MAKE A DIFFERENCE OUTSIDE YOUR OWN BACKYARD

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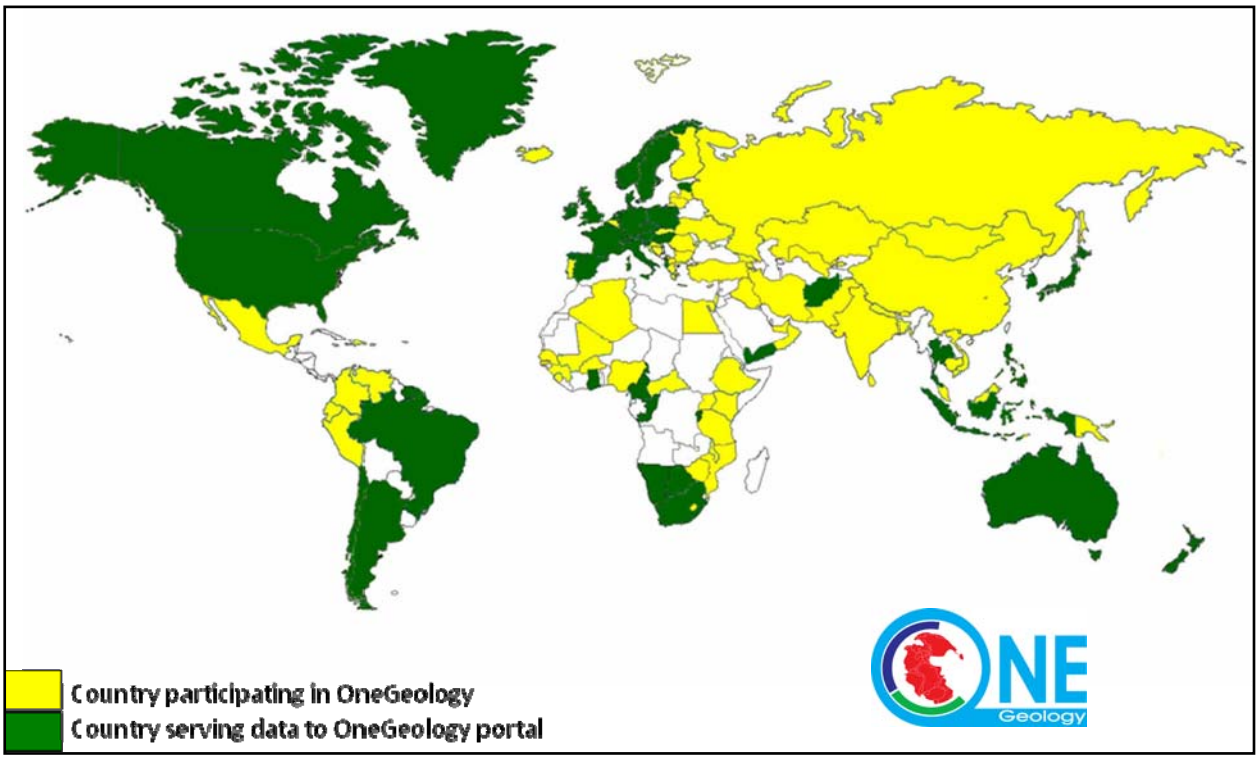
In this paper "outside your own backyard" is going to be used in two ways. The first refers to geoscience modellers making a difference within our own, geoscience, community. The second way relates to the need for modellers to improve their interactions with the wider world. The paper largely pertains to the work of geological surveys, with which I am most familiar, but some of the points will have relevance beyond.

UNITED BUT DIVERSE

They may already be obvious to some, but the experience of being a part of the OneGeology bandwagon has rammed home a few things in the last 3 years. For those who have not heard of it, OneGeology is a multi-national geological survey initiative to make geological map data Web accessible. It is an initiative that has provided several of us with the opportunity to visit and meet geoscientists and geological surveys in every continent and has given privileged insight into the status of geological information and informatics and the visions of our peers across the globe. And just what has the experience revealed? It can be summarised in a couple of paradoxical words – unity and diversity. Around the world geoscientists share a basic aspiration – to model and describe their multi-



dimensional, multi-parameter domains in a digital multi-dimensional and multi-parameter way. No-one has a monopoly on this aspiration; it is articulated wherever you go, sometimes in a technically sophisticated and complex way, sometimes with basic but elegant simplicity. At the same time, the resources, technology, and support infrastructure to implement this aspiration are much less ubiquitous and there is a huge disparity in the tangible progress made across the planet. Almost equally diverse are the approaches taken to modeling by those who are fortunate to have the wherewithal to do it. The conclusions that follow from these basic observations are the subject of the first part of this paper and a prime basis for the exhortation in the title for us to get outside our own backyards.

YOU ARE NOT ALONE

It is natural to assume that the scientific, technical, and cultural challenges one faces in developing and implementing 3D modeling are unique to you and to push ahead and try to deliver your own solution. It is, however, exceedingly improbable that, at the beginning of the 21st century, this will be the case - somebody somewhere will have struggled with, or will be struggling with your problem. Your piece of bedrock, or surficial, or even anthropogenic, domain and geological geometry is not unique. It is equally improbable that your application or hardware quandary or a similar problem has not been encountered before, and yet how often do we choose to re-invent our own little bespoke wheel? We then defend our "territory" and our own way of doing things, which in the long run only serves to fragment geoscience, not bring it together. We need to find improved ways of sharing experience and solutions. This workshop series has and is making a great contribution, but it needs to be replicated, diversified, and supplemented by other resources – on line and in print. But all these things are no substitute for getting on our bikes and visiting colleagues and seeing and borrowing from what others in the world have to offer.

PUTTING SOMETHING BACK

Around the world there are geoscientists who see the potential of a 3D and 4D digital world and share our vision but do not have the privilege of the resources, or influence, or experiences many of us here at this workshop have. They need help to marshal and win the arguments to make the progress they and their nations so desperately need. While some of us could, and do, supply their organisations with the 3D modeling software and applications, this is perhaps - however attractive and glamorous the application may appear to both recipient and donor - not on its own a sustainable, or responsible, answer. The real pressing need is arguably for assistance in developing basic infrastructure – i.e., a sound information policy foundation, a workable technical and managerial strategy, and well constructed use and business cases (of which more later), in other words an integrated and practical package with appropriate technology; above all assistance which helps avoid and mitigates the pitfalls that we encountered and shortens the length of the digital learning curve. There is a huge appetite for knowledge that we, in the so-called developed world, may consider routine and not particularly special and there are real opportunities to spread that knowledge and add value outside our accustomed territory.

MAKE THE CASE

Most geoscientists do not need to be convinced of the capabilities of models to more fully record our understanding of the world beneath our feet. We are know that these models, whether they be 3D or 4D, can better hold and present the interpretation of the diverse evidence we have gathered and can be used to predict geometry or properties at some point in space and perhaps time. But models represent a substantial investment in data and skills acquisition over conventional 2D outputs. Moreover, management and external clients (and some geoscientists) will need to be convinced that the cost-benefit case stacks up. We need to be able to answer the "so what" question that will inevitably come from these sources. How do you explain to an insurance company what benefit a model provides over the standard 2D geo-hazard assessment we provide to them, or to a local authority about the advantages of having information in a minerals plan that derives from more than two dimensions. It is not that the case cannot be made; it is just that too often we fail to make it persuasively, if we make it at all. One of the possible outcomes of this workshop could be a set of use cases and/or cost-benefit cases for 3D models, articulated in language which an intelligent layperson can comprehend. It would be excellent to see examples from groundwater resources and protection, urban planning, radioactive waste disposal, major civil engineering schemes, etc.

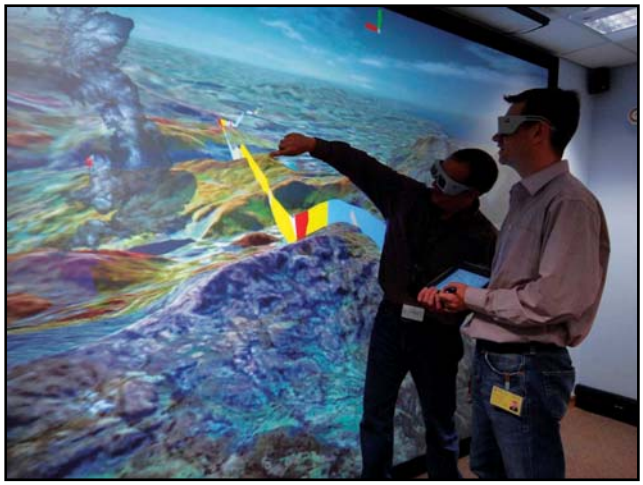
ENGAGING WITH THE FLAT EARTH SOCIETY

The dominance of the topographic sector within the increasingly important spatial data infrastructure (SDI) community

(and by contrast the relative silence of the geoscientists) means that at times you could be forgiven for thinking that geographic information and spatial data had only two (or at a push 2.5) dimensions. Of the three spatial dimensions, X and Y are very much the principal considerations. If you will excuse the pun, Z has a much lower profile. T = time gets a rare mention and a 5th dimension – uncertainty – little airtime at all. We know that modeling the real world requires us to get to grips with these other dimensions too. To predict the rocks, their properties and how they and the fluids and gases within them move, has required a multi-dimensional approach. On the other hand, the topographic community is much more mature and professional in terms of the organisation, management, interoperability, and dissemination of their data, and there is much we can learn from them. Instead of being snobbish about the geographers, we need to be proactive and explore how the geographic and geological communities might better share their expertise and experience in the future.

THE VIRTUAL WORLD BEYOND

It is a given that to reach outside our backyards we must make the fullest use of the internet. Making basic models available in 3D postscript and other formats is a great start, but inevitably the full modeling workflow, in particular delivery, must be as far as possible Web-enabled …and interactive…..and easy to use….and complying with international spatial data and applications interoperability standards. At the same time, we need to smoothly integrate the seductive game-like developments in visualisation and virtualisation with our 3D models and Web-enable these too and then unashamedly use them to convince the internal doubters and new potential external users of the advantages of a 3D world.



THE WHOLE IS GREATER THAN THE SUM OF ITS PARTS

As with the rocks, the issues that geoscience are central to – natural resource development, hazard mitigation, climate change - show no respect for political boundaries and are often trans-national. Those issues also transcend geoscience because they are multidisciplinary. Our world is shrinking at an accelerating rate too, in a virtual sense at least. These realities and the arguments made in this paper all point one way – that the optimum course of action by our community is not only to take forward the work of our own projects, programmes, and organisations, but to exploit every opportunity to add value by collective action. In other words: to share more and collaborate more, inside and outside our domain. This will depend crucially on those in senior management positions having the confidence to look beyond the expeditious local solution and recognise that it is joined up geoscience modeling that will sustain and have lasting strategic value. In a complex changing world it is multi-disciplinary science that can model and predict the real world that has the best chance of success, and we will be more innovative and ensure that our results can be deployed if we work together.