Management of 3D Geological Models at the British Geological Survey

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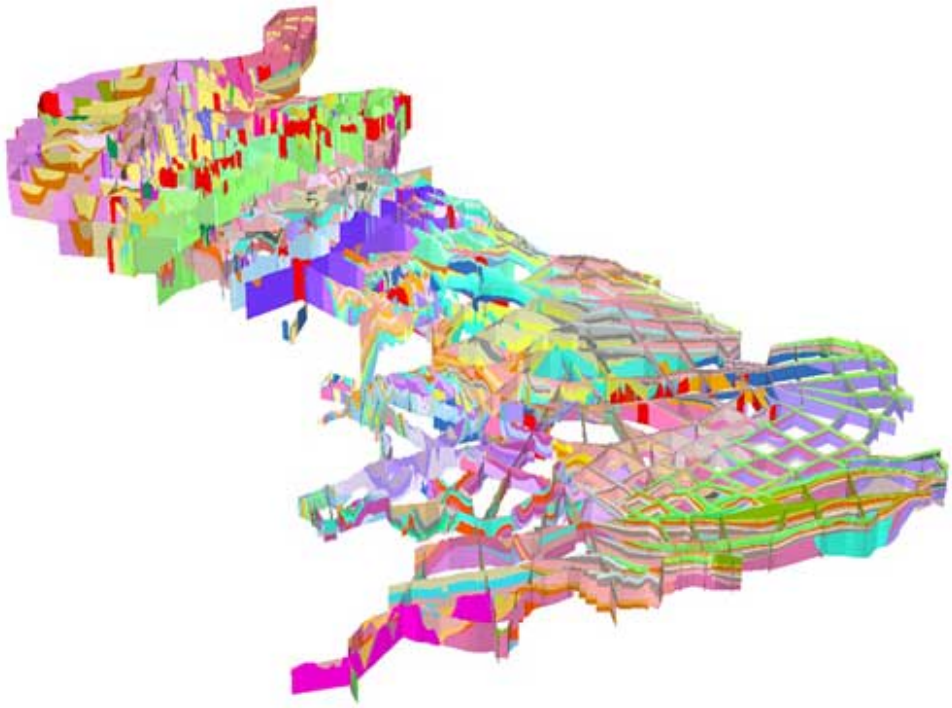
Models at the BGS



- Quaternary & Bedrock
- Local, Regional and National
- National Good & Commissioned

Modelling Workflows

- Interlocking maps and cross-sections (e.g. GSI3D)
- Surface building (e.g. GOCAD)
- Grids and voxels (e.g. SKUA, PETREL)
- Structural & kinematic (e.g. MOVE)

The situation is heterogeneous
This poses a challenge for storage

File Storage

- In the simplest case, we can store the project files

- Requires manual maintenance
- Potential for data loss
- Difficult to re-use

Analysis

- We analysed the main types of data coming from the modelling workflows;

- Linework – maps, cross-sections, structure contours
- Meshes – triangulated surfaces
- Grids – elevation grids and voxel grids

Within BGS, linework is still the most common…

….it is also the most complex to store.

….so, this is where we started.

Storing Geometry

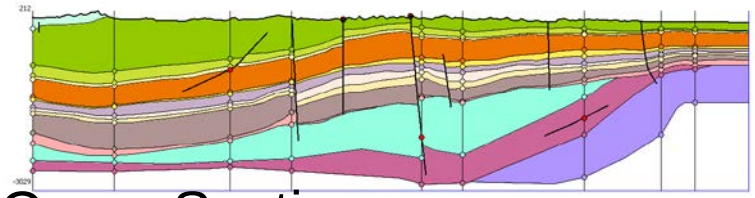
- The first problem is to store the geometry, we looked at two ways of doing this.

1) Dis-assemble, and store each piece separately

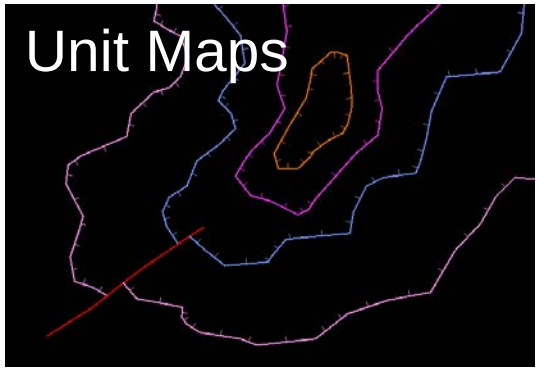
2) Store objects intact

Geological Objects

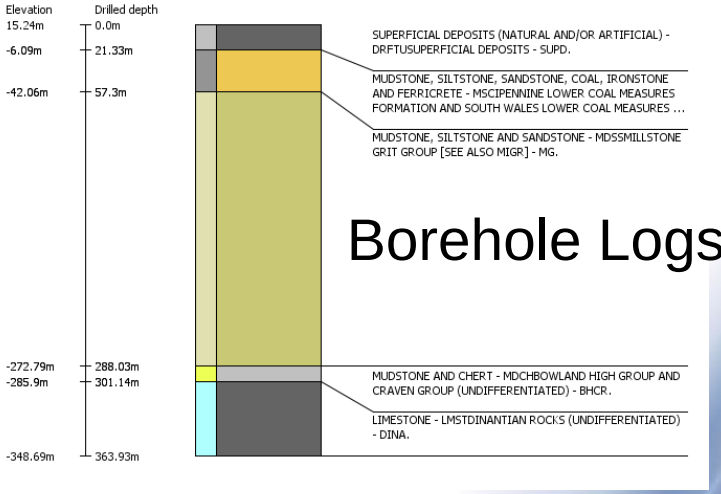
- We decided to store the objects intact
- Dis-aggregation would be complex and expensive to design – and the benefit is small
- The approach is object-oriented



Cross-Sections



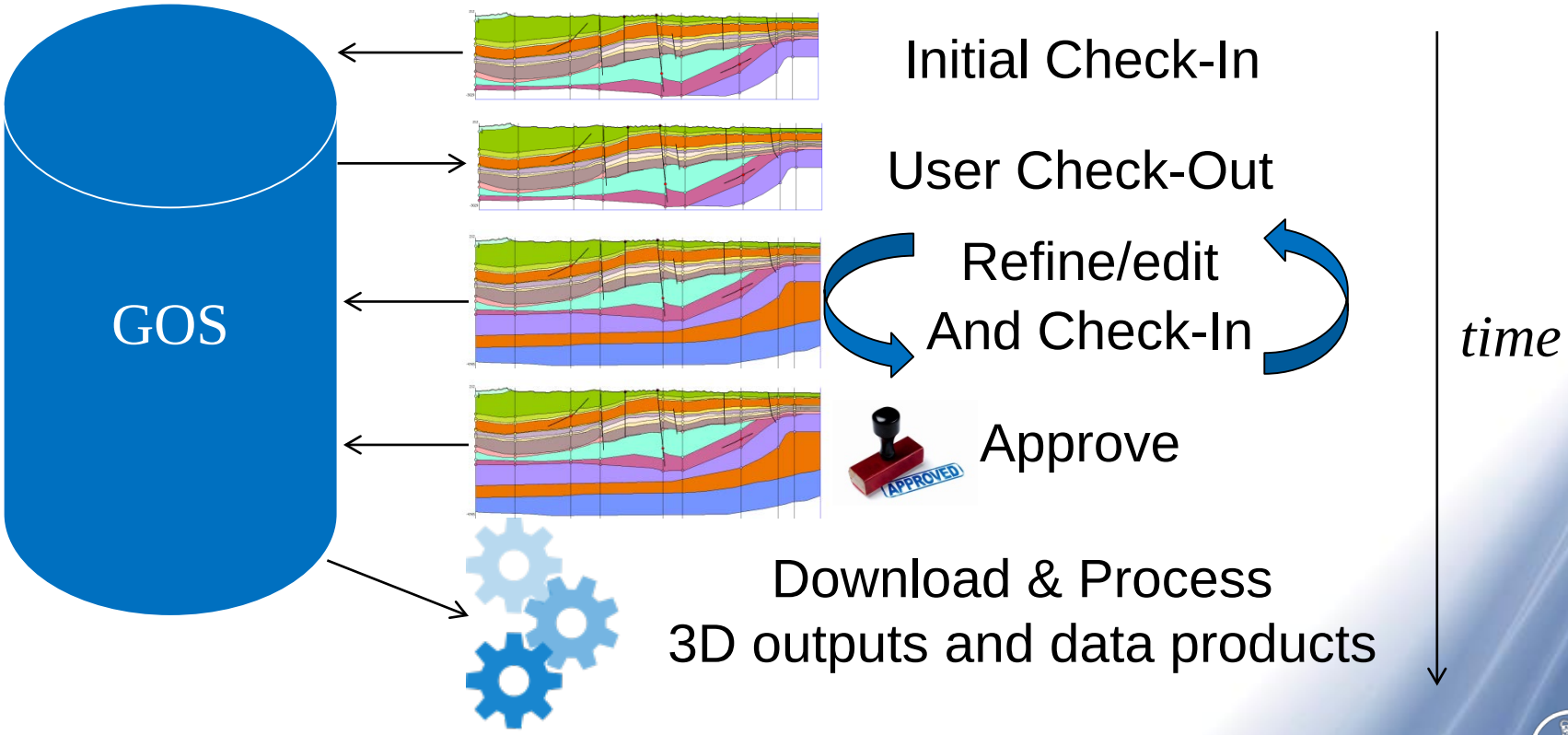
Typical ‘Geological Objects’



Borehole Logs

Geological Object Store - GOS

- Oracle relational database with spatially-enabled fields for geometric elements
- Basic attribution – geological layer codes

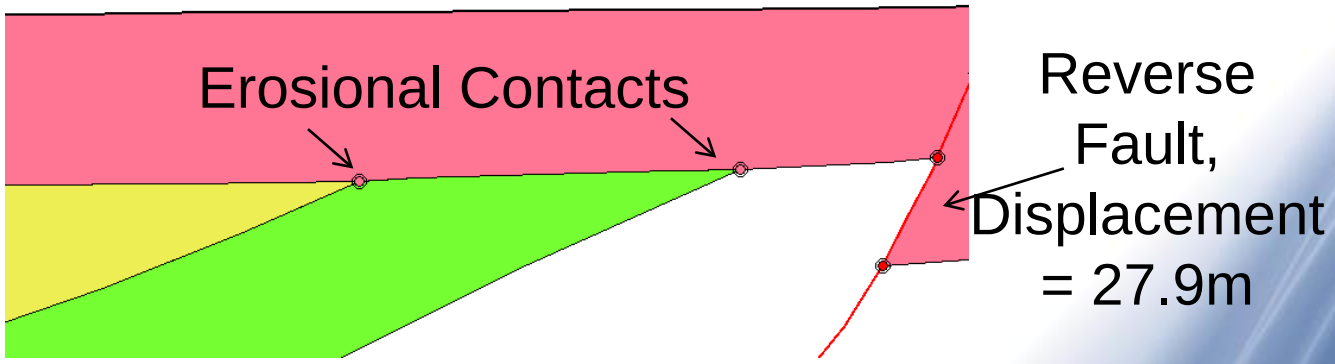


Object Model

- Programmatic – Java Class Library
- Transfer – XML Schema
- Ensures consistent representation of data

+ *Topology*

- Spatial connections between objects are recorded
- ‘Snap’ nodes ensure watertight model and enable powerful geometric and geological querying in the database

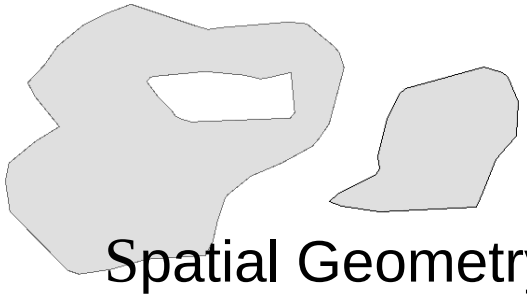


Future Work

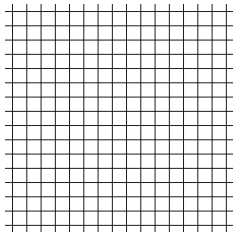
- Still need to handle meshes and grids
- GOS can provide the relational object record
- GOS can store a spatial component (coverage polygons)
- Object geometry stored elsewhere – native or agnostic (e.g. TIN for surfaces, NetCDF for grid data)

	A	B	C	D	E
1	OBJECT ID	GEOLOGIST	GEOLOGY CODE	OBJECT TYPE	
2	15698752	Smith, W	CHALK_1	GRID	
3					
4					
5					

Database Record



Spatial Geometry Field (Coverage)



e.g.
Grid Data,
Voxels,
Meshes

Thank You!

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