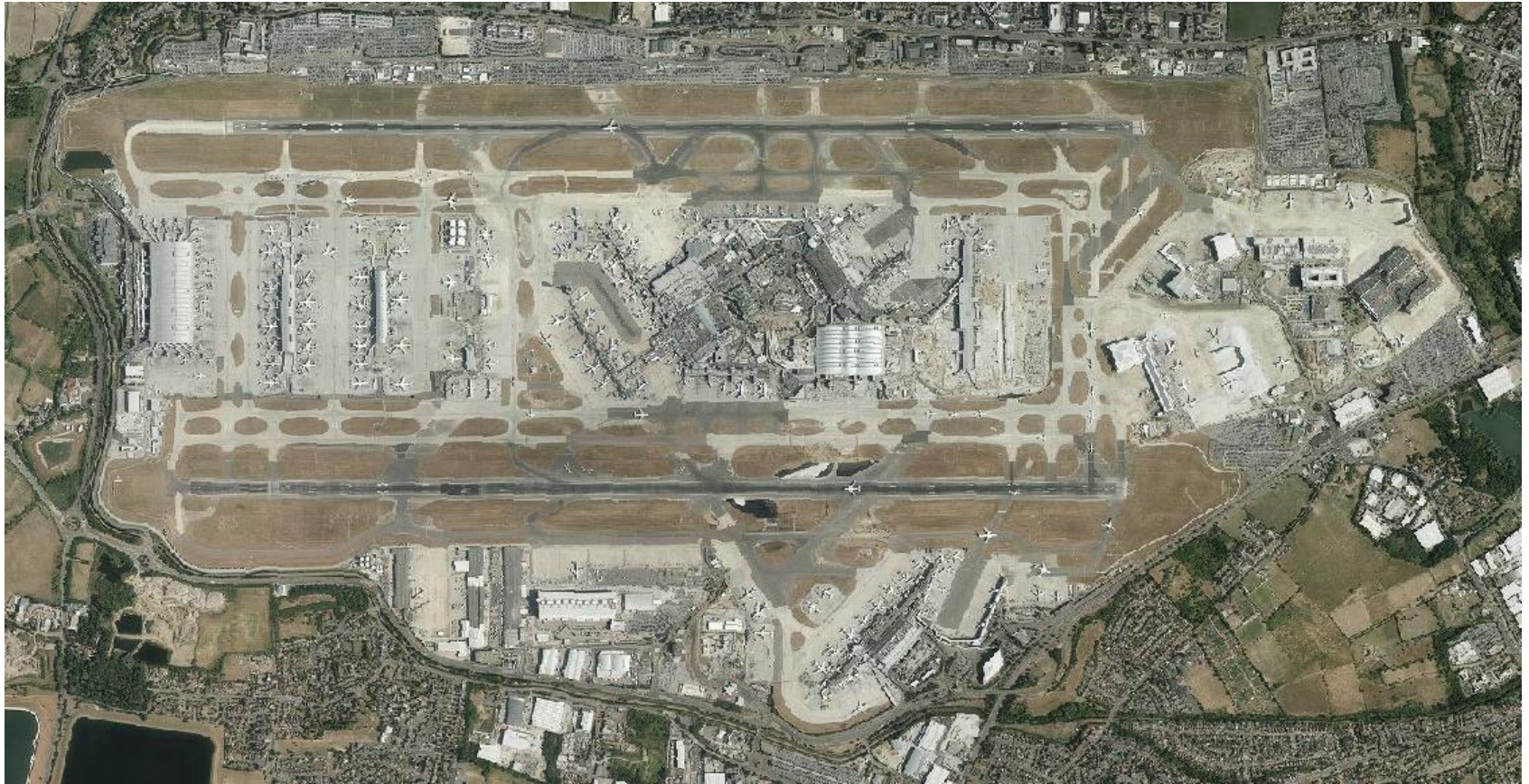


Cities Revealed Aerial Photography  
Copyright :  
The GeoInformation Group  
307 Cambridge Science Park  
Milton Road  
Cambridge  
CB4 0ZD  
England

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



# Heathrow Through the Years - 2013



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



# 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



# The Vision





2035





2035

New T6



Extended T2  
& new CTA

**Heathrow**  
Making every journey better

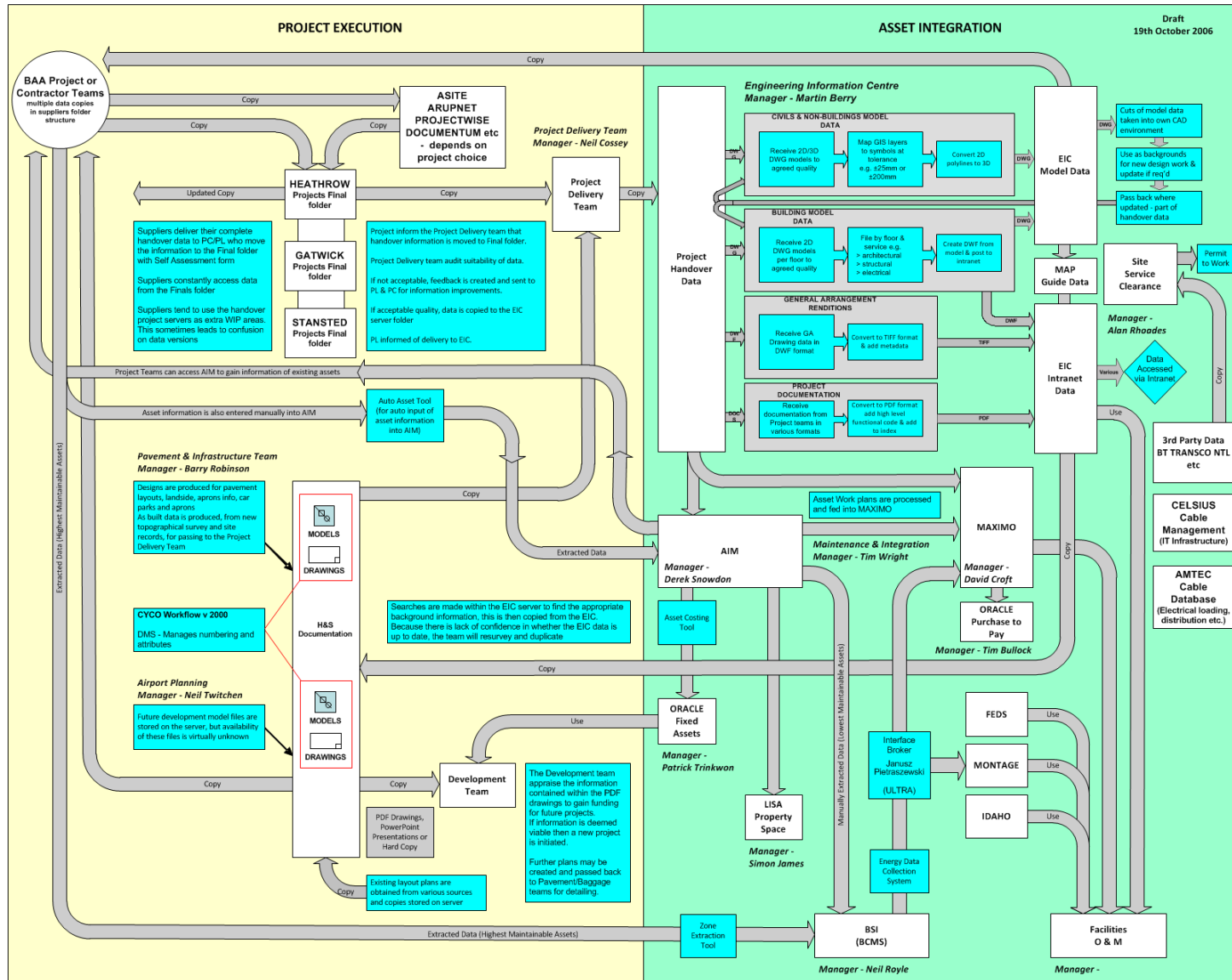


## 1994 - Out of Crisis Comes Investment





# Where did we start?





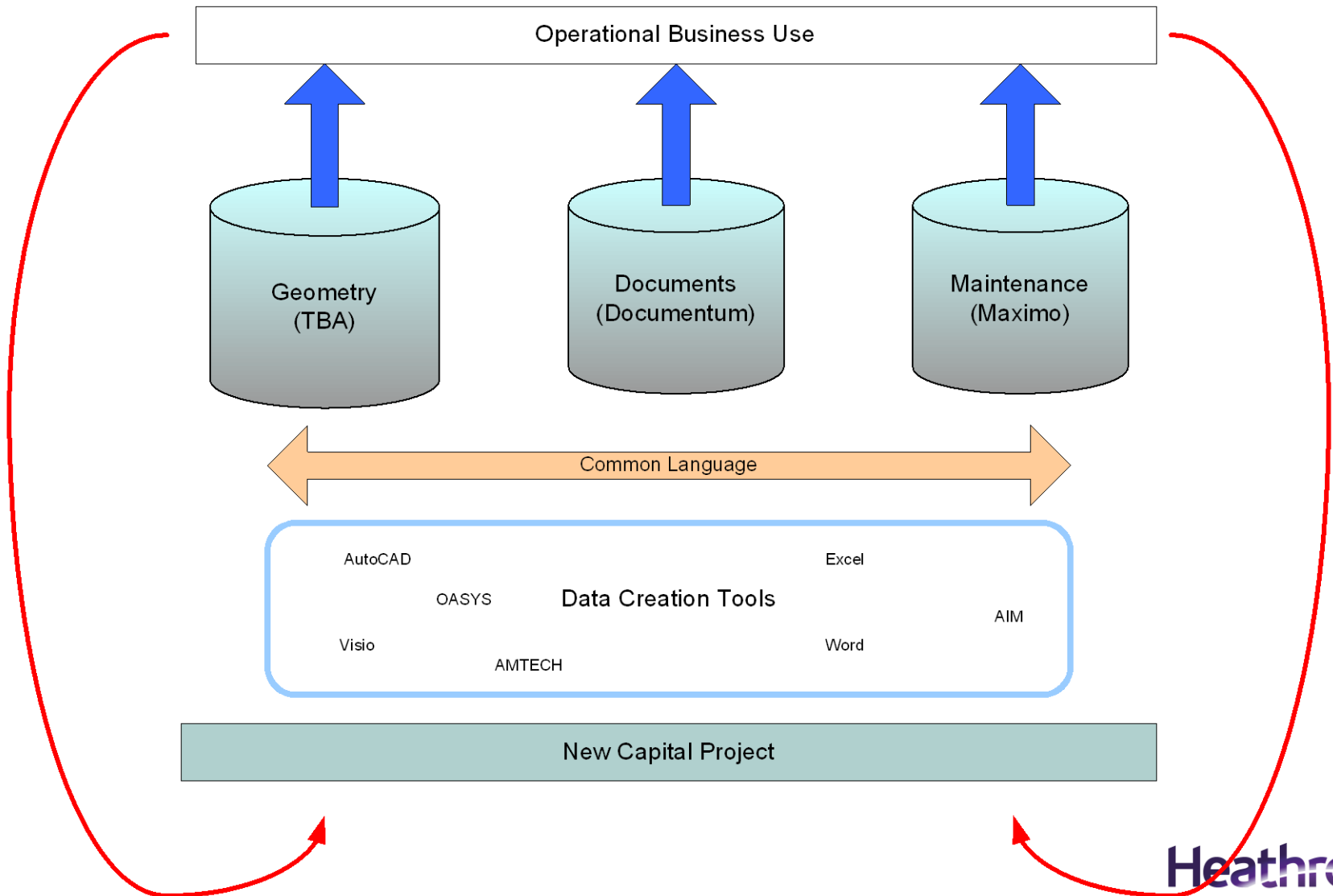
# 2006 – Maximo 5.2 implemented and T5 becoming a reality

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





# Asset Technical Data Vision



# 2007 – Common Language Mandatory

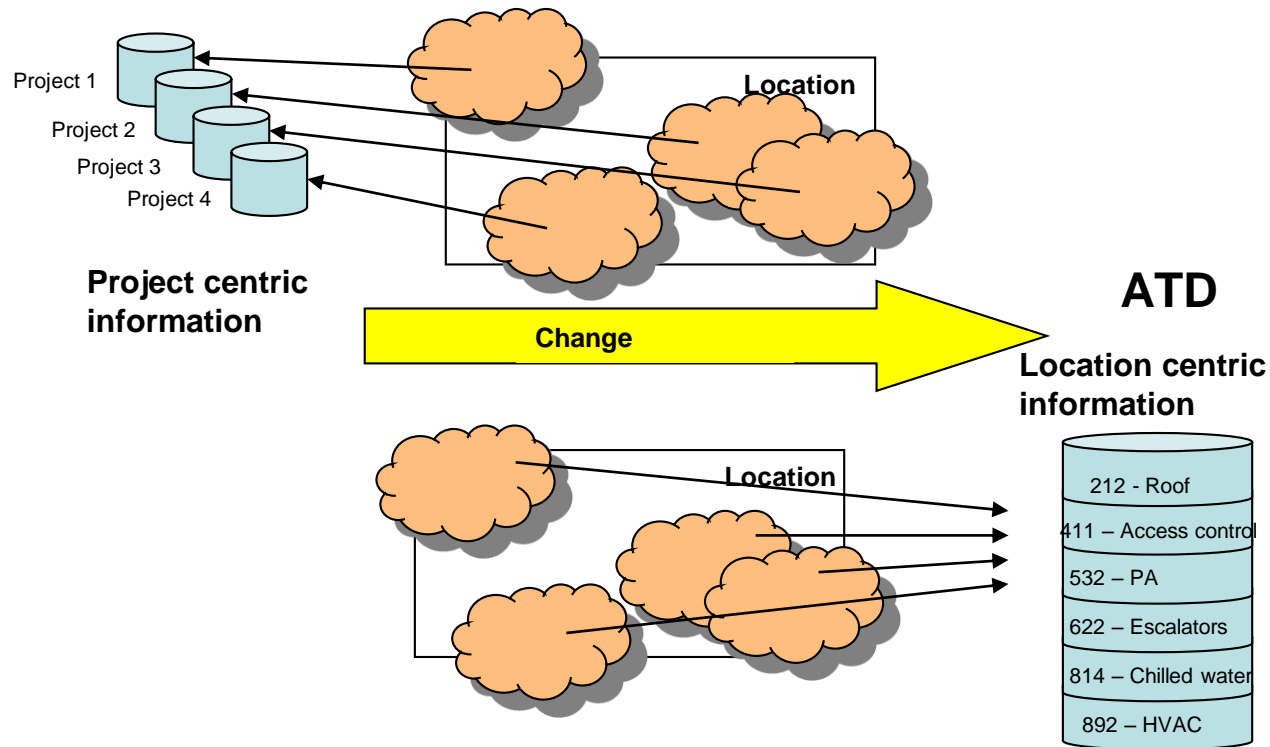




# 2008 – Project Information Delivery

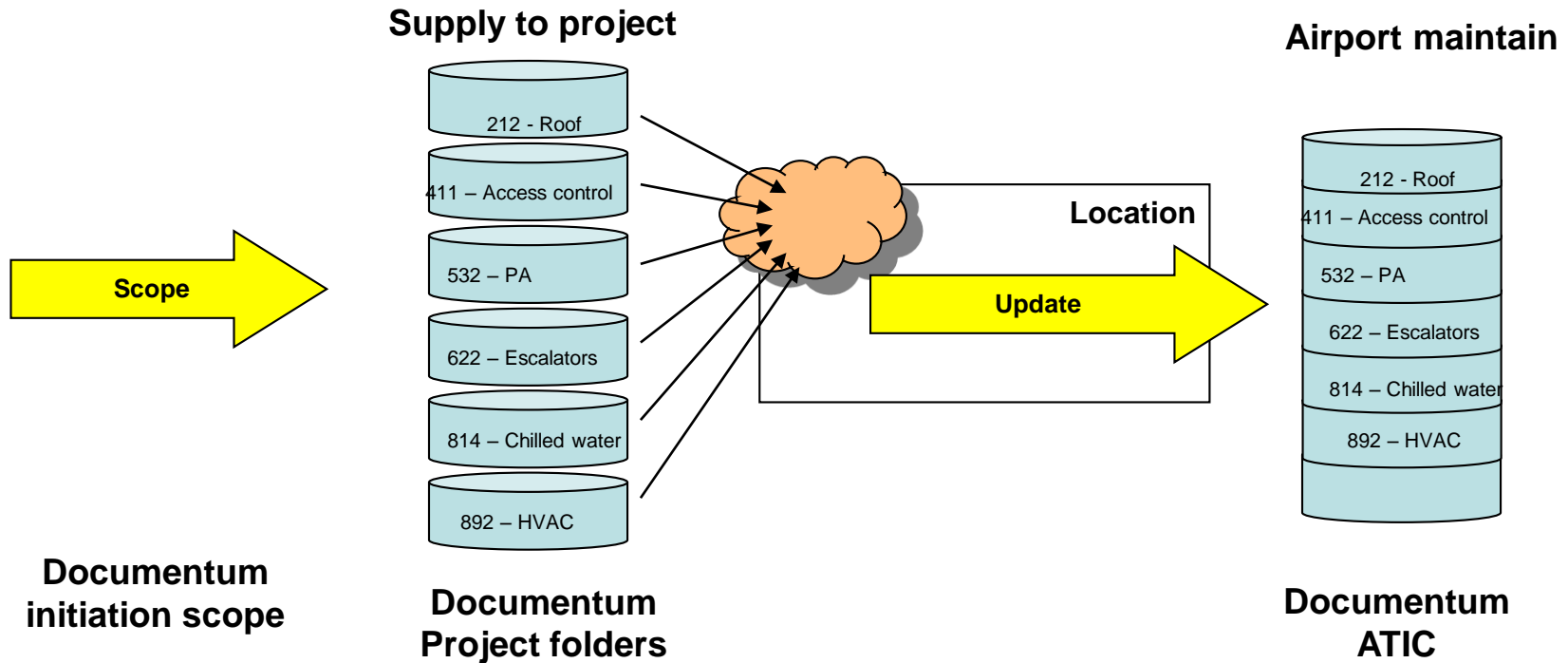
- Formalised Asset Technical Data requirements in contracts
- Information moves to being location centric rather than project centric
- New philosophy to update exiting information rather than create new
- Plan information deliverables from the start of a project
- Progressive handover of information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

# Change from project information stacking to location information management





# H&S File - supply and update principles



# 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



# Industry and Government View

*“BIM...is seen as having the greatest potential to transform the habits and eventually the structure of the industry”*



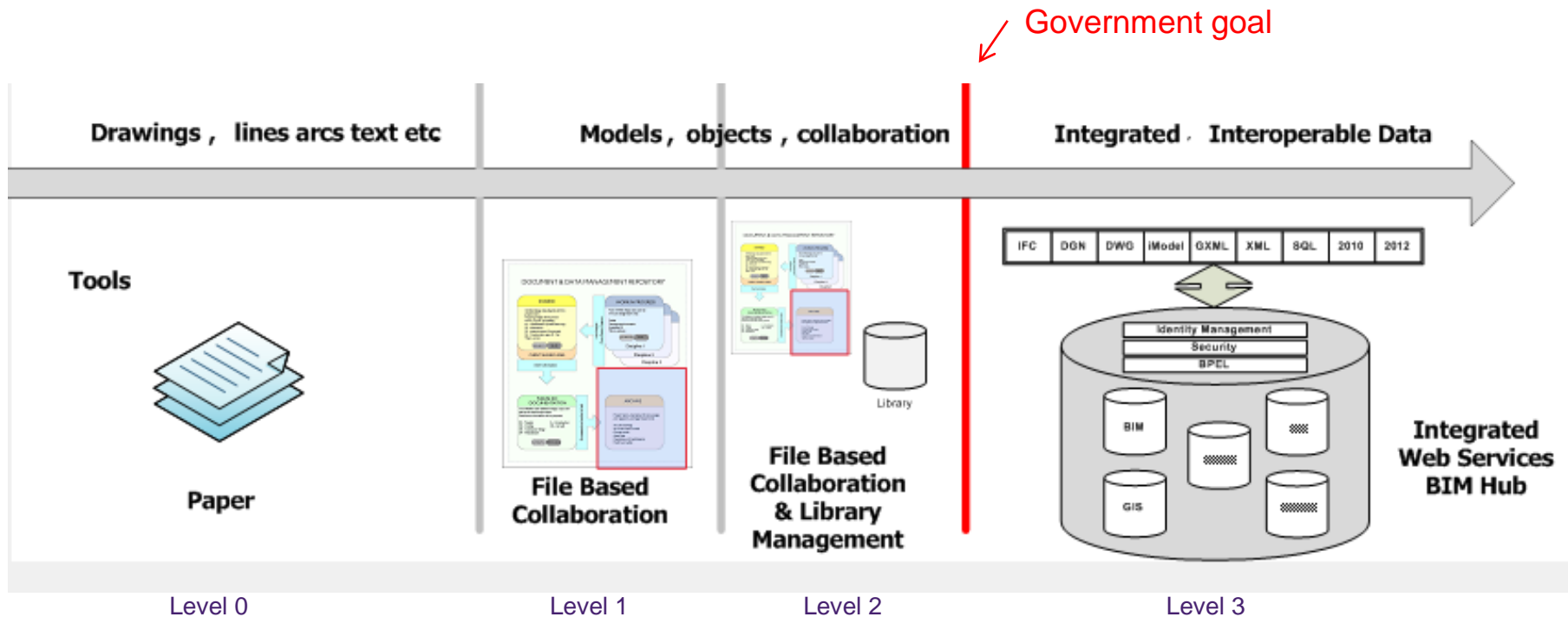
Paul Morrell – UK government chief construction advisor

# 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”*





# 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.”*

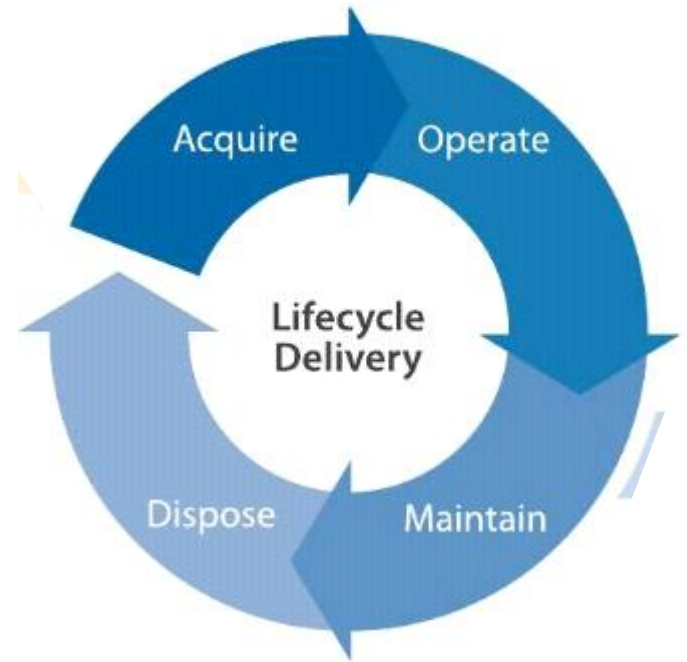
The same principles apply whether it is a building, a gas main or an AGL light fitting on a runway.

# 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.....”





# 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?

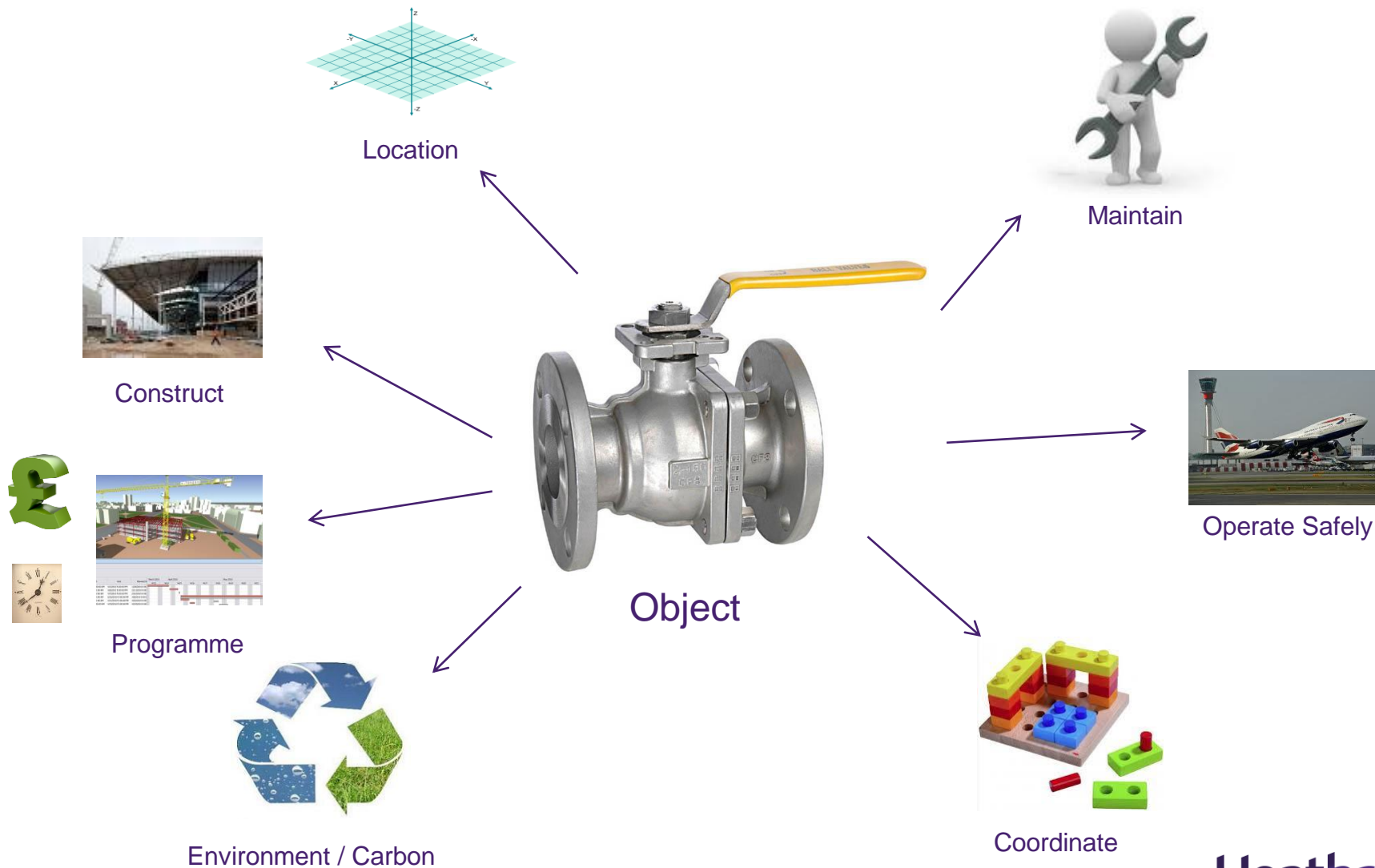


1. How critical is this escalator to the operation of Heathrow?
2. What is the risk if this escalator stops working?
3. How likely is this to happen?
4. How is this risk being mitigated?
5. Do we have a contingency plan for this asset in case the worst happens?

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

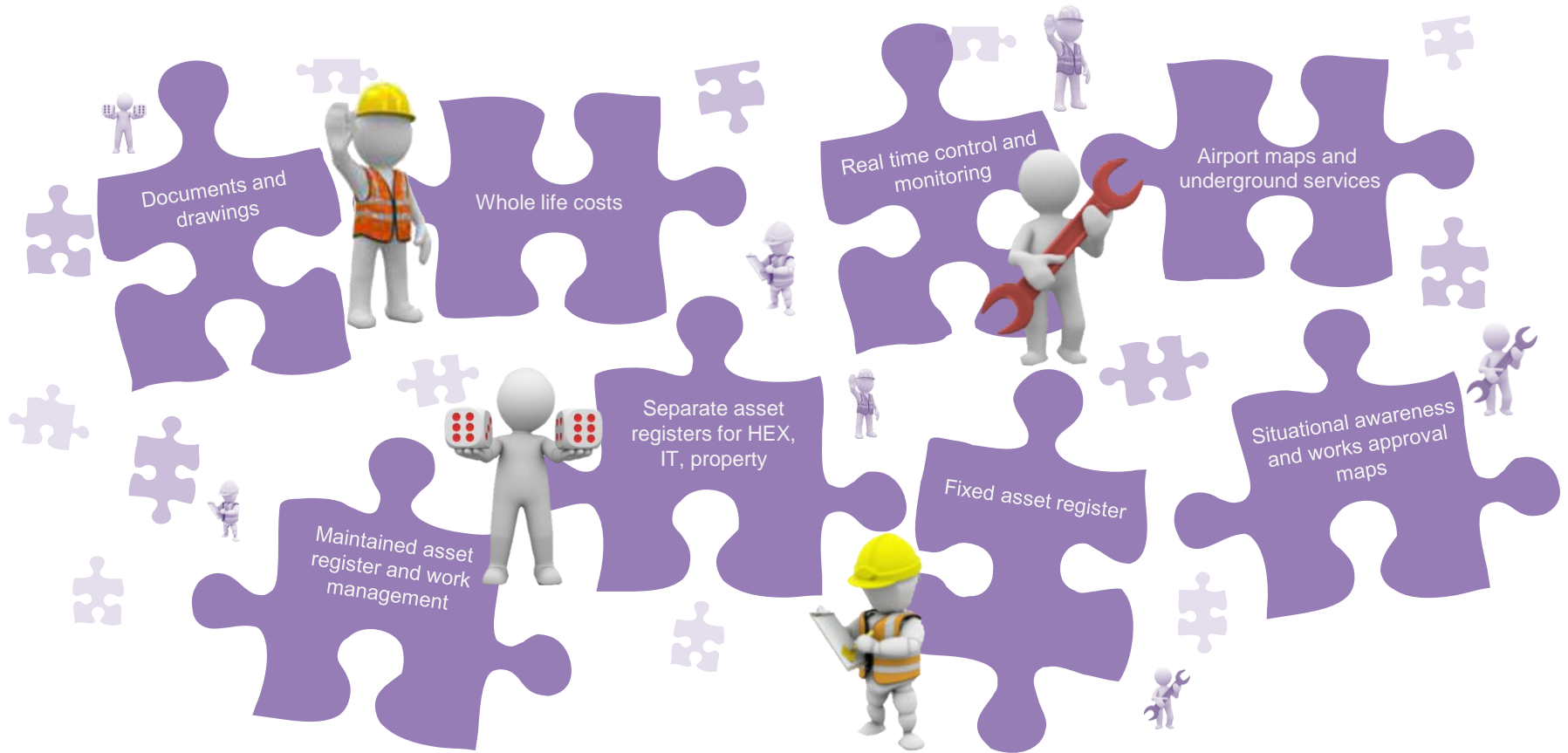


# Object showing Business uses





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

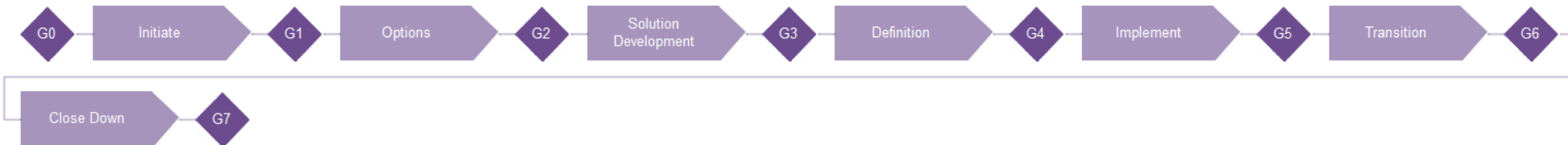
Know the current status of an asset and improve our prediction of when it might fail



Allow us to visualise at any one time which permits are active on the airport

# 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

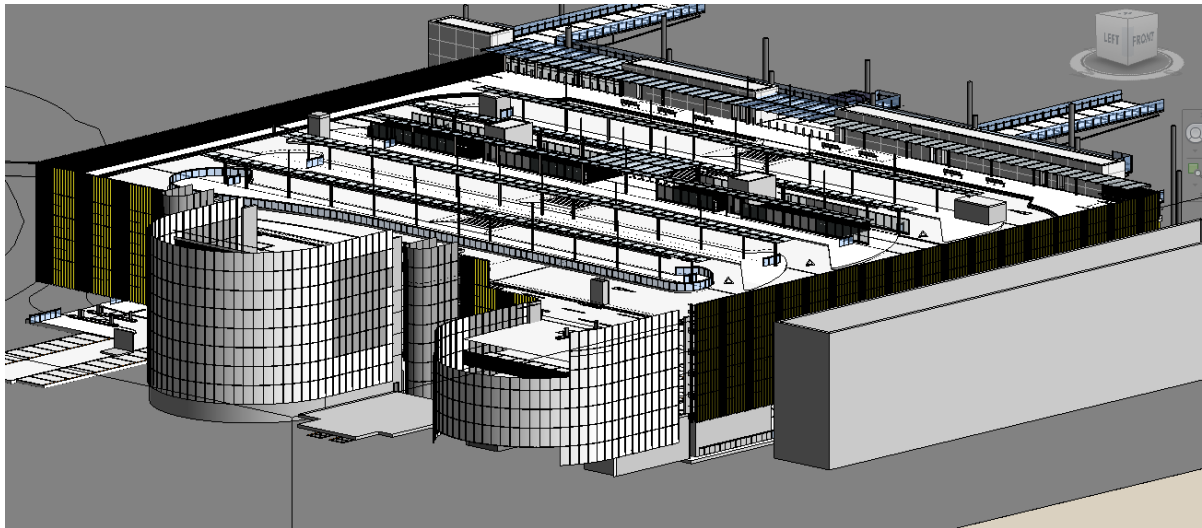
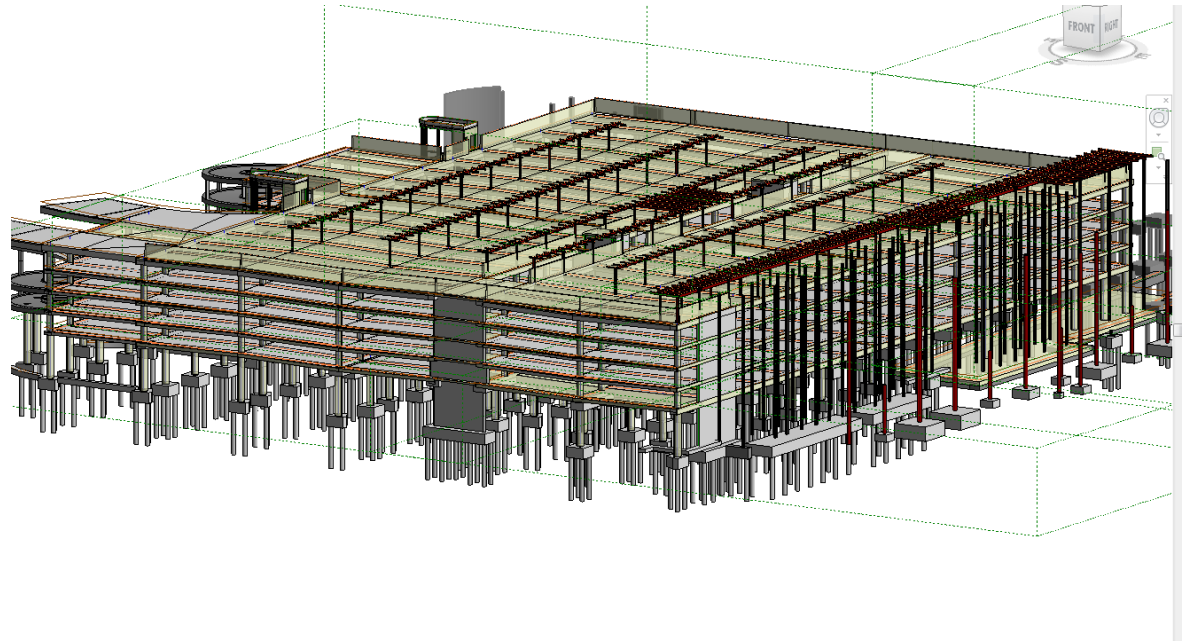


- Heathrow Map Live giving the business visibility to model information  
Model information in one place



# Design Models

## T2A Car park



# 2010 – 2015



2010 AssetNet launched

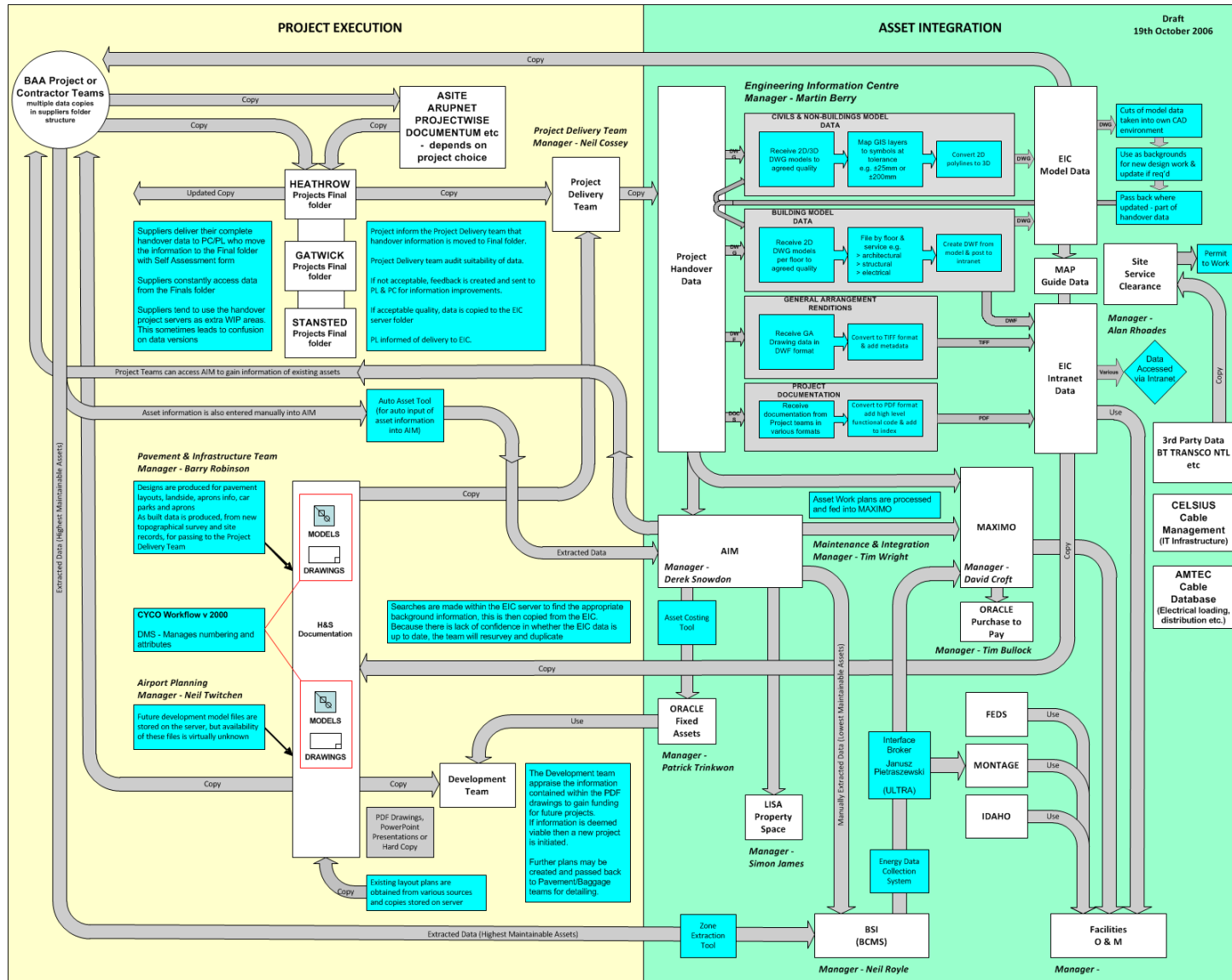
2011 Heathrow Map Live is born

2014 APOC goes live

2015 Mobile Maximo & External access  
to Heathrow Map Live

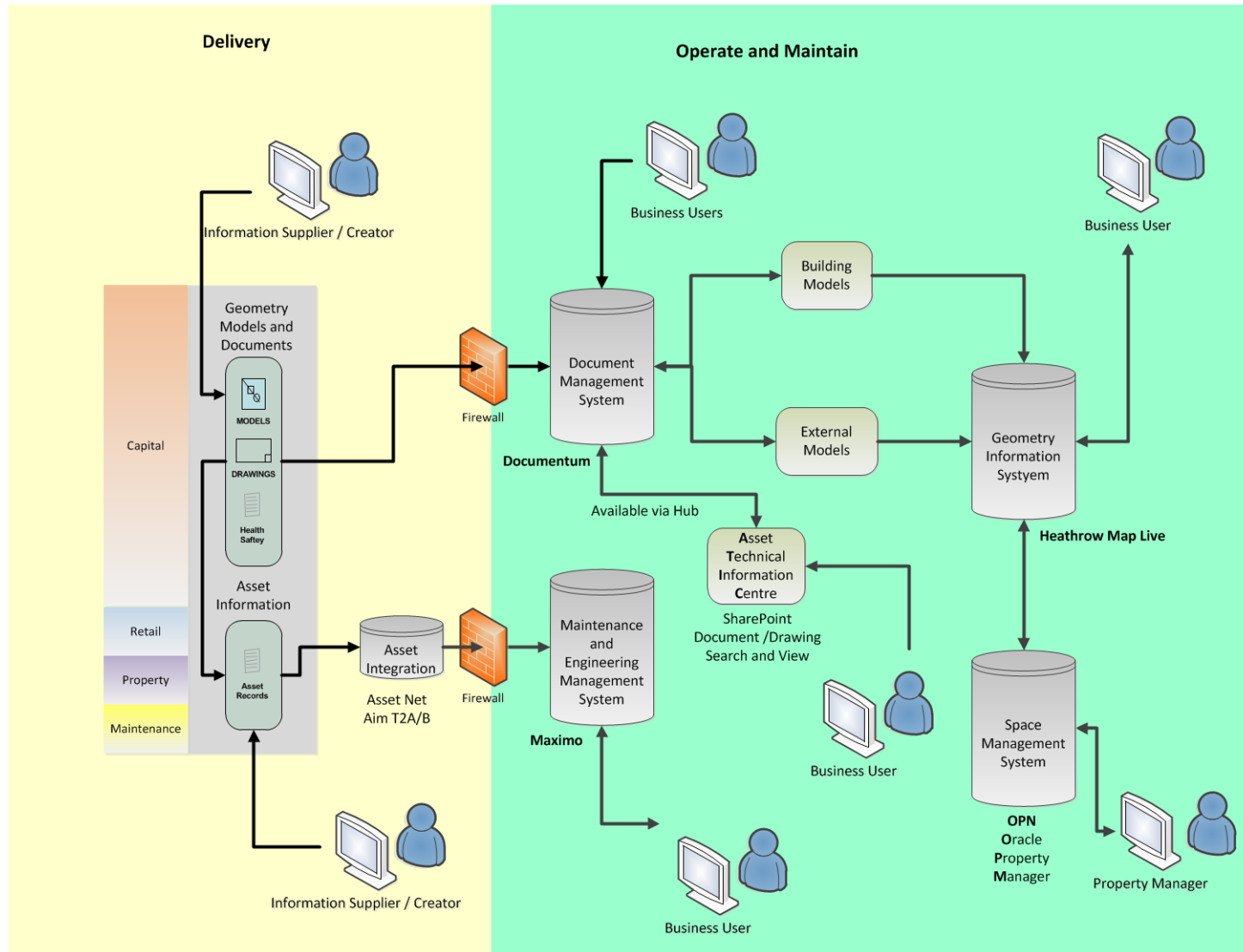
2015 SSoW licenses including survey

# Where did we start?

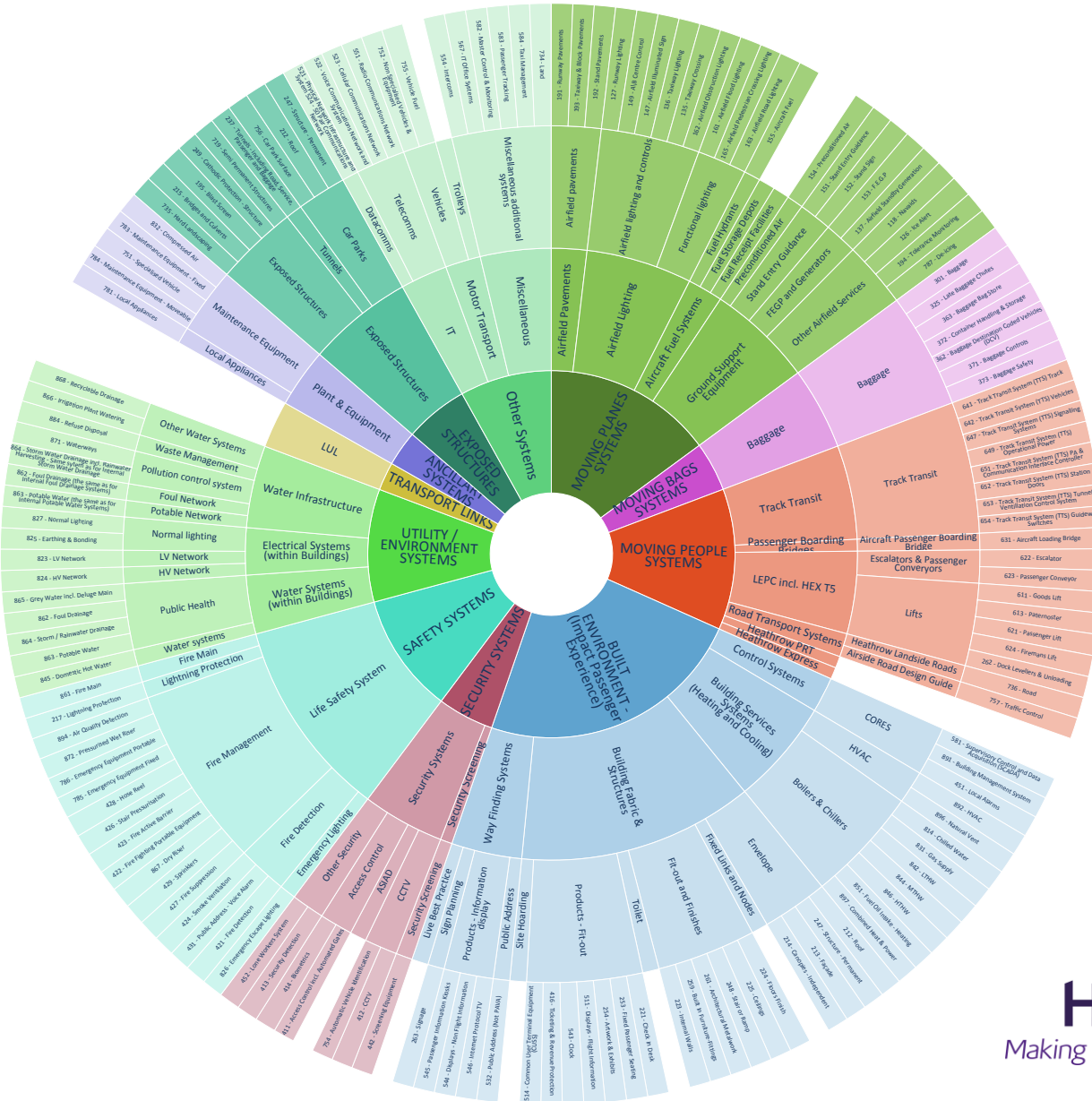




# Information Flows 2013



## 2007 – Common Language Mandatory



# Why Maintain Information about our Assets

- Operate our airport safely
- Make informed decisions

Also...

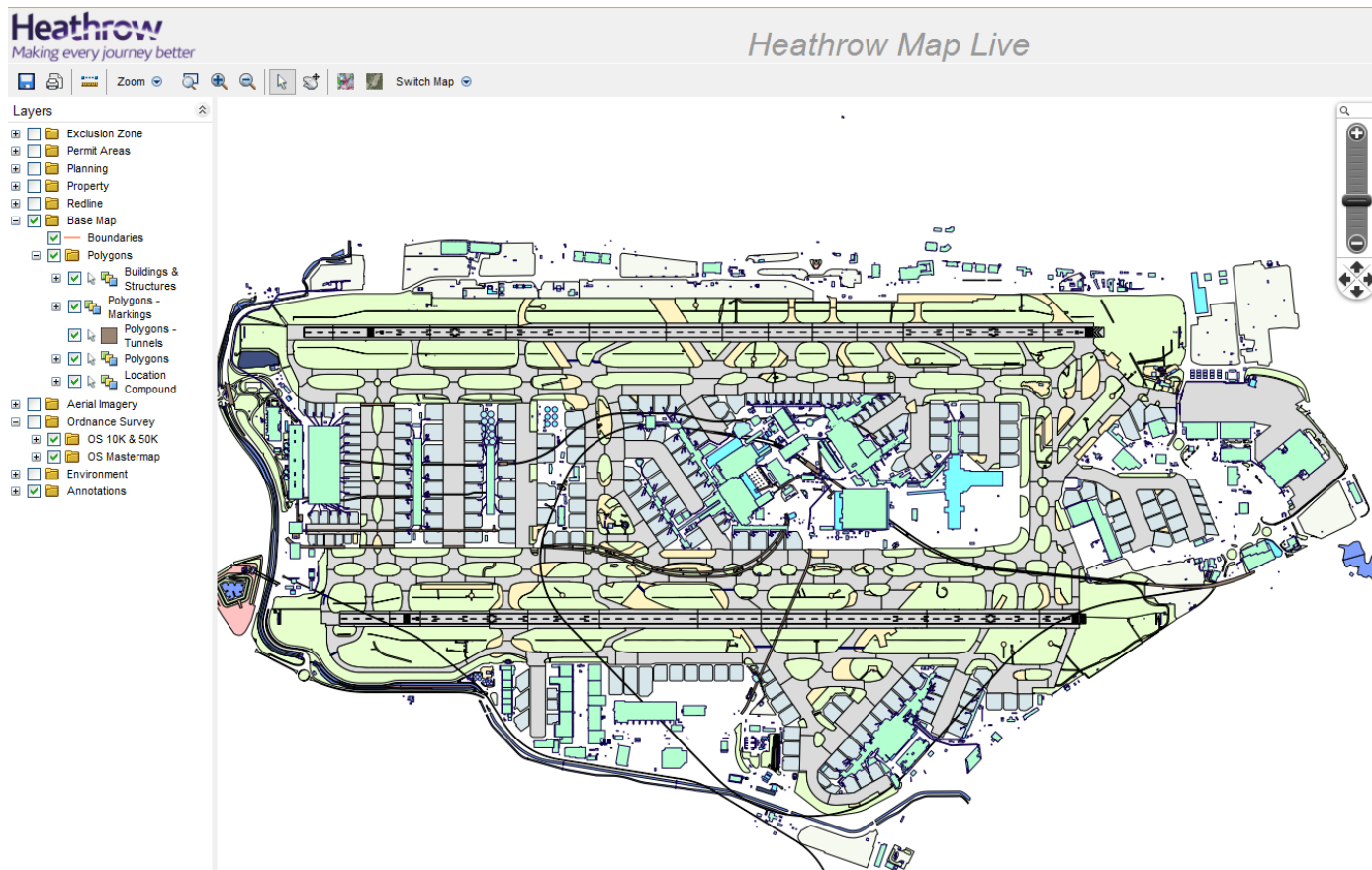
- CDM (Construction Design Management) regulations
- Corporate manslaughter act





# 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



# 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.

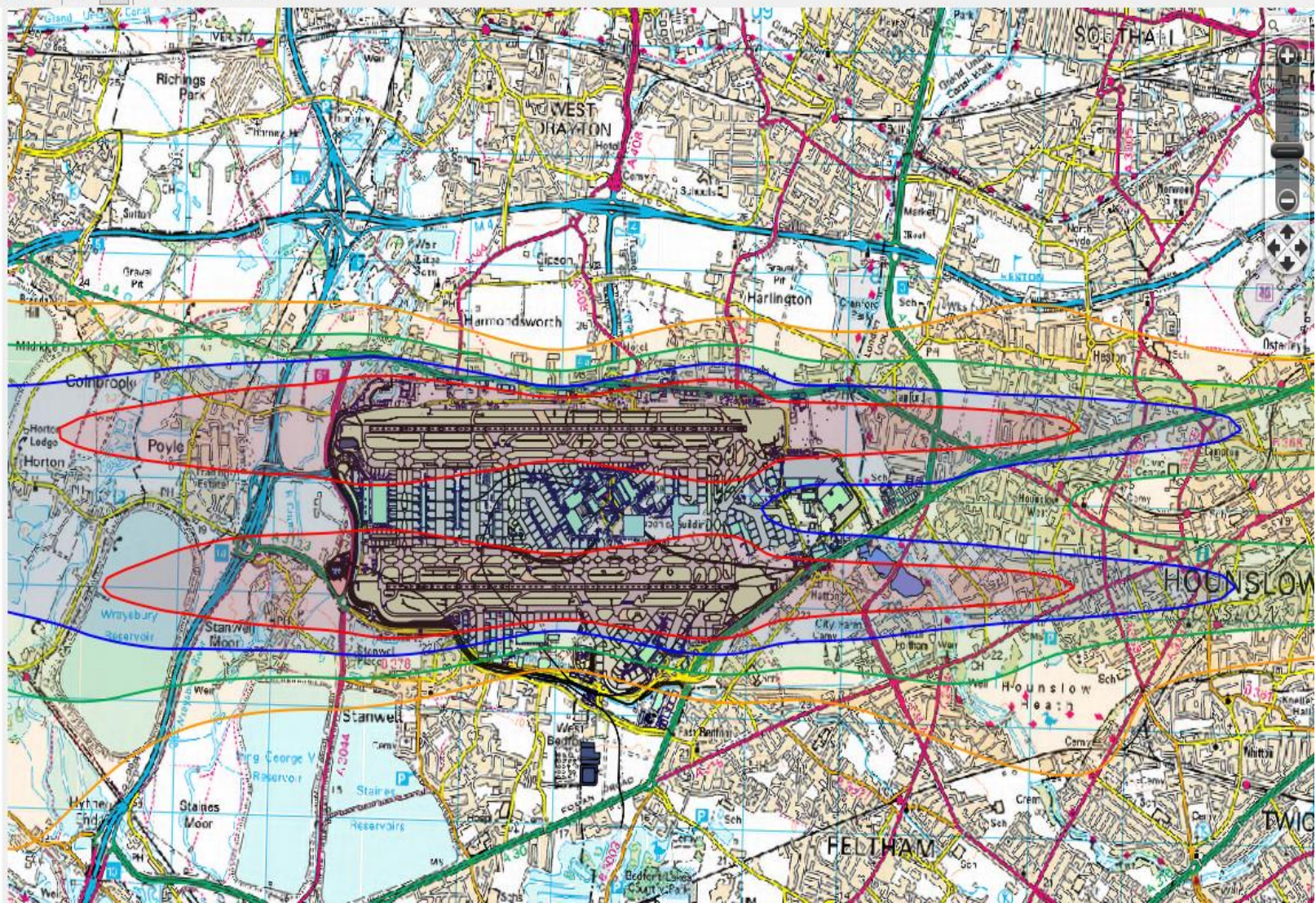
Calculated noise zones are added to Heathrow Map Live to enable the business to visualise affected properties. Post code information can be extracted and used for calculations.

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





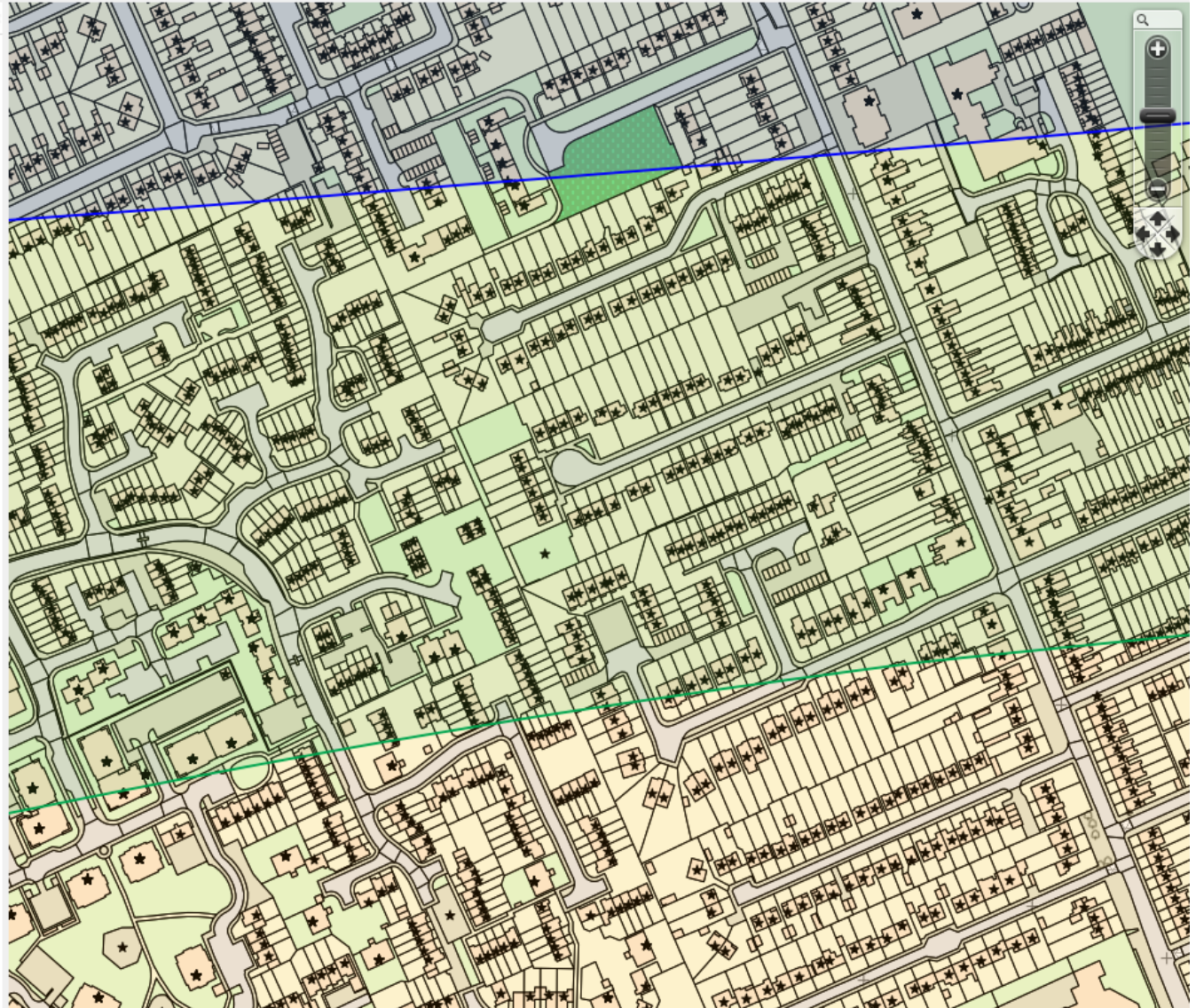
- Layers
- ☒ Planning
  - ☒ Noise Contour
  - ☒ NOISE\_CONTOUR\_Adjusted
  - ☒ PROXIMITY\_BOUNDARY
  - ☒ Redline
  - ☒ Base Map
  - ☒ Boundaries
  - ☒ Buildings & Structures
  - ☒ Polygons - Markings
  - ☒ Polygons - Tunnels
  - ☒ Polygons
  - ☒ Ordnance Survey
  - ☒ OS 10K & 50K
  - ☒ Annotations





## Layers

- ☐ Airfield Ground Lighting
- ☐ Communications
- ☐ Electrical Distribution
- ☐ Exclusion Zone
- ☐ Fuel Networks
- ☐ Gas Supply
- ☐ Mechanical Services
- ☐ Permit Areas
- ☐ Planning
- ☒ PLANNING\_CONSENT\_SITE
- ☒ Noise Contour
- ☐ NOISE\_CONTOUR\_Adjusted
- ☐ PROXIMITY\_BOUNDARY
- ☐ Property
- ☐ Unknown Underground
- ☐ Water Networks
- ☐ Redline
- ☒ Base Map
- ☒ Boundaries
- ☒ Buildings & Structures
- ☒ Polygons - Markings
- ☒ Polygons - Tunnels
- ☒ Polygons
- ☐ Aerial Imagery
- ☒ Ordnance Survey
- ☒ OS 10K & 50K
- ☒ OS Mastermap
- ☒ Annotations





# APOC

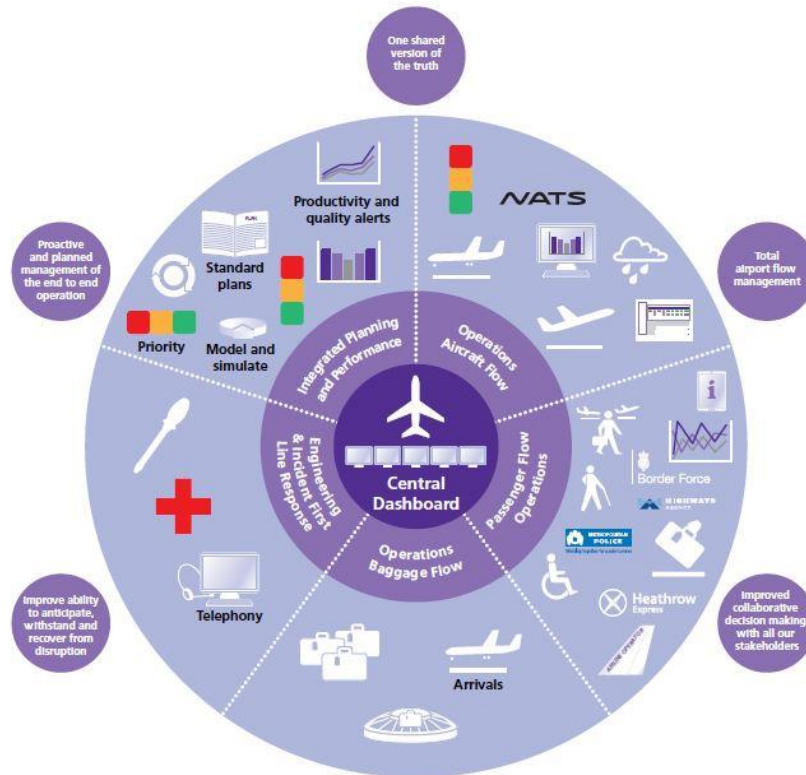
## Managing airport operations collaboratively

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.



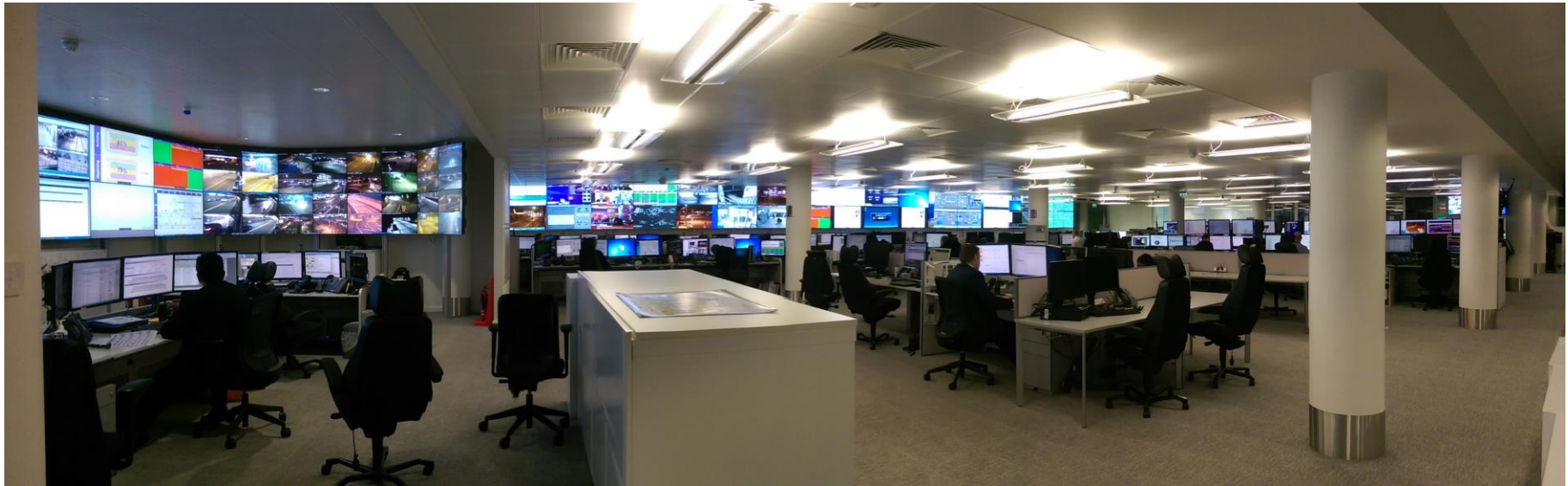
# APOC

Landside Roads &  
Terminals

999 &  
Fault reporting

Engineering  
Ops

Air Traffic  
Control



CCTV & Security

Command

MET Office

Ground  
Movements

Baggage  
Ops

**Heathrow**  
Making every journey better

# APOC



# APOC

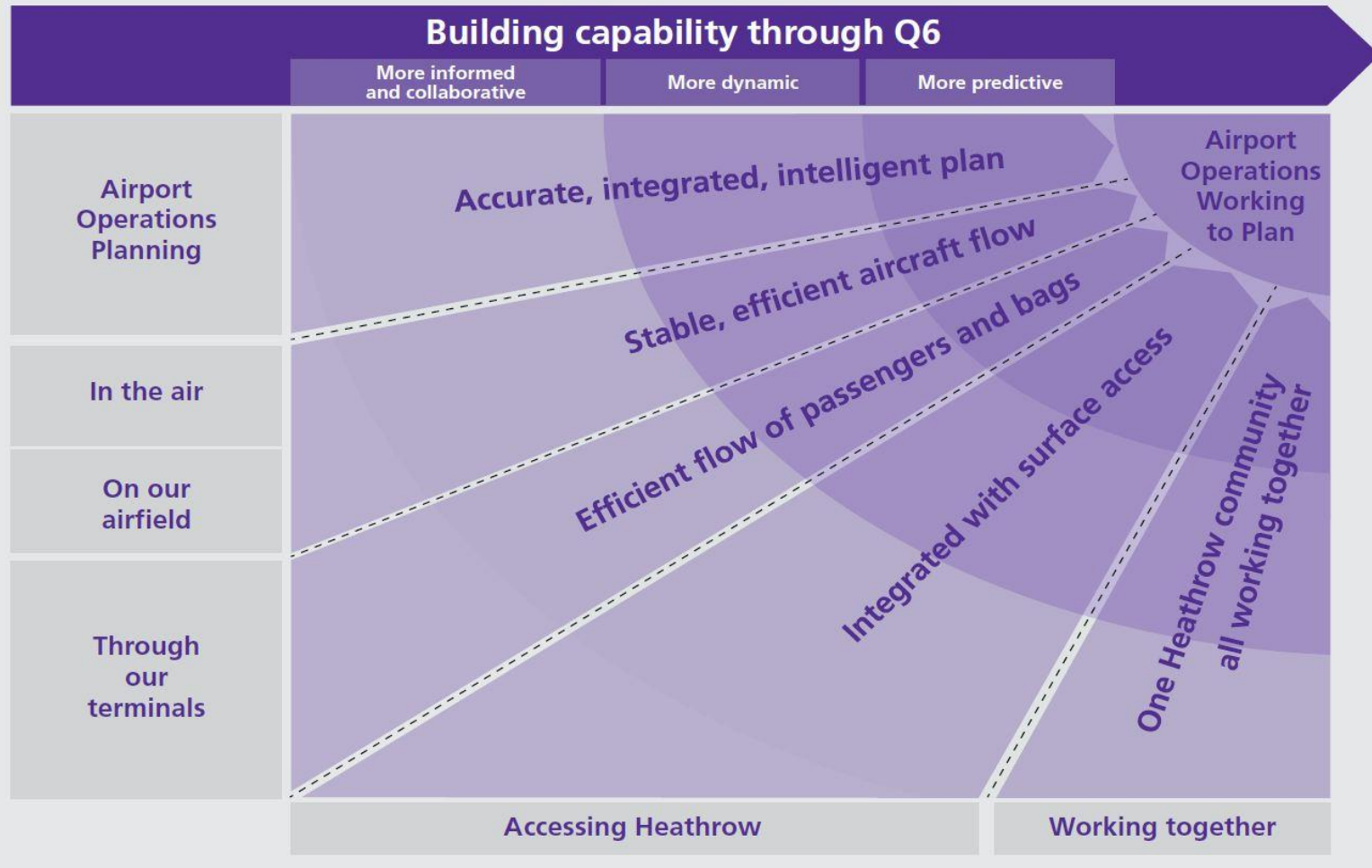
## The Operating Model: Plan, Do, Review Lifecycle





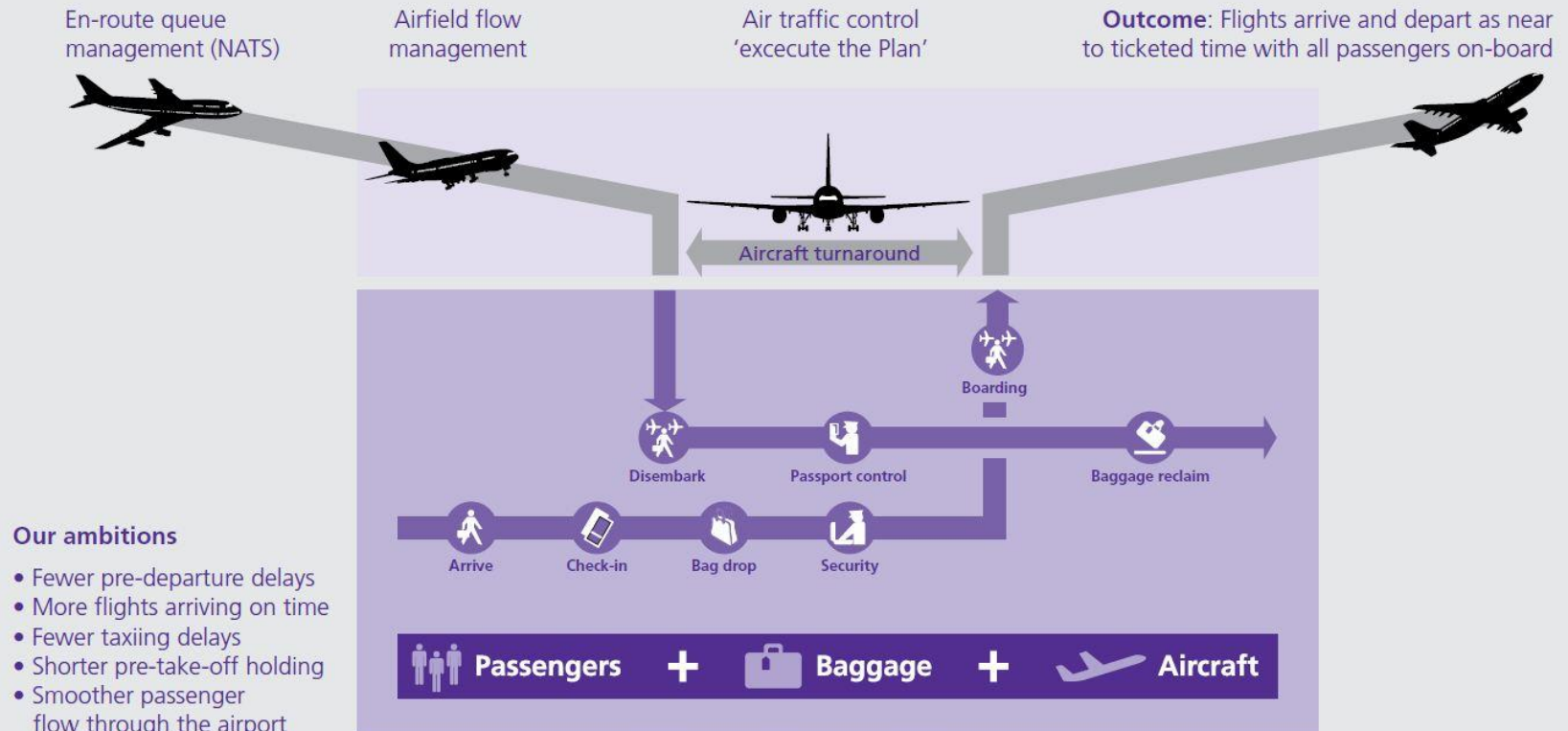
# APOC

## Airport Operations Centre (APOC) – Change programme transformation roadmap



# APOC

## Operating to plan to reduce delay and improve flow



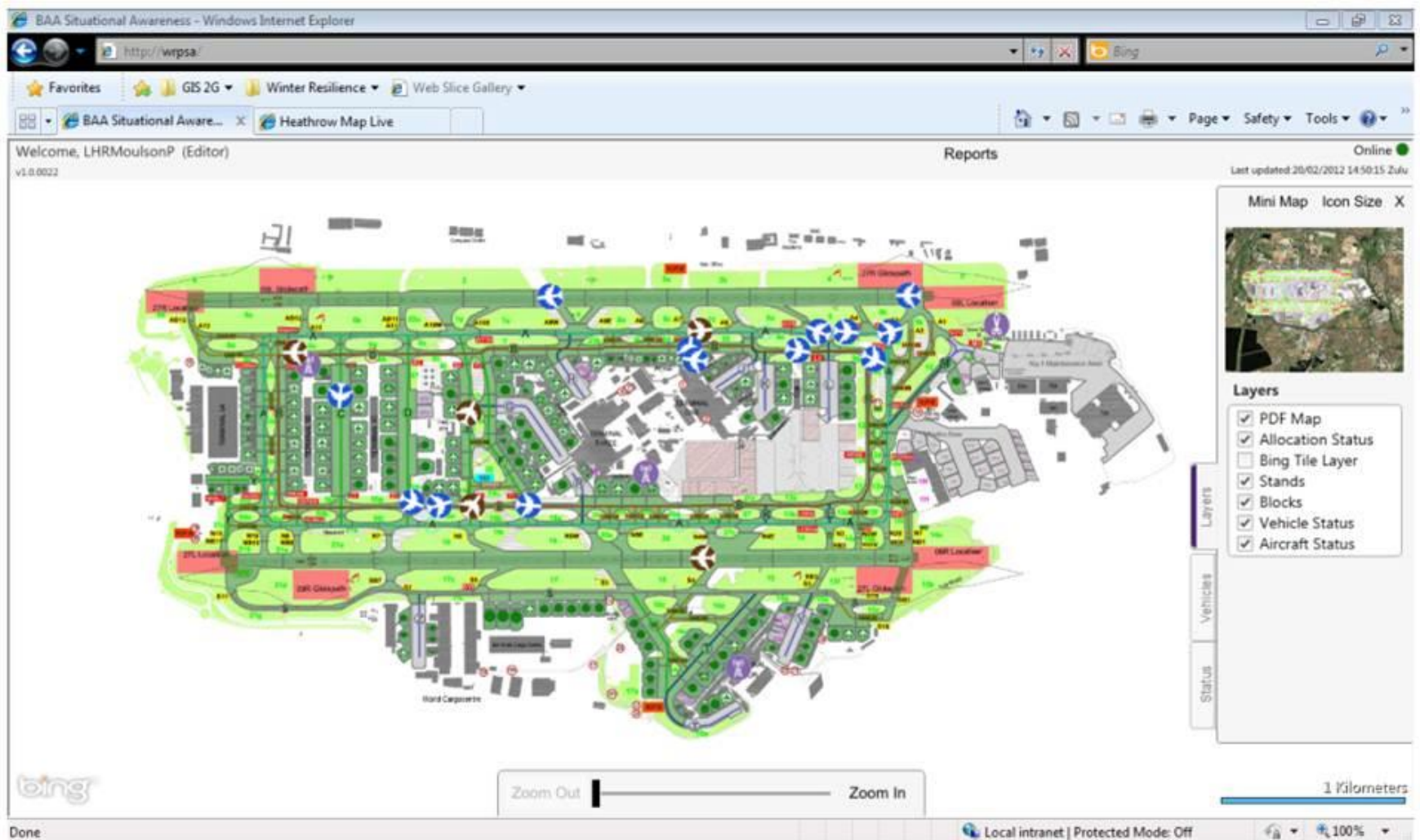
### Our ambitions

- 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'.

# Situations Awareness





BAA Situational Awareness - Windows Internet Explorer

http://wrpsa/

GIS 2G Winter Resilience Web Slice Gallery

BAA Situational Aware... Heathrow Map Live

Welcome, LHRMoulsonP (Editor)  
v1.0.0022

Reports Online  
Last updated: 20/02/2012 14:51:31 Zulu

ID: 555

Asset Works Aircraft X

**Flight BA093**

Aircraft Registration	GVIIC
ATC Call Sign	BAW93
Stand Position	Centre
Status	Aircraft leaving < 1hr
SIBT	
EIBT	
AJBT	
SOBT	Zulu 20/02/2012 12:15:00
TOBT	Zulu 20/02/2012 15:00:00
TSAT	
AOBT	
TOBTUpdate	

TERMINAL 5B

TERMINAL 5C

FUEL FARM

FIRE STN

50f 50g 50h 50j 50k

19a 19b

Zoom Out Zoom In

250 Meters

Layers

- ☒ PDF Map
- ☒ Allocation Status
- ☐ Bing Tile Layer
- ☒ Stands
- ☒ Blocks
- ☒ Vehicle Status
- ☒ Aircraft Status


Local intranet | Protected Mode: Off

Done

Situation  
Awareness

# Airport Collaborative Decision Making

CDM - Microsoft Internet Explorer provided by The Hub

**Heathrow**   
*Making every journey better.*

**Welcome to the A-CDM Portal** Log off

Pete Moulson

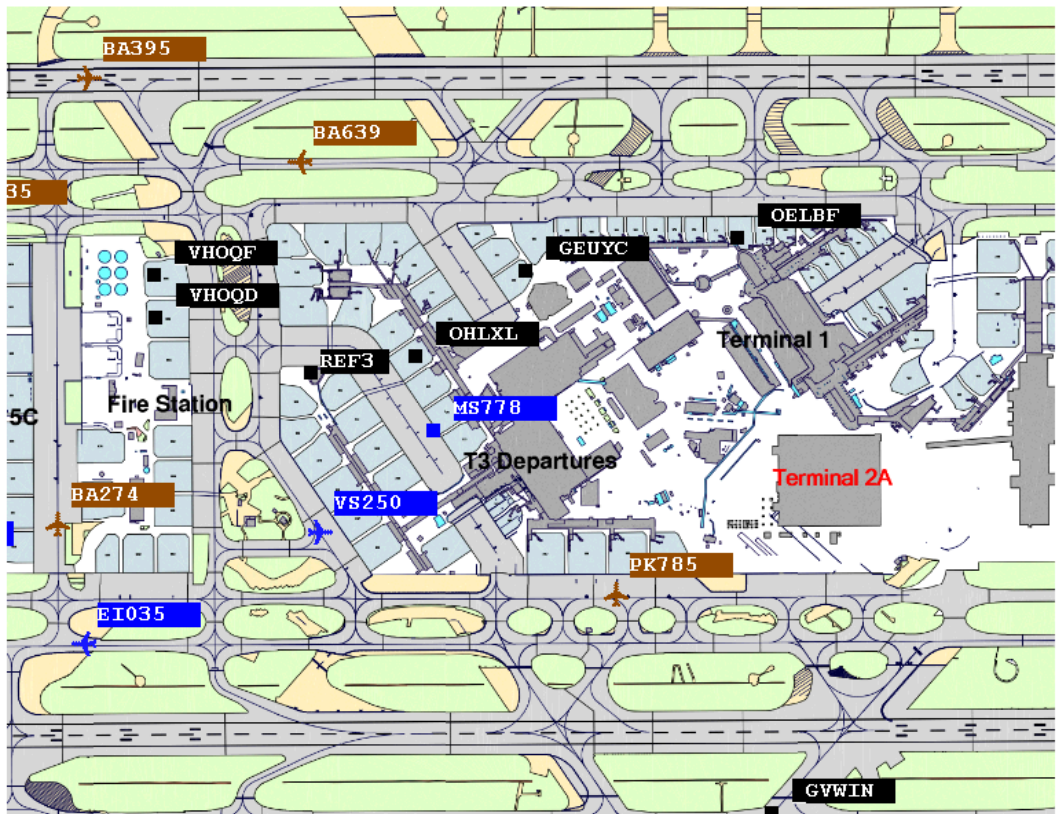
Arrivals Departures Turn-round **SAM** Met

**Flight Information**

Find Flight  
  
Find  
Advanced Search

[A-CDM User Manual](#)  
[BAA IT Help Desk](#)

> Performance Flow  
> Operational Status  
> Process Status



BA395  
BA639  
VHOOF  
VHOOD  
REF3  
OHLXL  
GEUYC  
OELBF  
Terminal 1  
Terminal 2A  
Fire Station  
T3 Departures  
MS778  
VS250  
PK785  
GVWIN  
BA274  
EI035

I Trial days increase to 3 per week: TUES, WEDN & THURS: CLICK HERE FOR MORE:\*\*\* \*\*\*\*\*REMINDER: WEDNESDAY 28th March A-CDM Trials Day 11: Full A-CDM Procedures are

Pete Moulson

## Flight Information

Find Flight

Find

Advanced Search

[A-CDM User Manual](#)
[BAA IT Help Desk](#)
[Performance Flow](#)
[Operational Status](#)
[Process Status](#)
**Arrivals** Departures Turn-round SAM Met
Auto-Refresh ☐ ATC ? ☐

Last Updated: 28/3/2012 14:23:05 UTC

[-] Hide Filter

Carrier  Terminal  ☐ Hide CX & DVHandler  Start Time 

Save Filter

Flight No	Reg	Status	Air Holding	LDT (E/A) ▲	IBT (E/A)	SIBT	Linked Flight	Rwy	Term	Stand	Ty
BA084	GCIWN	First Bag	2	12:51 A	13:02 A	12:40	BA085	09L	5	562	B7
BA347	GEUPN	First Bag	0	12:56 A	13:06 A	13:35	BA348	09L	5	525	A3
BA713	GEUPL	First Bag	2	13:01 A	13:05 A	13:15	BA1314	09L	5	501	A3
IB3164	ECJZM	First Bag	2	13:09 A	13:21 A	13:05	BA516	09L	5	515	A3
OS461	OELBF	Last Bag	1	13:12 A	13:16 A	13:35	OS462	09L	1	101	A3
BA601	GEUJJ	First Bag	4	13:11 A	13:17 A	13:30	BA480	09L	5	523	A3
BA729	GEUUR	First Bag	4	13:13 A	13:29 A	13:25	BA568	09L	5	517	A3
BA108	GYMMP	First Bag	0	13:19 A	13:25 A	12:55	BA263	09L	5	568	B7
BA841	GEUYE	First Bag	0	13:23 A	13:43 A	13:50	BA920	09L	5	537	A3
BA577	GEUPA	First Bag	1	13:24 A	13:33 A	13:45	BA554	09L	5	521	A3
IB3176	ECHGZ	First Bag	0	13:26 A	13:34 A	14:00	BA518	09L	5	509	A3
BA969	GEUOF	On Chocks	0	13:30 A	14:12 A	13:55	BA792	09L	5	527	A3
EI166	EIDEA	Last Bag	0	13:32 A	13:35 A	13:55	EI167	09L	1	184	A3
JJ8084	PTMUC	First Bag	0	13:39 A	13:44 A	14:00	JJ8085	09L	1	249	B7
UA930	N791UA	First Bag	0	13:43 A	13:46 A	13:05	UA931	09L	1	247	B7
BA579	GEUPK	First Bag	0	13:38 A	13:48 A	13:50	BA820	09L	5	511	A3
BD128	GDBCC	Last Bag	2	13:36 A	13:38 A	14:05	BD060	09L	1	178	A3
BA549	GEUUP	First Bag	3	13:41 A	14:04 A	14:15	BA486	09L	5	519	A3
BA491	GEUUN	Last Bag	0	13:46 A	13:49 A	14:00	BA884	09L	3	355	A3
BA815	GEUXI	First Bag	0	13:44 A	13:54 A	13:55	BA440	09L	5	522	A3
BA256	GBNLM	First Bag	2	13:47 A	13:53 A	11:40	BA009	09L	5	548	B7
EK029	A6EMU	First Bag	1	13:49 A	13:59 A	13:20	EK030	09L	3	307	B7
AY839	OHLXL	Last Bag	2	13:51 A	13:54 A	14:10	AY840	09L	3	329	A3
BA489	GEUYK	First Bag	4	13:51 A	13:59 A	14:05	BA956	09L	5	524	A3
BA863	GEUHH	First Bag	3	13:53 A	14:02 A	14:10	BA856	09L	3	192R	A3

Rows: 1-25

\*\*\*\*\*ACDM Trial days increase to 3 per week: TUES, WEDN &amp; TH



# Airport Works Approval



Application for Heathrow works

New

Search



Log Off

Permit Approver Test

Process Work

Recent

Resources

Airside Publications

Map

Reports

My Work

Group Work

New

## Create New Works Application

Schedule

Start Date \*

28/3/2012

Start Time \*

13:00

Completion Date \*

28/3/2012

Completion Time \*

17:00

Working Days:

Mon

Tue

Wed

Thu

Fri

Sat

Sun

Select All Days

Project Identity

Project Name \*

Test

Contractors Ref.

Type of Work \*

Other

Hot Works

Works Description

Test

Is Emergency

On Site

Contact Name \*

Test

Phone Number \*

0123

Alternative Phone  
Number \*

0123

Contractor and HAL Sponsor Details

Company Name \*

Please select a Contractor...

HAL Sponsor Name \*

Please Select a HAL Sponsor...

Contact Name

Contact Telephone

Contact Email

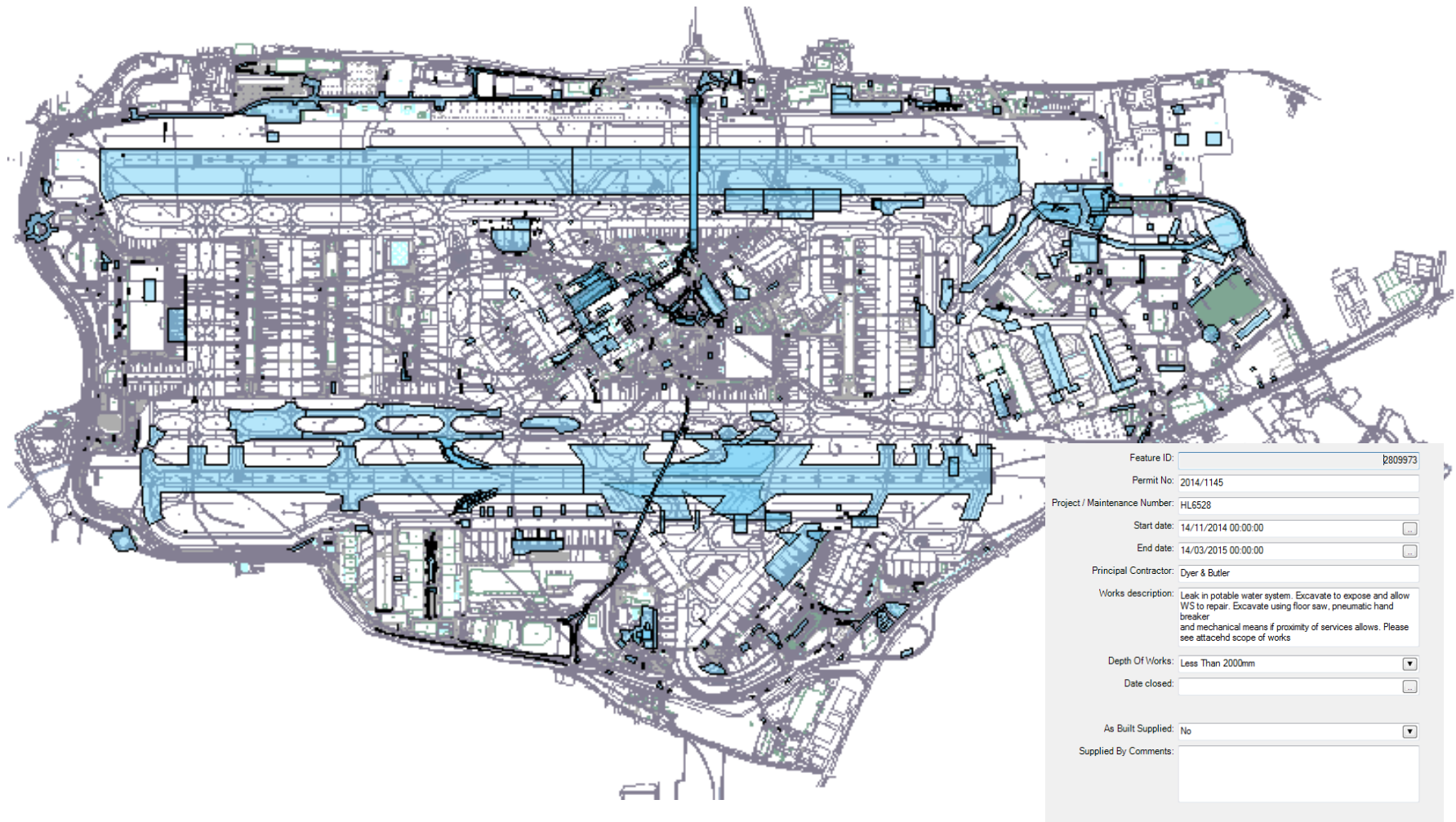
Create

Local intranet | Protected Mode: Off

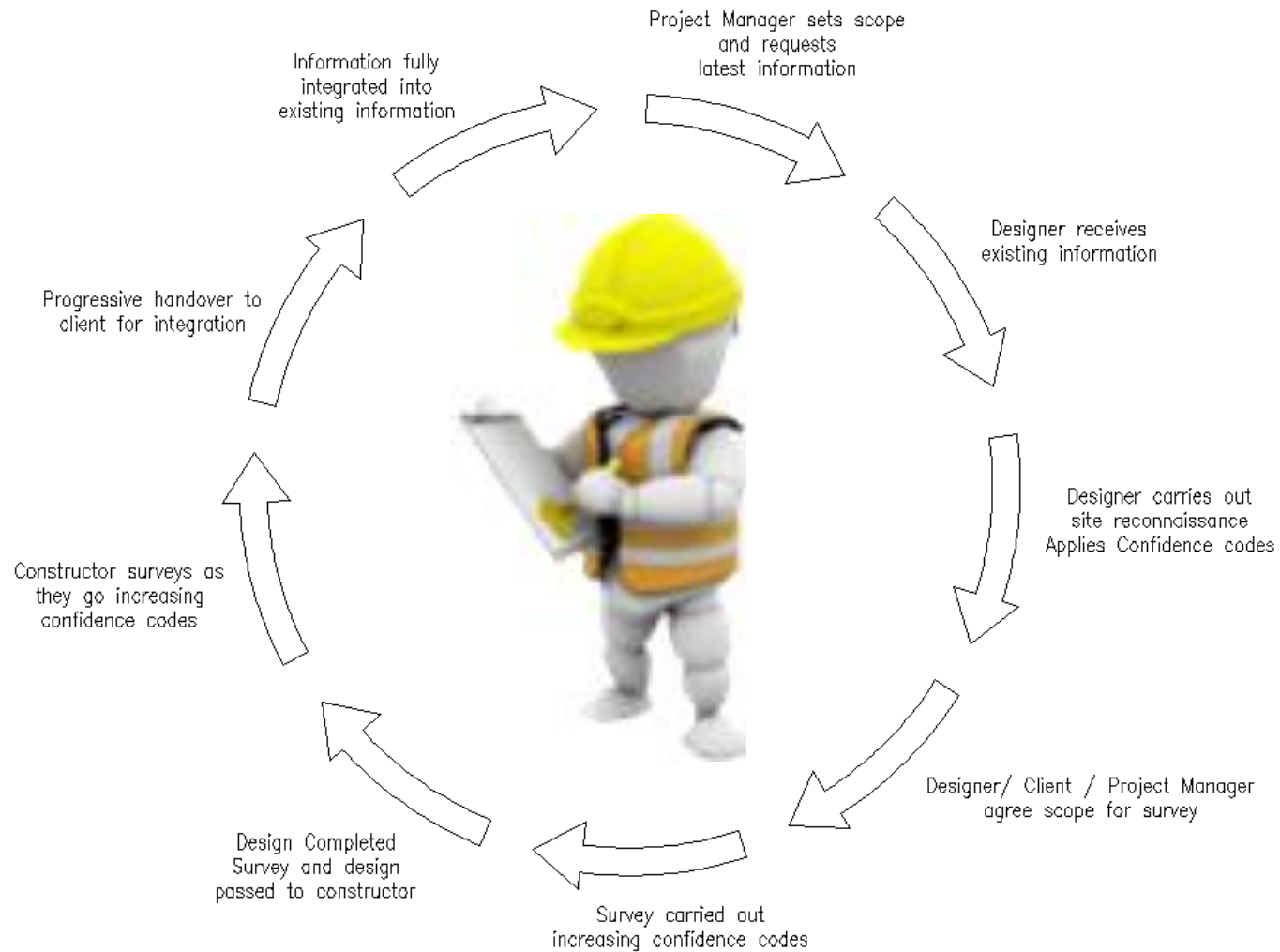


100%

# Heathrow current works – 1328 locations



# Validation Life Cycle



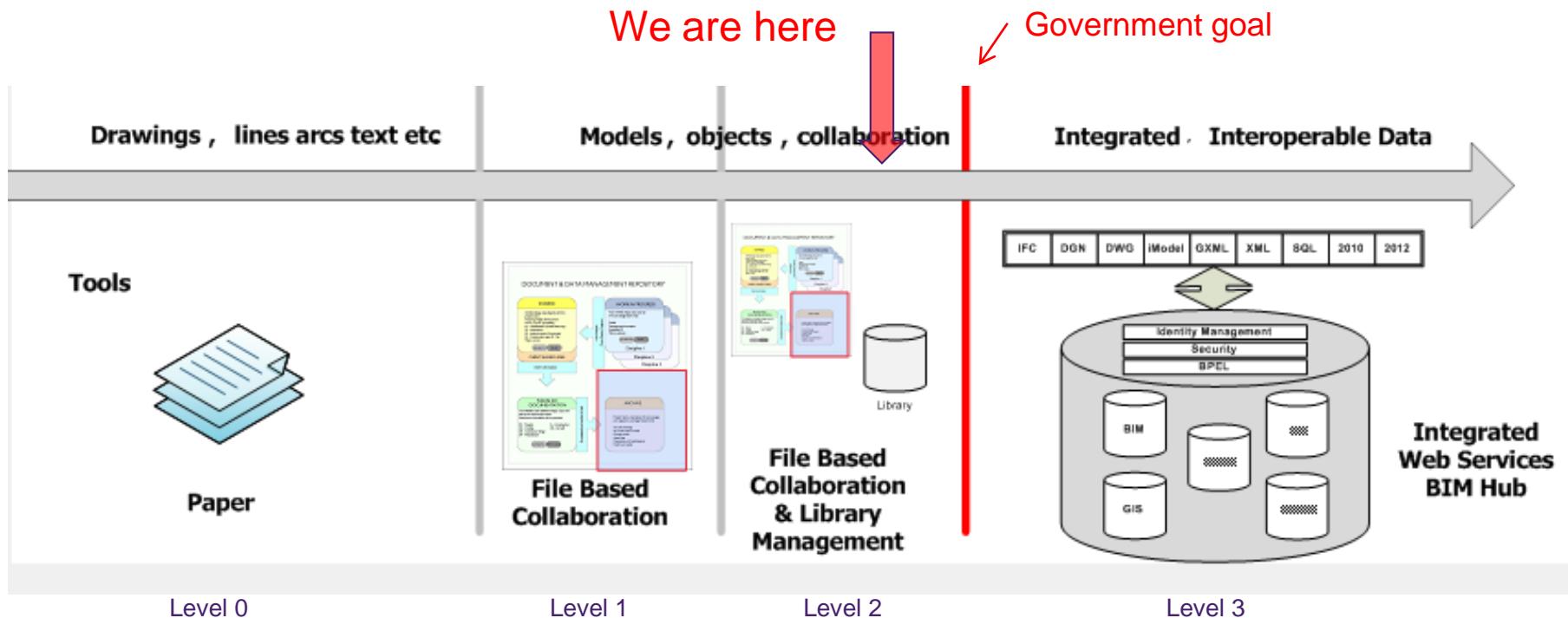


# External View

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”*

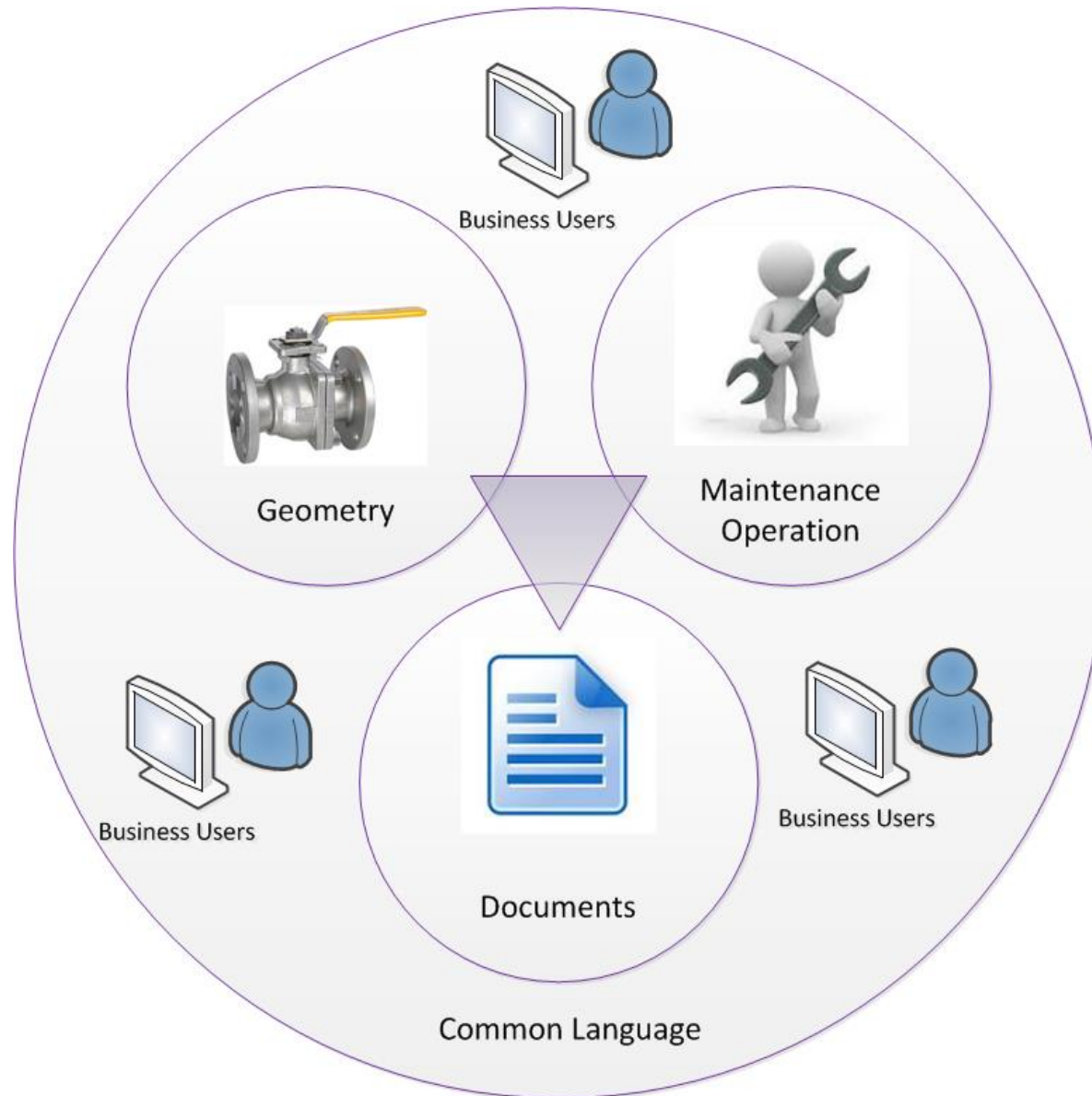


## Proof of Concept



- 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





# 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



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



# Any questions?



# Heathrow

*Making every journey better*