# SESSION NATIONAL / REGIONAL SDI

## REACHING OUT AND UNDER

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**Introduction**

A number of European Geological Surveys have now reached the conclusion that in order to truly meet the needs of society it is no longer enough to produce geological maps, or digital geological maps, or even applied thematic data within a GIS. Even the latter is often insufficient to fully explain the relevance of our science to a particular problem. We need to reach out even further if we want to get our message across. The "understanding gap" between the tiny minority in society who are trained geoscientists and the overwhelming majority who are not, is huge, and we geoscientists have to be innovative and imaginative and flexible if we want to bridge that gap. This short paper describes two very different initiatives from the UK. The first is the development of an automated reporting system for ground stability for the British house buying and selling market – a system that has the capacity to automatically deliver a report on geo-hazards for every house transaction that takes place in one year; ie 1.4 million reports or over 5000 reports per working day. The second initiative is completely different and for a completely different set of users – it is a system to allow users to have easy, intuitive and dynamic access to 3 dimensional geological models and to create their own maps, or sections or even virtual boreholes. Finally, the paper will take a brief look at future developments.

**A ground stability report for the property market**

This initiative is a joint venture between BGS and the UK Coal Authority, a public sector body which regulates the UK coal industry and provides information to home buyers on potential subsidence due to past coal mining. The Coal Authority has for some years operated a high volume automated service to supply this information to the market. The system uses transactional GIS querying and analysis of an extensive coal mine plan database to automatically generate reports for specific properties. BGS has developed high resolution (50 metre) spatial databases for natural ground instability factors for the whole of Great Britain. Damage caused by natural geo-hazards causes more than 450 million Euros of insured losses every year in Britain. The two organisations agreed to form a partnership to develop a system that could produce a combined Ground Stability Report. The report and the system have taken over 4 years of work, much of its being devoted to the content and format of the report for homebuyers. But we have also had to address major challenges in developing the delivery system and ensuring we address and mitigate the risk of liability. The presentation will describe the system and report in detail and also discuss the important issues of due diligence (professional responsibility) and liability, which have been a significant area in developing this service.

**Why did we do it?**

We did it because we believe it is part of our mission - we have knowledge that can help people make informed decisions about factors that cause damage to health and property (eg radon induced cancer causes approximately 2000 deaths pa and natural ground stability causes >£300 million of insured losses to property pa in the UK). We did it beacuse being a due diligence element of the property transaction process strongly reinforces BGS's role and future. And finally we did it because our annual grant from the UK government covers only 50% of our costs: so this venture has the potential to generate considerable revenue to allow us to do more and better science.

**The geo-hazard data and the ground stability report**

In the first phase of the venture we will be producing a report on 6 natural geological hazards, coal mining and brine extraction. The 6 natural hazards are:

- Swell shrink clays
- Soluble rocks
- Landslip
- Compressible deposits
- Collapsible deposits
- Running sand

The Combined Ground Stability Report is specific to a particular address and states whether these particular hazards are present, how likely they are to cause a problem and what the homeowner should do to avoid or mitigate the problem. Guidance, terms and conditions inform the buyer of the report how the report should be used and what its limitations are. The report can be ordered and delivered on-line or by post and fax.

**Professional responsibility and liability**
If Geological Surveys are serious about applying their science and benefiting society they have to communicate it to those who don't speak our science language. That means new, simpler, products for users who do not understand geological science and its uncertainties. This increases the need for legal advice to ensure we properly and responsibly explain the product and its limitations. BGS has spent substantial time and money with lawyers making sure that we describe the Ground Stability report fully and appropriately for the user and provide as much protection as is possible for BGS against litigation.

**Providing access to geological models**
Many Geological Surveys are now producing 3 dimensional geological models. From 2000 to 2005 the BGS invested more than 10 million Euros in developing a corporate system and protocols to develop, manipulate, store and present such models routinely (The Digital Geoscience Spatial Modelling – DGSM - project). From April 2005 the production of such models became a part of the BGS operational programme with a strategy that would progressively move the organisation from a mapping to a modelling culture – ie every geological surveying project would be expected to deliver 3d models rather than simply 2d geological maps. However, this paper is not about the development of the overall 3d modelling system, or any of the pieces of modelling software we use, rather it focuses on one particular issue that became very apparent once we had built and delivered to clients a number of 3d models for parts of the UK. The issue is this – we Geological Surveys can build and view and manipulate geological models and show them to our customers, but those same customers rarely if ever have either the software or the expertise to use the models or get the full dynamic, benefit from their 3 dimensional information. Essentially, we were building 3d models, proudly showing them off to our customers on our software and then either leaving them with static paper print outs or with digital data which they could not use to its full extent because they did not have the software to view or interrogate it dynamically. The solution was a simple to use and inexpensive 3d Viewer, which we provided free with each set of 3d model data. The Viewer was developed by InSight GMbH in association with BGS.

**The 3d Viewer**
The Viewer software allows the user intuitively to interrogate and manipulate the model. They can zoom and pan, select specific units, rotate the model, change the vertical exaggeration; but most significantly they can construct cross sections at will along any set of vectors, and even "drill" a virtual borehole at any location. This simple to use functionality empowers the user, whether they be a planner or an engineer, to get full and dynamic access to the full model – without having to come back to BGS. The Viewer has been very well received by our clients, but has also made a big impact within BGS. The presentation will demonstrate the Viewer and present and discuss its functionality.

**The future**
BGS is continuing to develop innovative systems for delivering its geoscience knowledge in new ways. We already have a prototype system for delivering the same geo-hazard report information to mobile phones fitted with GPS – Location Based Services or LBS. Your phone knows where you are and thus the location that you want information about! We are also working with clients on dynamic delivery of our data via web services – secure real-time internet access obviating the need to provide multiple (and soon-to-be out of date) copies of our data on DVD etc. Systems using portable immersive technology (3d virtual reality) are in development, providing enriched access to the wealth of spatially related data that BGS (and every Geological Survey) holds. The possibilities for exploiting geoscience knowledge through new technologies are limited only by our imagination.

**Conclusions**
The two systems described above are very different but what they have in common is an acknowledgement that we need to understand the real needs of our clients and then use the new technology to work to meet those needs. What we cannot do is try to impose our science and technology on society and then, when society fails to understand it and rejects it, sit back and sigh and grumble about the ignorance beyond our walls – for Geological Surveys that would be a recipe for rapid decline.

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