Maximising the benefit of past investment: the subsurface agenda – a case study from Glasgow

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<thead>
<tr>
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<tr>
<td>Ken Lawrie</td>
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<td>Martin Smith</td>
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### Which INSPIRE theme?

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5. Addresses  
6. Cadastral parcels  
7. Transport networks  
8. Hydrography  
9. Protected sites | 1. Elevation  
2. Land cover  
3. Orthoimagery  
4. **Geology** | 1. Statistical units  
2. Buildings  
3. Soil  
4. Land use  
5. Human health and safety  
6. Utility and Government services  
7. Environmental monitoring facilities  
8. Production and industrial facilities  
9. Agricultural and aquaculture facilities  
11. Area management / restriction / regulation zones & reporting units  
12. Natural risk zones  
13. Atmospheric conditions  
14. Meteorological geographical features  
15. Oceanographic geographical features  
16. Sea regions  
17. Bio-geographical regions  
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21. Mineral resources |
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BGS: TWG Editor Geology, Mineral Resources & Coord for Natural Risk Zones
Geology – the 3\textsuperscript{rd} dimension

Zone of Human Interaction
the subsurface – unseen side of construction

Brownfield sites

Urban regeneration

You must know what you are building on
you need subsurface information..

Much of it is already available – the past investment

But more is required
Ground Investigation

Ground Investigation costs*:
- c. 2% of substructure costs
- c. 0.1% overall building costs

BUT industry reports ground problems cause:
- 30 – 50% of delays to projects
- 50% over-run > 1 month
- Most common source of project risk & overspend
- Costly resolution, claims and litigation
- Focus on unforeseen ground conditions

* Chapman & Marcetteau 2004, The Structural Engineer
“DEFRA estimate that £210m per year is spent unnecessarily on remediation due to poor site investigation”

Addressing the problem - INSPIRE approach

Could increase spend on more boreholes etc.

But, much better to maximise use of existing, and future, data & knowledge, e.g. In 3D models

**BUT problems in accessing all publicly-held data:**
- numerous forms/standards
- very variable quality
- re-use prevented by conflicting acts/regulations/IPR
- confidentiality issues
- Poor accessibility (analogue v digital, multiple locations)
The Glasgow experience

Subsurface raw data (>35,000 Boreholes)

BGS digital data

Data integrated in BGS 3D models for GCC & others – maximises benefit of past investment
Glasgow 3D models

Urban: High resolution

Catchment: Low resolution
following some INSPIRE principles..

- Data should be collected only once and kept where it can be maintained most effectively

- Easy to find what geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used

For Glasgow 3D models:

- Over 35,000 boreholes in BGS archive
- But many more held by GCC
- Access and constraints impede their reuse (by BGS)
- So improved data flow & partnership key to efficiency gains
The Glasgow partnership solution....

GCCs consultants and contractors (e.g. Grontmij):
- use simple data acquisition templates (INSPIRE-compliant) for ground investigation data
- provide georeferenced site plans

Glasgow City Council (Client):
- Receive and use data
- Transfer key data to BGS

BGS (National Custodian):
- Archive & reinterpret data to update 3D models/GIS
- GCC upload BGS updates to support decision making

All using web services to reduce costs for all parties
The wider perspective

Partnership approach towards culture of improved data accessibility and exchange:
• between LAs & BGS
• and between public & private sectors

Hence
• national subsurface 3D models for decision makers
• reduction in costly unforeseen ground conditions
• improved/ timely delivery of public construction
• potential culture change in private sector
• direct savings to government and Industry

And the scale of the impact?
the construction industry....

10% of GDP
26 million jobs

8% of GDP
€126 bn (2009)

10% of GDP
€10.8 bn (2009)
Any questions?

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