Magnox

Managing Change: 20 Years of Geospatial Data Management

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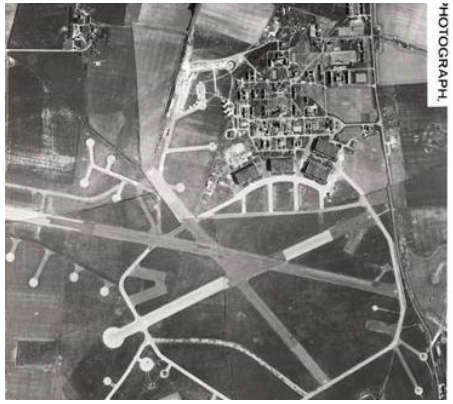
Overview

- Introduction to Magnox
- Geospatial data in nuclear decommissioning
- Types of change
  - Data management structure
  - Organisational
  - Geospatial software
- Lessons learnt- specifics
- The ‘Road Ahead’



RAF Harwell

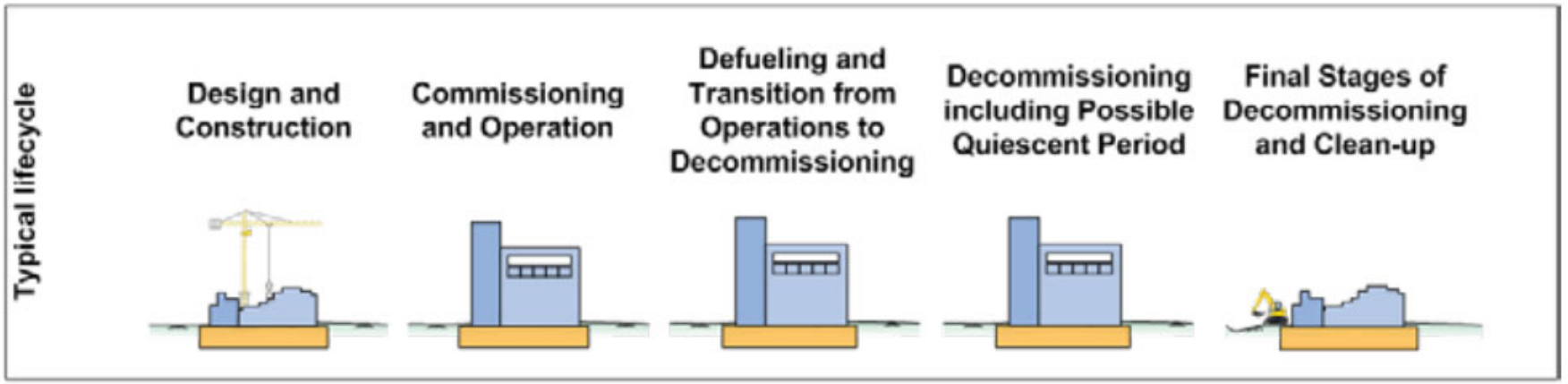
Site in the 1960s

Decommissioning complete

Magnox

- Magnox is a wholly-owned subsidiary of the Nuclear Decommissioning Authority (NDA)
- Responsible for safely decommissioning 10 first-generation nuclear power stations, 2 civil nuclear research sites, and operating one hydro-electric power station.
- Responsible for ensuring that activities are carried out:
  - safely, securely and predictably, with due regard for the environment
  - in the long-term interests of our organisation, our employees, the local communities and our supply chain partners
    - **Including records & geospatial data management**
- The Site Restoration programme manages land quality and site end states across the sites.

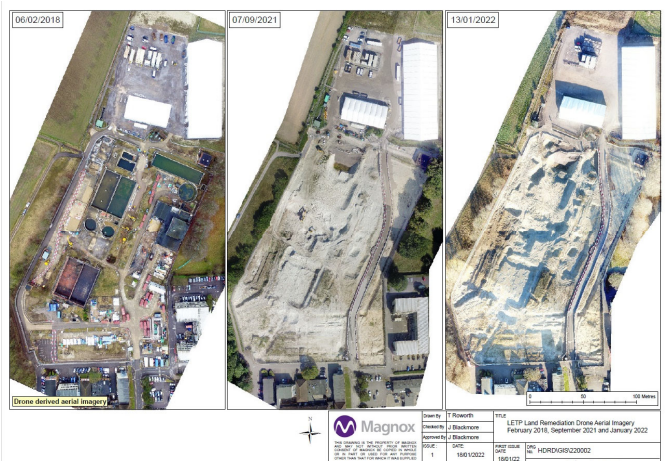
Geospatial Data and the Nuclear Site Lifecycle



Types of Geospatial Data					
Env Compliance	✓	✓	✓	✓	✓
Land Quality	✓	✓	✓	✓	✓
Buildings/ Pipelines	✓	✓	✓	✓	✓
Decommissioning	New-build	New-build	✓	✓	✓
End State/ Site Release	New-build	New-build	✓	✓	✓

Geospatial Data Management

- Magnox sites generate and utilise large volumes of site characterisation data over decades (e.g. land, buildings, drains)
- Data underpins regulatory compliance, site end state, site release & numerous on-going projects
- Data is valuable well beyond its initial purpose and required for decades after initial capture
- Data team's challenge – to retain relevance of, and access to, required data over time



Site Remediation

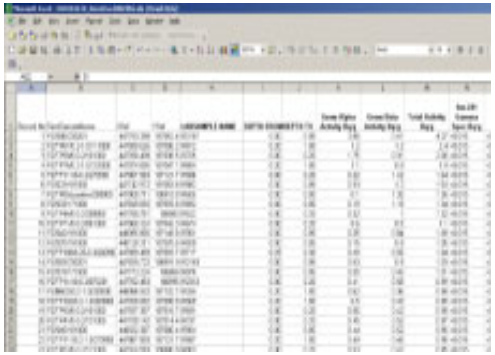
Site Release

Data Required for Site Restoration

Buildings (Current & Former structures)

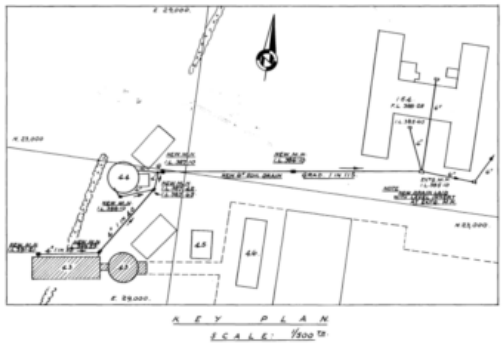
Photographs inc. multi-date aerials

Technical Reports



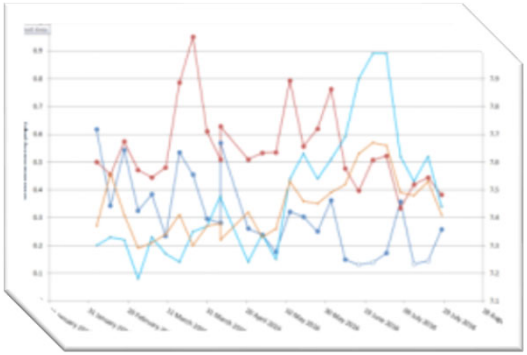
Quantitative Data

Site history inc. staff anecdotal knowledge



Drawings/Maps

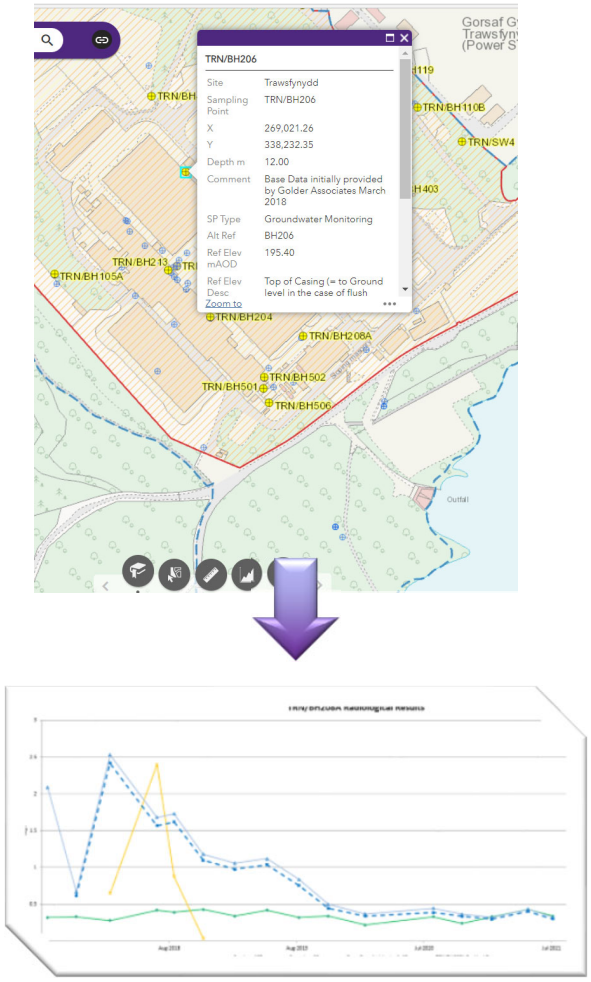
Land Surveys & Sampling



Routine Monitoring

GIS & Magnox

- Early adopter of GIS in UK Nuclear
  - Used at Magnox sites since 1999 (ArcGIS 3.x)
  - GIS is a tool to access/analyse geospatial data
  - Enabling smarter use of data
  - Compliments ‘Power Reporting/Analytics’ tools
  - Enterprise level use of GIS and ArcGIS Portal
- Decision to only use “off the shelf” technology from GIS suppliers
  - Industry leading, fully supported software
  - Bespoke GIS tools/complex GIS models susceptible to GIS version changes
- Current focus on land quality, site restoration, environmental compliance

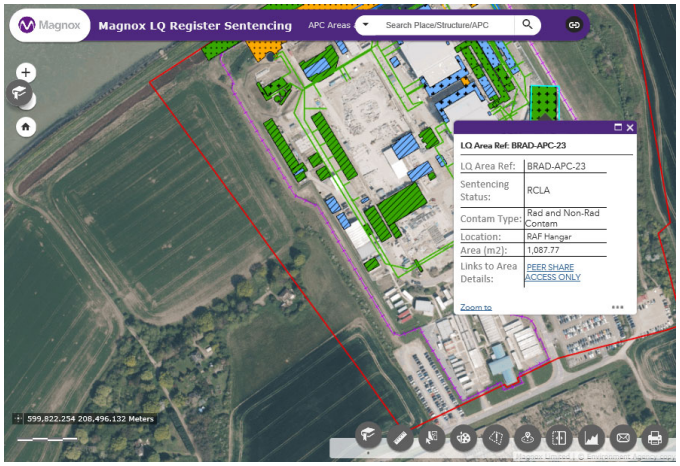


Groundwater Monitoring (>1600 BHs at Mx)

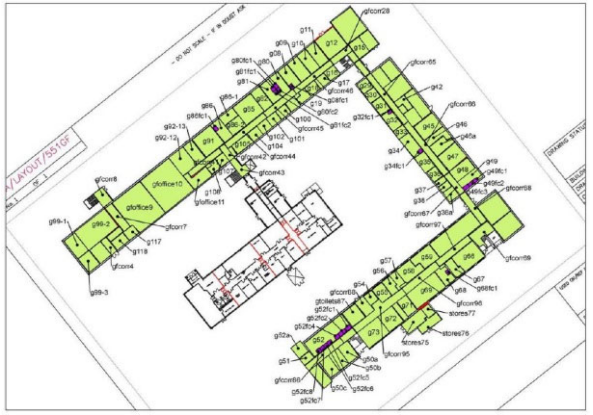
Geospatial Data Challenges

Challenge 1 – Data Management Structure

- Provide a consistent structure for SR data spatially across the 12 sites
  - Over time (decades)
  - Between different on-site projects & supply chain partners
  - To enable reporting of metrics to NDA
- Structure must:
  - Meet current project needs: compliance, decommissioning, characterisation,
  - Meet predicted future requirements (final site clearance, site end state)
  - Enable accessible user interface
  - Be resilient to adapt to future change



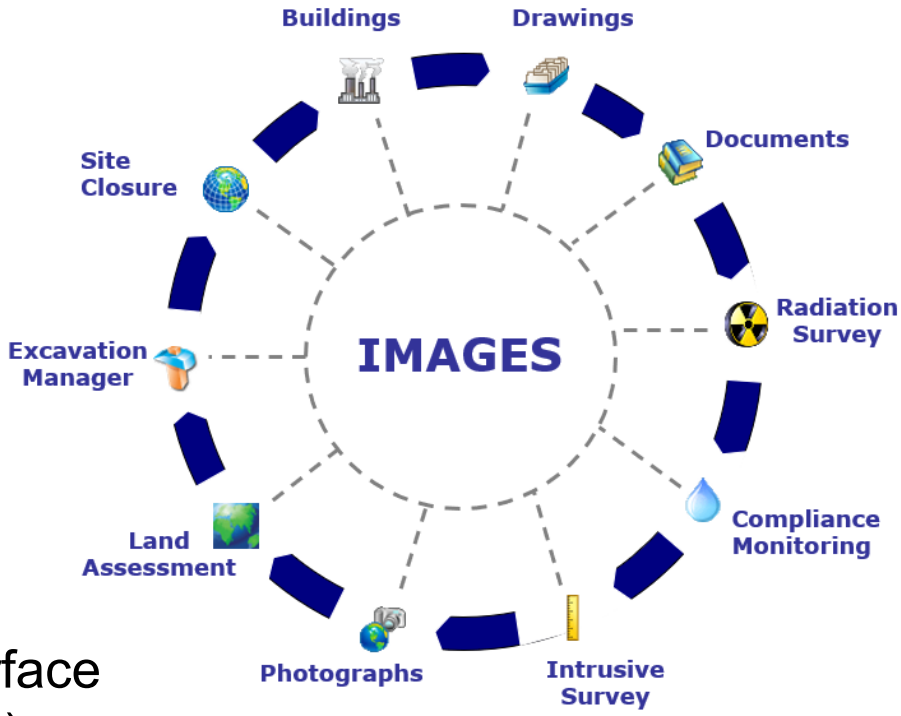
Metrics reporting to NDA



Building characterisation

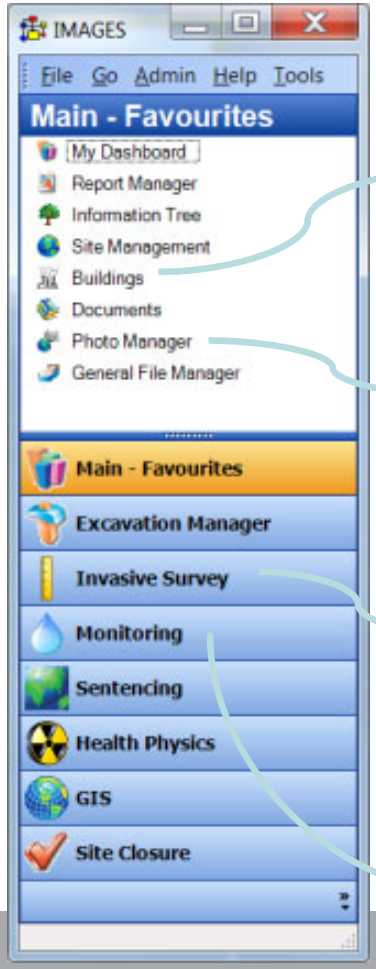
Challenge 1 - Magnox Approach

- **IMAGES** software and database system **developed specifically** for site characterisation, monitoring and decommissioning technical data/records
- Used at **12 Magnox sites & Dounreay**
- Demonstrates **control of site restoration activities** to regulators, underpins regulatory submissions
- **Resource for decommissioning** projects
- Secures **long term accessible records**
- Current project to bring **IPR under NDA** ownership
- **Visualise and assess** data on a map interface with Geographic Information Systems (GIS)
- **Documentation** of data management solution, register code



Accessing IMAGES Data Through GIS

IMAGES Database User Interface



Database Tables with Attributes

(Linked Tables)

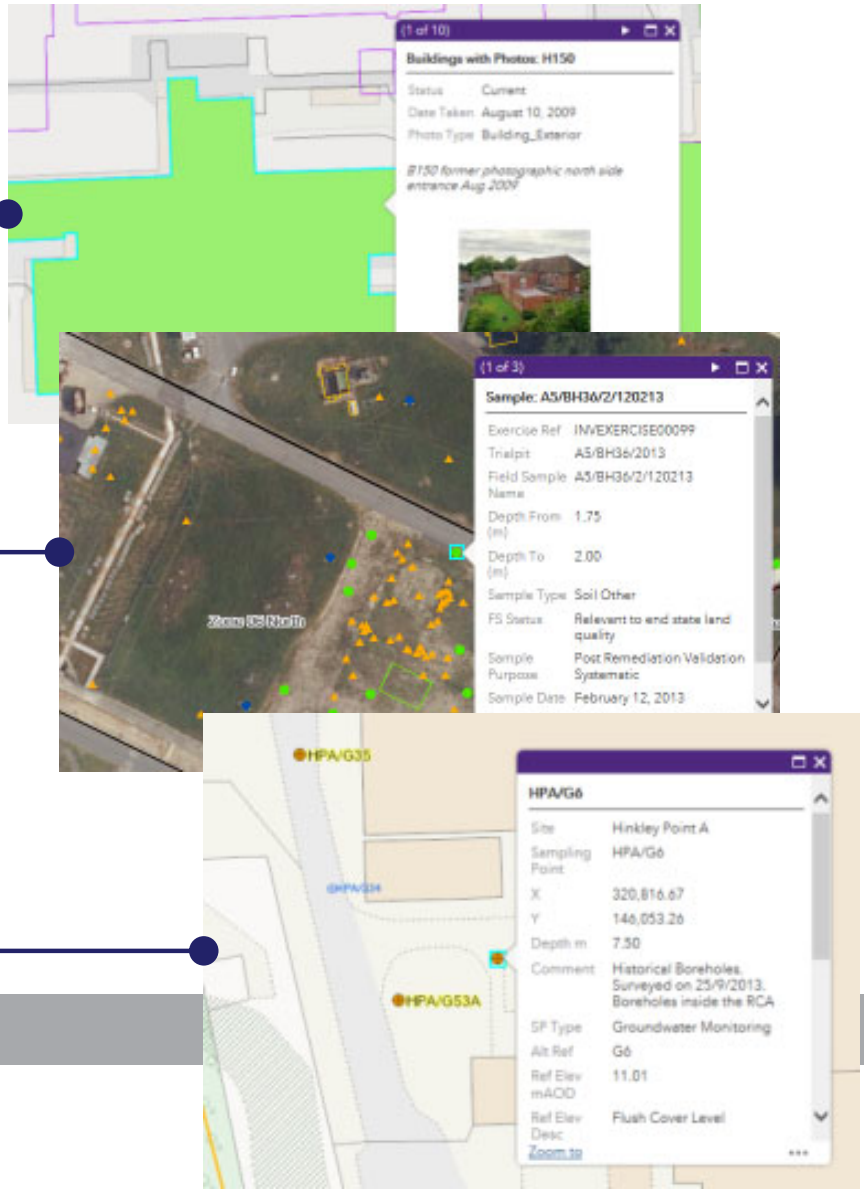
Buildings	Attributes
Id1	Data
Id2	Data
Id3	Data

Photos	Attributes
Id1	Data
Id2	Data
Id3	Data

Invasive Samples	Attributes
Id1	Data
Id2	Data
Id3	Data

Monitoring Locations	Attributes
Id1	Data
Id2	Data
Id3	Data

IMAGES Data Linked to GIS



NDA | Magnox

Challenge 2 – Organisational Change

- Change is inevitable through time

  - Outsourcing of IT (competed every 4-5 years)
  - Change of IT provider & technical staff
  - Reorganisation (projects, programmes, site)
  - Goal of IT system consistency across 12 sites
  - Future plan to add Dounreay + AGR stations
  - Management systems & records
  - Staff turnover over time period/ change in responsibilities

Magnox Approach to Organisational Change

- Communication – across organisation & for system users
- Information Asset Owners/Administrators
- Senior management buy-in to system longevity
- System profile and track record
- Management system arrangements during transition
- Human Factors
  - Training
  - Succession planning
  - Relationship management (system owners and IT)
  - Understanding various parties' points of view/terminology
  - Patience and perseverance

Challenge 3 – ‘Geospatial’ data formats…

Examples	Short <10 years	Long >10 years
Technical Data storage formats	Various: Excel (xls, xlsx, xlsm), AGS, ‘native field data formats’ etc	Csv, txt, xml, database + schema & metadata
Documents	MS Word (doc, docx), PDF	PDF/A, paper, microfiche
Drawings & image files	Numerous	DWG, DXF, JPG, PDF/A
Database	MS Access (various versions)	Oracle, SQL etc
GIS data (e.g. ArcGIS)	Shapefiles, GeoDB, raster catalogs	Maintaining enterprise formats? Raster files?
Specialist tools/data formats	Numerous	Conversion to CSV+ schema & metadata?

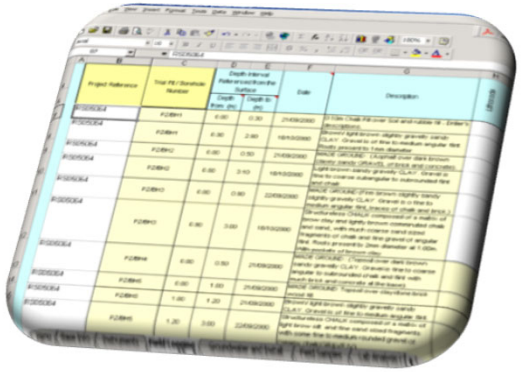
Challenge 3 – Geospatial Software Changes

- Change is inevitable in Geospatial Data Management
- Only limited backwards compatibility (max ~ 4-5 years)
- Magnox minimise exposure to software/system change by:
  - Adopting industry standard solutions where possible
  - Minimise bespoke developments where possible
  - Remain ‘database agnostic’ as much as possible
  - Align with Mx wide IT strategy and involve IT teams early on
  - Use common data formats for geospatial data
  - Migrate in advance of obsolescence, keep original as record
  - Full User Acceptance Testing (UAT) between versions; system owner sign off before updated system deployment
  - Wait to upgrade- other than security patches etc

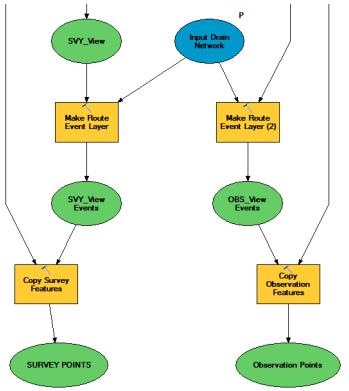
Lessons Learnt:

Lessons Learnt 1 – Data Management

- Benefits of standardising data structure & workflows
- Concept/scope development time is very valuable
- Appropriate scaling up from prototype to production environments – full RDMS may be needed!
- ‘Essentials’ v ’Should Have’ v ‘Nice to Have’
- **Focus on long term use of GIS as a tool for mapping/analysis/data accessibility**
  - Link databases to GIS and harness the power of geospatial data; ensure appropriate ownership of data for long term
- ***Defined roles and responsibilities***
  - IT support, third parties, in-house technical staff (databases, desktop GIS, web GIS)
- **One source of the truth- link between systems, don’t replicate data!**



Data collection



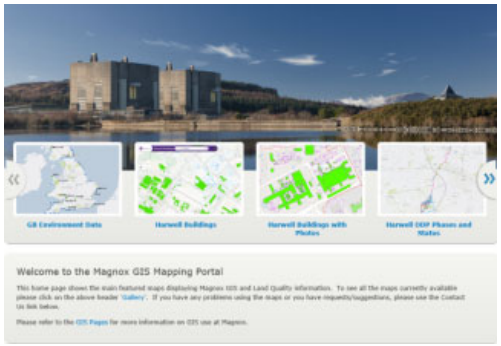
GIS model workflow

Lessons Learnt 2 – Organisational Change

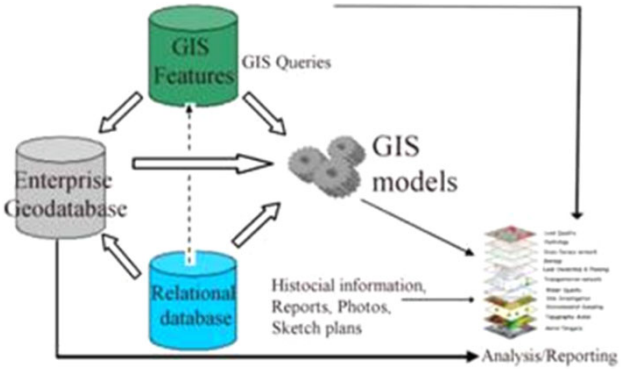
- Recognising the value of the data, realising what is not easily ‘replaced’
- Resources for system support AND service to manage/analyse the data
- Planning for organisational changes needs to be proactive:
    1. Involve system owners and key users
    2. Allow for sufficient time for application testing and issue resolution
    3. Issue tracking systems during testing = efficiency savings
- ‘On-premise’ v ‘The Cloud’
  - impact on geospatial data systems
- Outsourced IT scope needs to consider geospatial data
- Collaborative approach both internally & with supply chain

Lessons Learnt 3 – GIS for the long term

- Long term geospatial data management
  - Separation of data structures from specific GIS software
  - Geospatial features LINKING back to attributes in databases
- Minimise GIS coding direct interactions
- Understand scope of ‘tools’ to enable replacement when incompatible with GIS
- Plan for staff/contractor resources
  - ‘Industry standard GIS’ staff more common now
- ‘Small’ IT changes can lead to big GIS impacts
  - Changing data source locations, various software updates, policy changes etc.
- *‘Larger’ IT changes can have even bigger GIS impacts* (domain changes, operating systems etc.)



ArcGIS Portal



Magnox

Lessons Learnt- General IT & Geospatial data

- Configuration settings- current and how they vary between versions
- Permissions- critical to data integrity and security
- Geospatial users are not standard IT users
- Optimise usage of browser based platforms for ‘non-power’ users

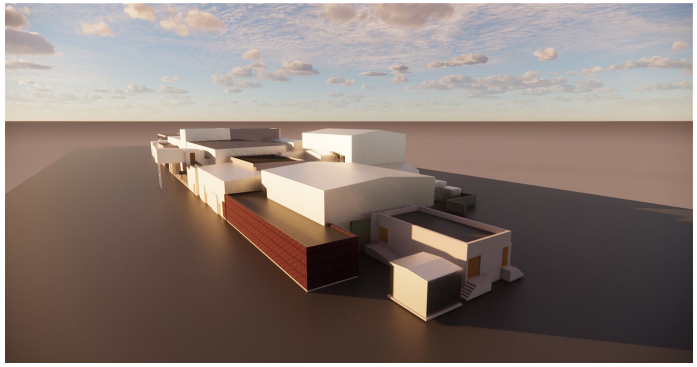
Magnox ‘GeoHub’ Portal

- New server/IT contractor? System owners need to check backups/monitoring are in place and establish helpdesk workflows
- Importance of Service Level Agreements (SLAs) and Key Performance Indicators (KPIs) for support contracts

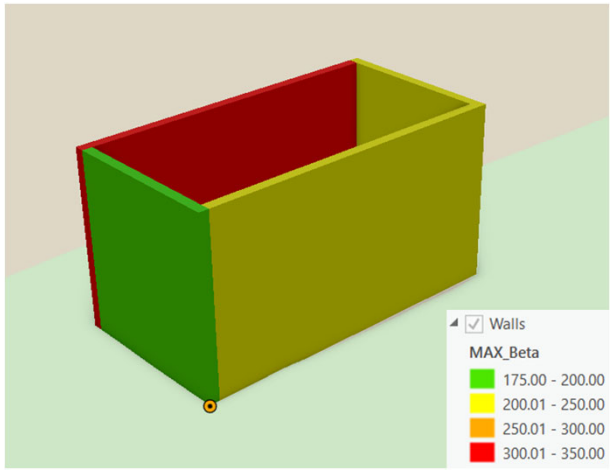
Magnox Geospatial Data: The Road Ahead

Magnox Geospatial Data – The Road Ahead

- Profile of geospatial data growing
- Role in digital decommissioning
- Linking CAD 3D models to GIS
- Consideration of ‘GeoBIM’
- Eventual transition to the cloud
- Increased use of MS tooling rather than bespoke software tools
- Realisation of the value and power of geospatial data in decision making
- Linking systems, not replicating data
- GIS as a ‘Portal’ for geospatial data



Revit models



3D models, in GIS

Questions?

- Magnox ‘regeneration’ of its sites; release to the Harwell Campus example:

- *“Within this overall Masterplan, planning permission has been sought for a new 500,000 sq ft expansion of the Life Science / HealthTec cluster sited close to the major facilities at its core.”*

- Campus Masterplan - Harwell Campus