

The following was presented at DMT'09
(May 10-13, 2009).

The contents are provisional and will be
superseded by a paper in the
DMT'09 Proceedings.

See also earlier Proceedings (1997-2008)
<http://ngmdb.usgs.gov/info/dmt/>



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL



Applied geoscience for our
changing Earth

Data and Applications for Environmental Modelling

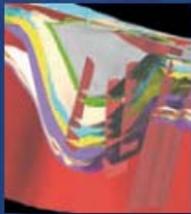
Why Doesn't Your Model Pass Information to Mine?

Jeremy Giles & Holger Kessler

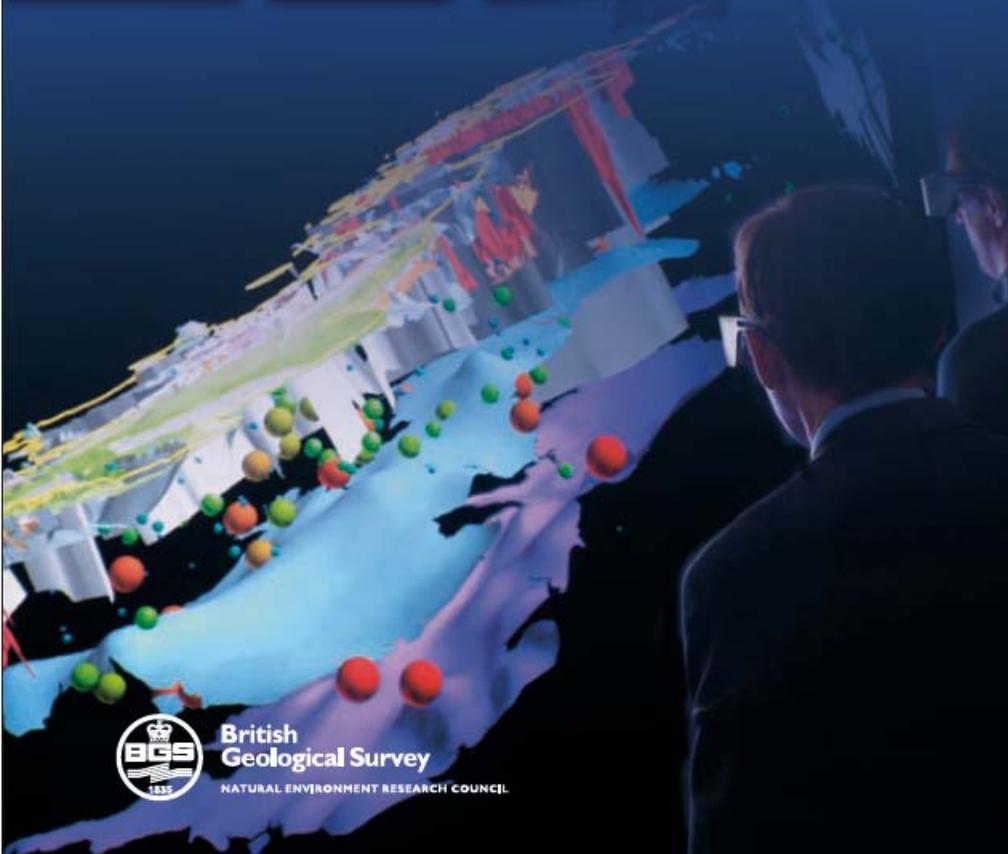
DMT 09

British Geological Survey

Strategy 2009–2014



Applied geoscience for our
changing Earth



British
Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

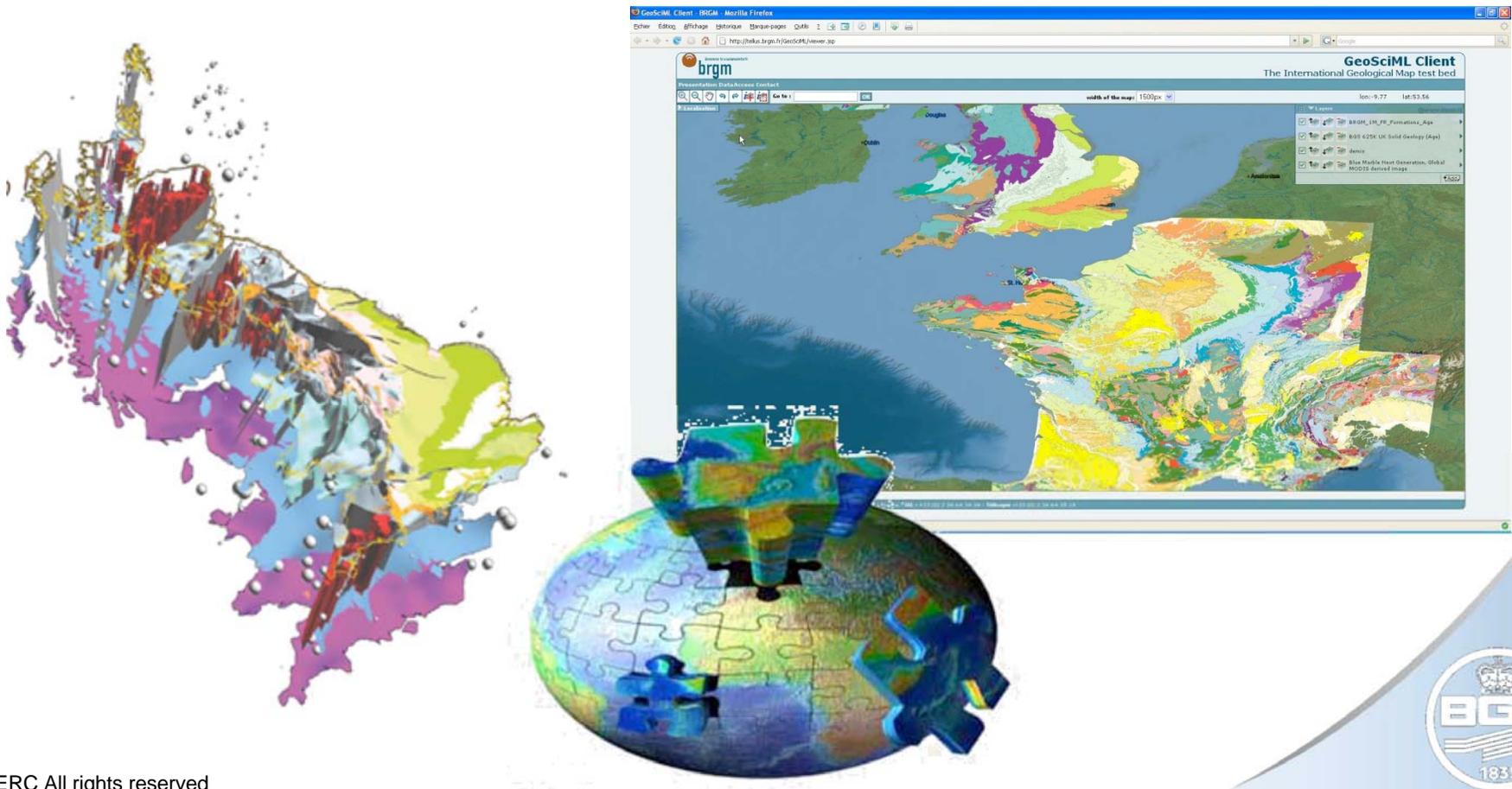
BGS Strategy

The BGS work programme over the next five years will address six priority challenges.



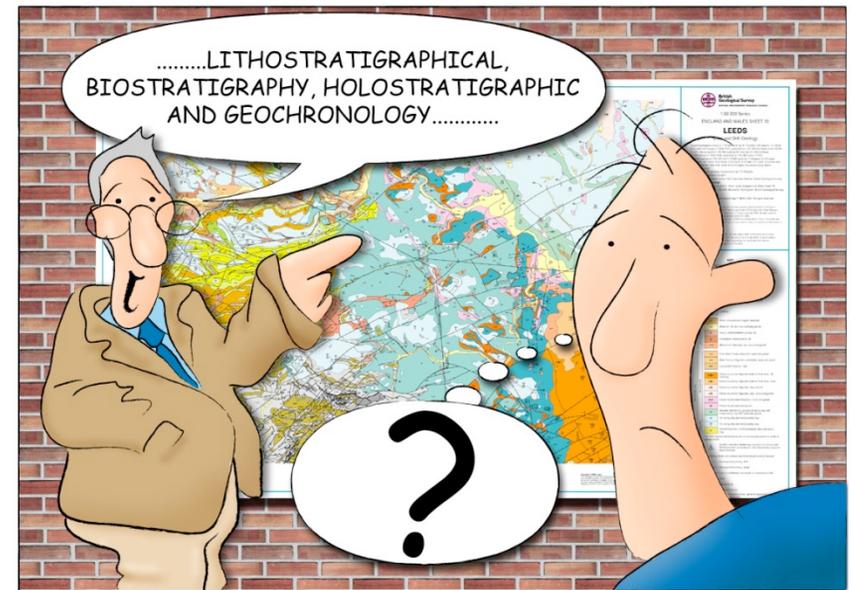
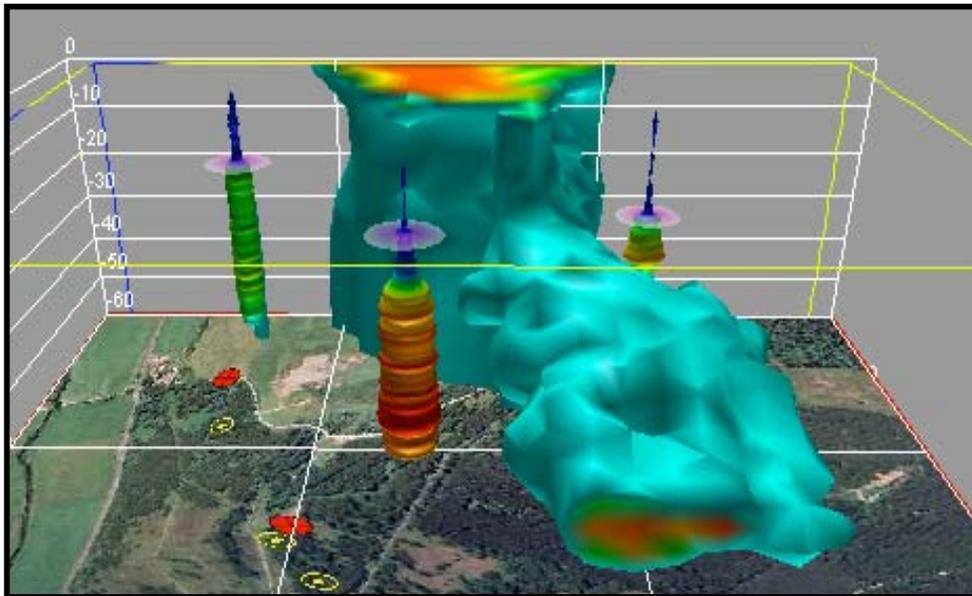
Challenge 1

Acquire, interpret and enhance the UK geoscience knowledge base - accessible and interoperable



Challenge 2

Improve the communication of geoscience knowledge so that it can better support policy and decision making



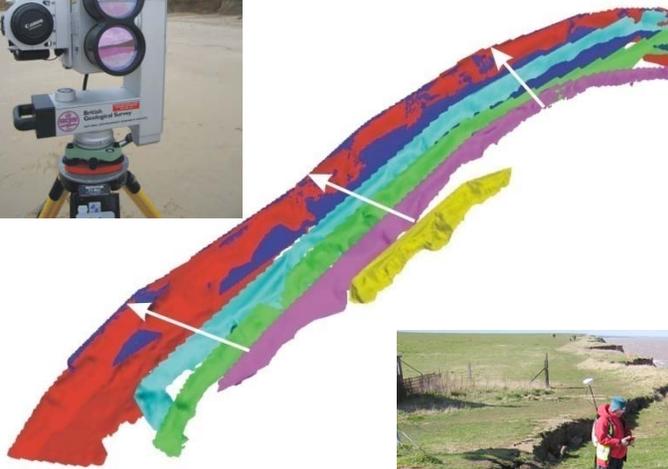
Challenge 3

Enhance external partnerships to improve the quality, reach and impact of our science



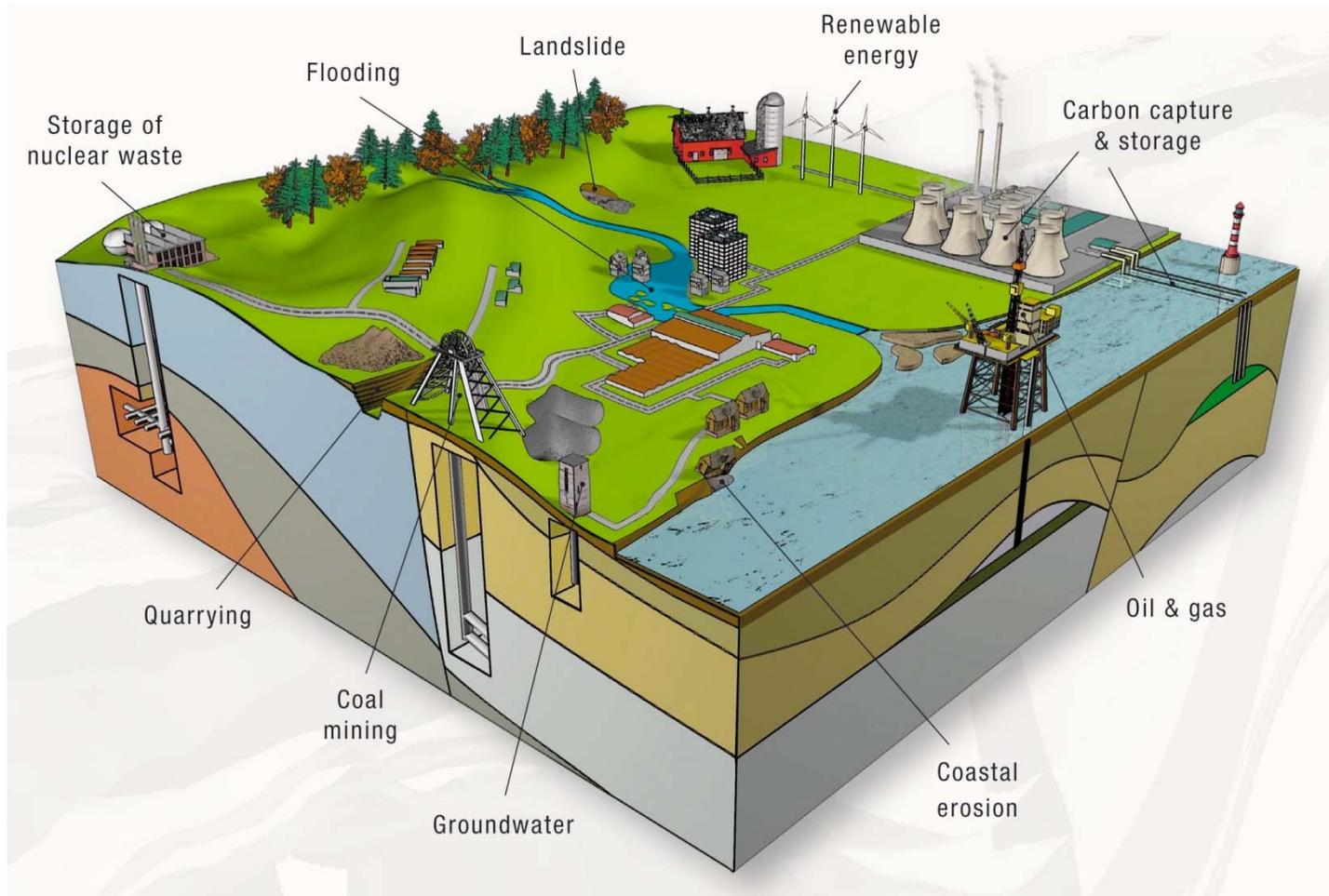
Challenge 4

Apply a whole systems approach to our science and improve understanding of the nature and potential impact of hazards and the sustainable use of resources



Challenge 5

Understand quantify and predict the response of the Earth's "zone of human interaction" to future environmental change

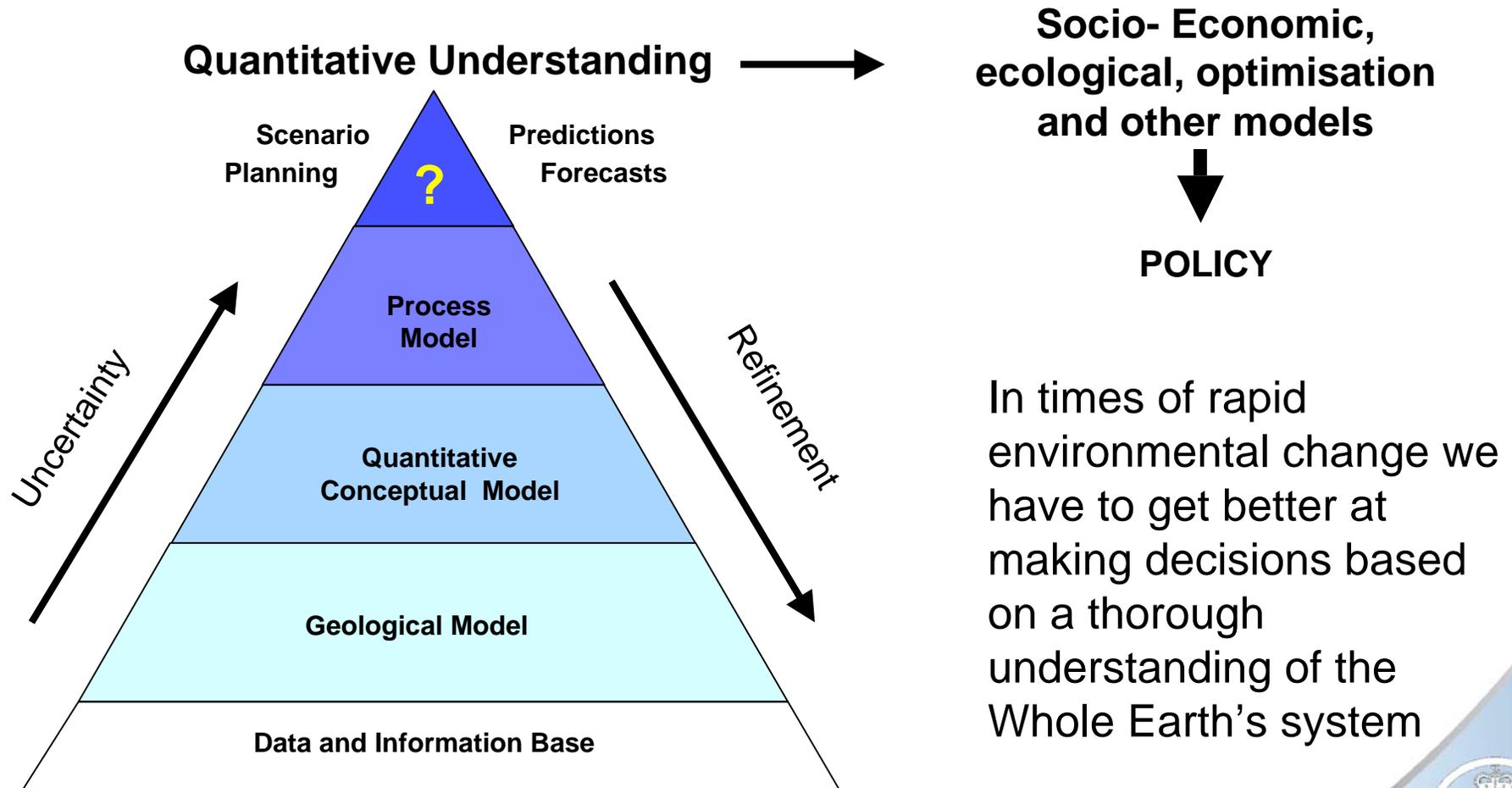


Challenge 6

Increase the economic impact and relevance of our work

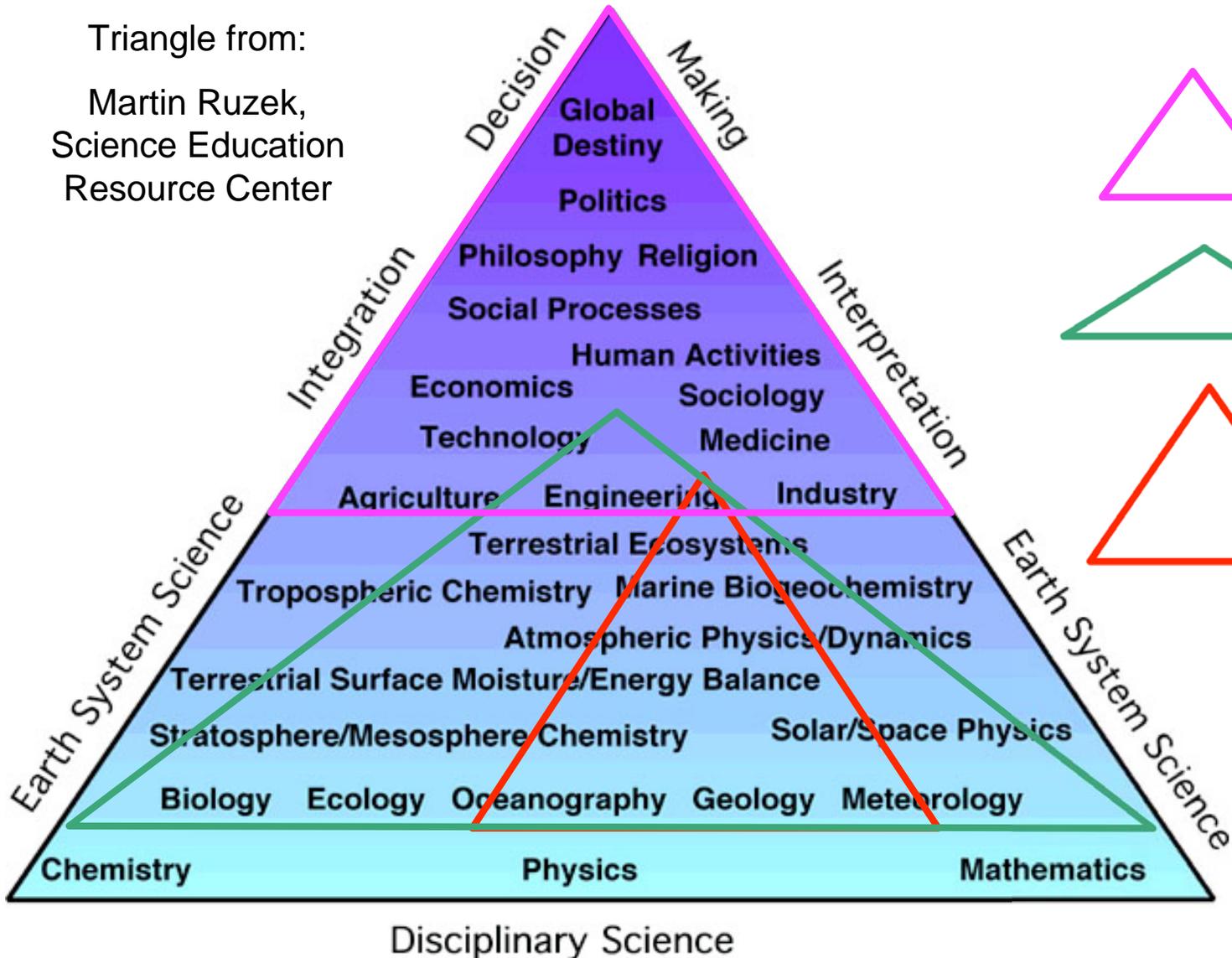


Vision - Environmental Modelling Platform which links data, knowledge and concepts seamlessly to numerical process models



Our footprint in Earth System Science

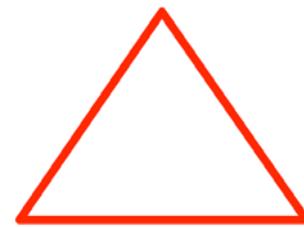
Triangle from:
 Martin Ruzek,
 Science Education
 Resource Center



“where it matters”



NERC



BGS

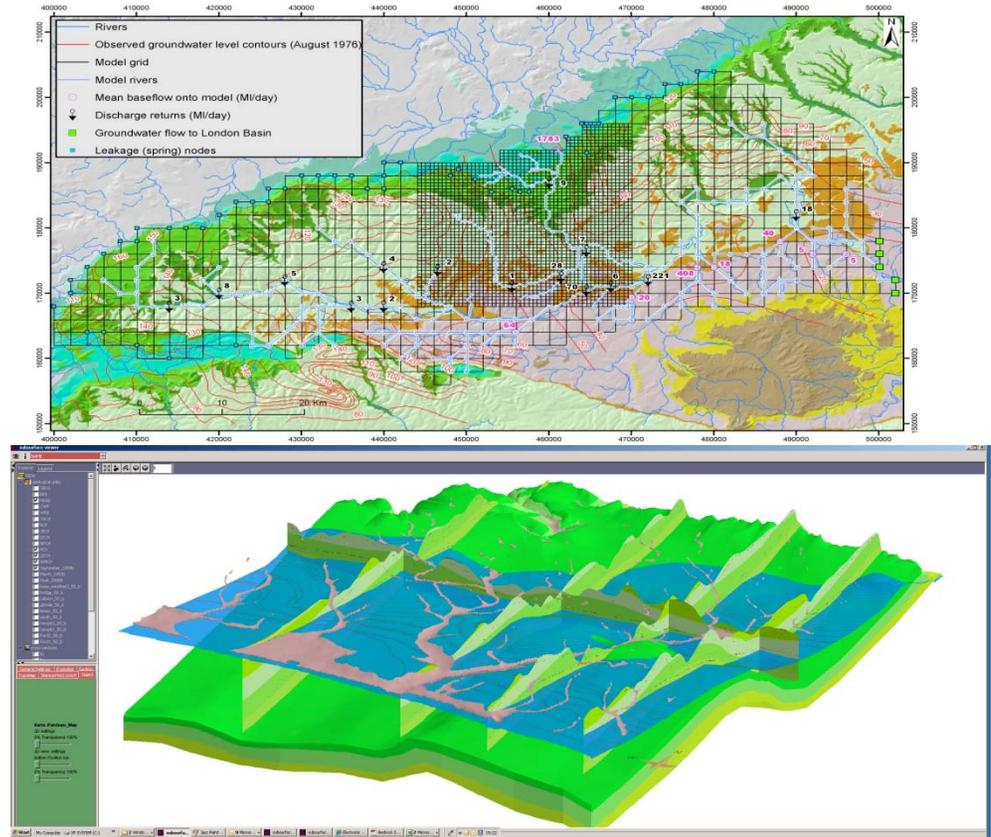


A Good Model

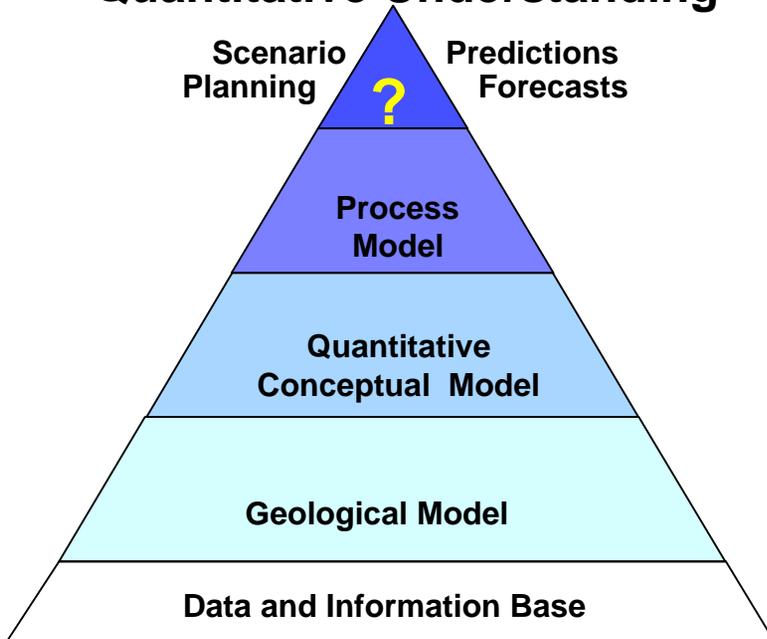


- Realistic geological framework
- Full hydrological cycle
- Considers ecology
- Ability to vary inputs
- Real time operation
- Links to other models
- Communicates clearly
- Engages the end users

BGS Modelling



Quantitative Understanding



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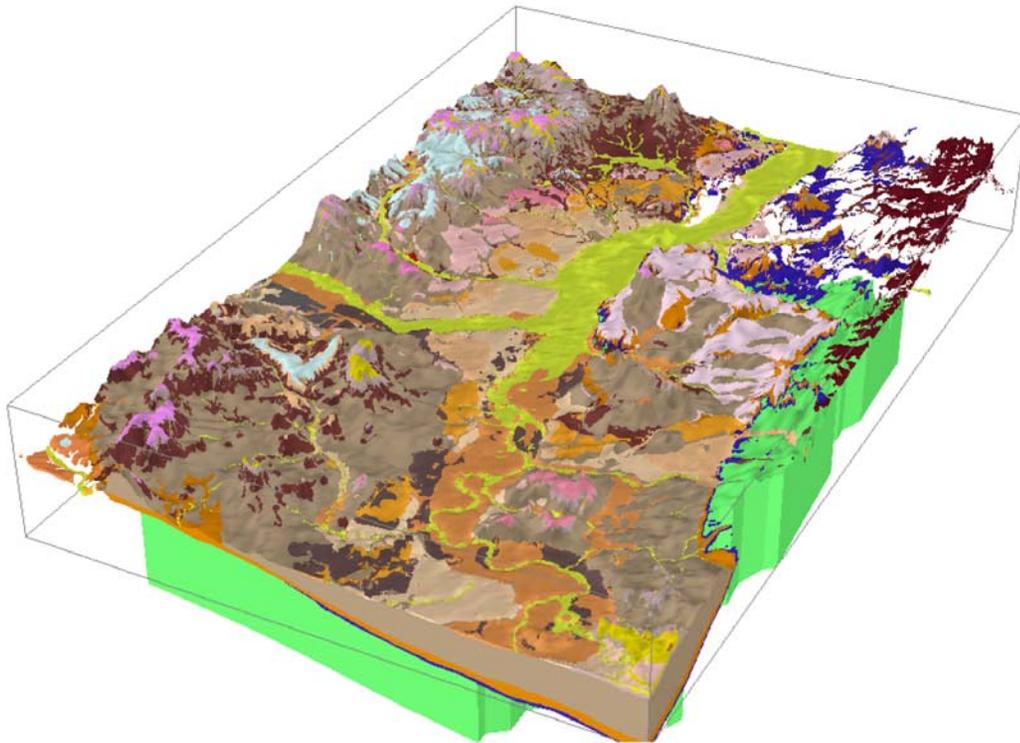
If the question is –

Will there be
enough fresh water
in 10 years?

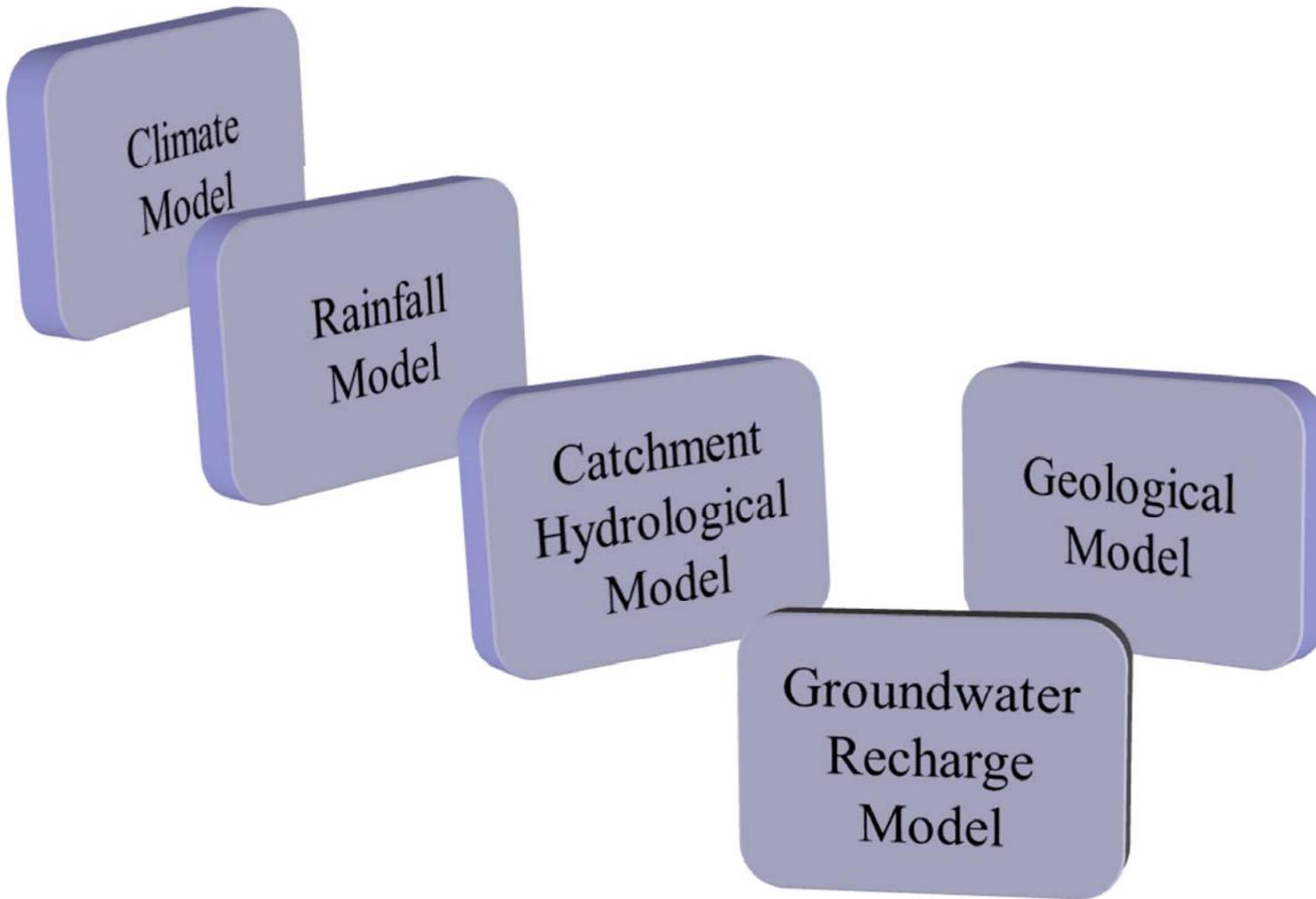


The answer is not –

Haven't I got a
great 3D geology
model?



Multiple Models are Required





**Bottom up design leads to lack
of interconnectivity and
interoperability**

Drivers – INSPIRE & SEIS

25.4.2007 EN Official Journal of the European Union L 108/1

I

(Acts adopted under the EC Treaty/Euratom Treaty whose publication is obligatory)

DIRECTIVES

DIRECTIVE 2007/2/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 14 March 2007
establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Economic and Social Committee⁽¹⁾,

After consulting the Committee of the Regions,

Acting in accordance with the procedure laid down in Article 251 of the Treaty, in the light of the joint text approved by the Conciliation Committee on 17 January 2007⁽²⁾,

Whereas:

(1) Community policy on the environment must aim at a high level of protection taking into account the diversity of situations in the various regions of the Community. Moreover, information, including spatial information, is needed for the formulation and implementation of this policy and other Community policies, which must integrate environmental protection requirements in accordance with Article 6 of the Treaty. In order to bring about such

integration, it is necessary to establish a measure of coordination between the users and providers of the information so that information and knowledge from different sectors can be combined.

(2) The Sixth Environment Action Programme adopted by Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002⁽³⁾ requires full consideration to be given to ensuring that the Community's environmental policy-making is undertaken in an integrated way, taking into account regional and local differences. A number of problems exist regarding the availability, quality, organisation, accessibility and sharing of spatial information needed in order to achieve the objectives set out in that programme.

(3) The problems regarding the availability, quality, organisation, accessibility and sharing of spatial information are common to a large number of policy and information themes and are experienced across the various levels of public authority. Solving these problems requires measures that address exchange, sharing, access and use of interoperable spatial data and spatial data services across the various levels of public authority and across different sectors. An infrastructure for spatial information in the Community should therefore be established.

(4) The Infrastructure for Spatial Information in the European Community (Inspire) should assist policy-making in relation to policies and activities that may have a direct or indirect impact on the environment.

(5) Inspire should be based on the infrastructures for spatial information that are created by the Member States and that are made compatible with common implementing rules and are supplemented with measures at Community level. These measures should ensure that the infrastructures for spatial information created by the Member States are compatible and usable in a Community and transboundary context.

⁽¹⁾ OJ C 221, 8.9.2005, p. 33.
⁽²⁾ Opinion of the European Parliament of 7 June 2005 (OJ C 124 E, 23.5.2006, p. 116), Council Common Position of 23 January 2006 (OJ C 126 E, 30.5.2006, p. 16) and Position of the European Parliament of 13 June 2006 (not yet published in the Official Journal), Decision of the Council of 29 January 2007 and legislative resolution of the European Parliament of 13 February 2007 (not yet published in the Official Journal).
⁽³⁾ OJ L 242, 10.9.2002, p. 1.

Latest News & Events

- FR: French Land Register opens access to geo-data
- EU: Geo-information in the Third ICT PSP Call for

Shared Environmental Information System

Introduction

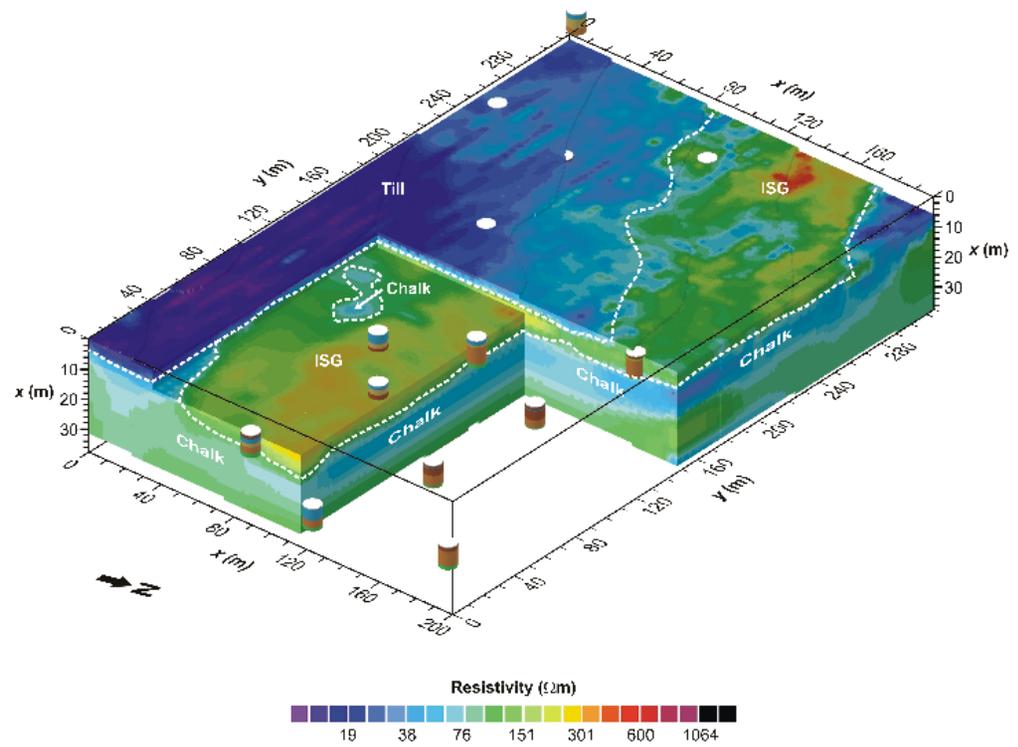
- What is the Shared Environmental Information System?
- Why is SEIS needed?
- What benefits will SEIS bring?
- SEIS and eGovernment
- How will SEIS be built?
- SEIS Task Force
- Documents
- Links
- Contact

SEISnet Newsletter
Issue #2 - (Mar 2009)

SEISnet Community on
epractice.eu [Join it »](#)

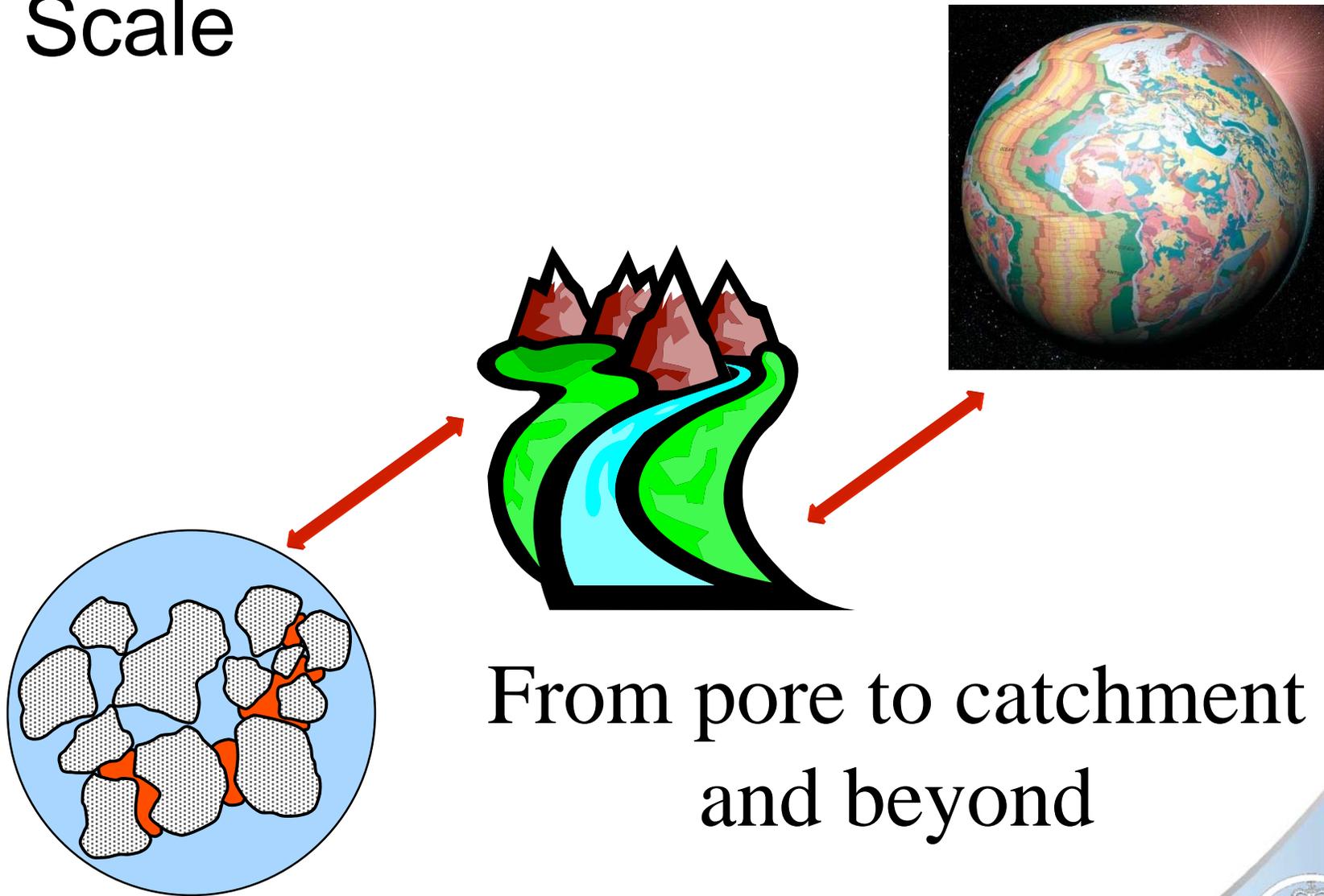
As Environment Commissioner Stavros Dimas stated at the launch of the Communication on SEIS in January 2008, "Timely, relevant and reliable information on the environment is absolutely necessary for decision makers to respond to the environmental problems of our time. But this is not enough. Our citizens are also entitled to know if the quality of air and water in their neighbourhood is good enough or if floods, droughts or pollution is risking their property and livelihood. This is the reason we must improve further the way we collect, analyse and communicate information on our environment."



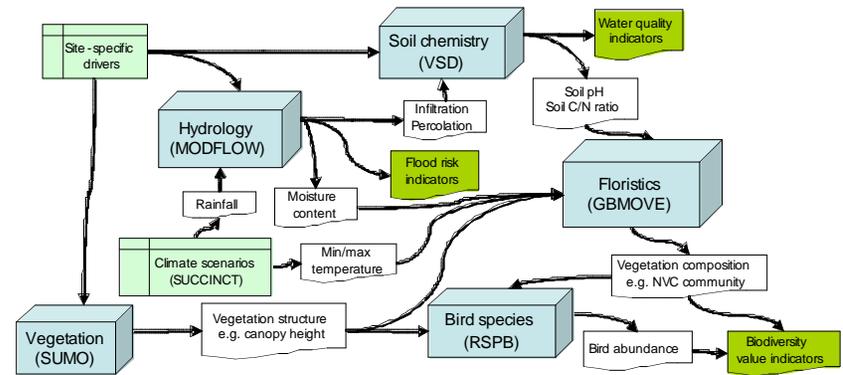
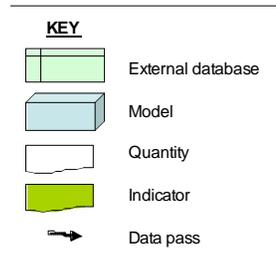


SOME INITIAL REQUIREMENTS

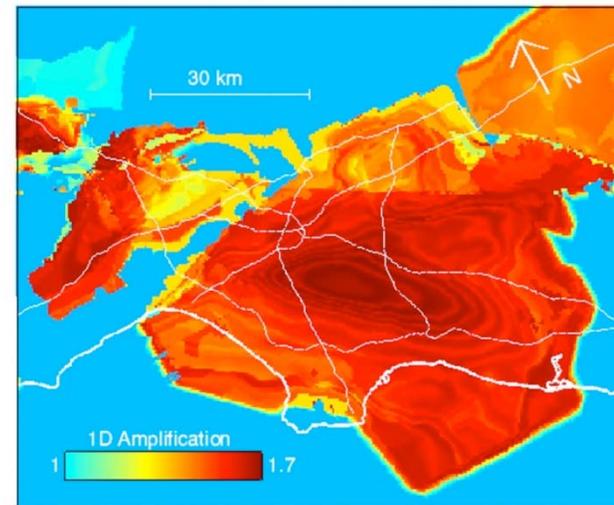
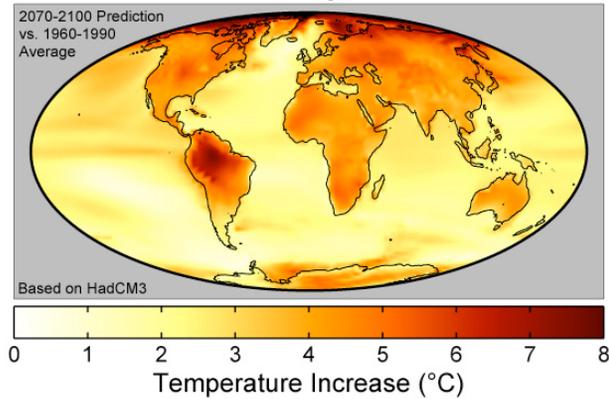
Scale



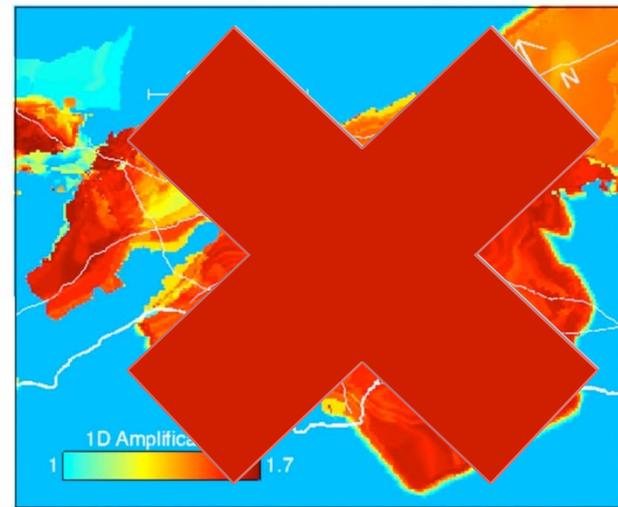
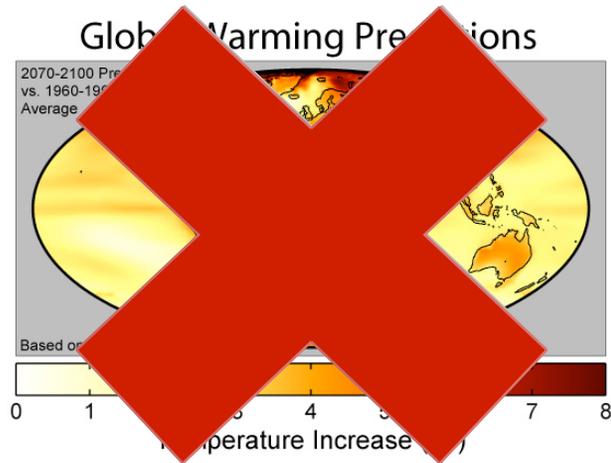
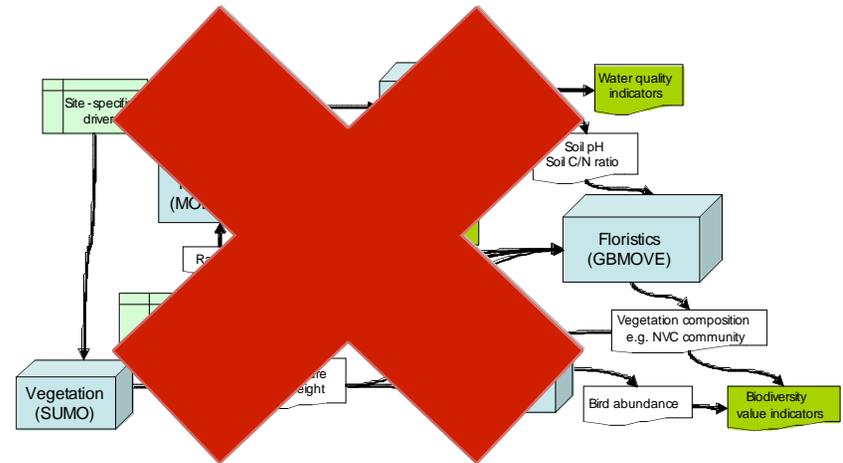
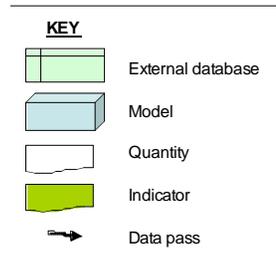
Intrusion



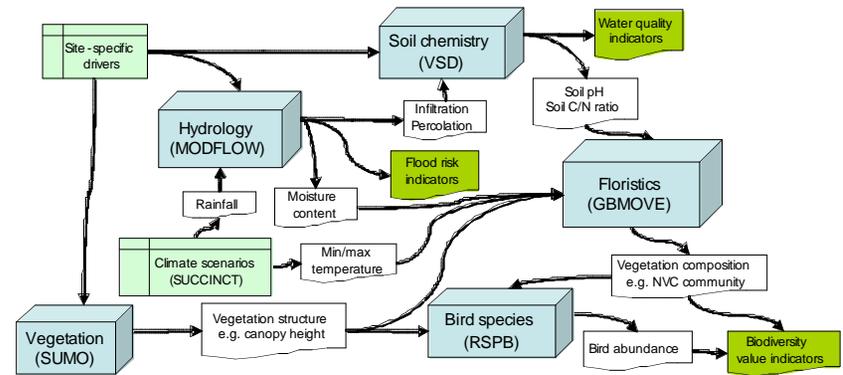
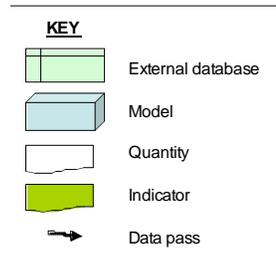
Global Warming Predictions



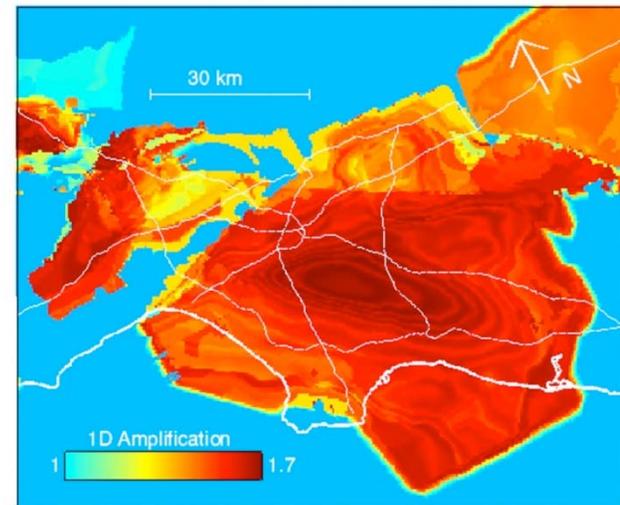
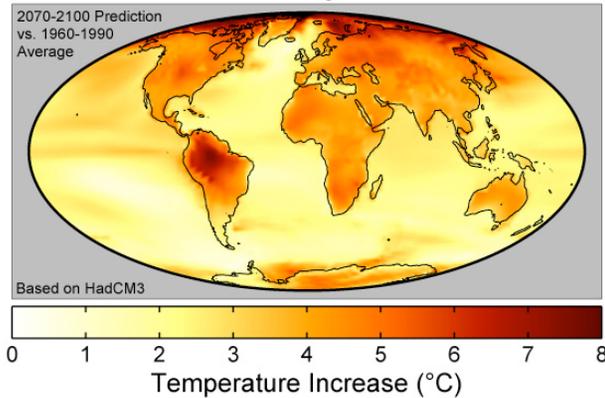
Intrusion



Intrusion

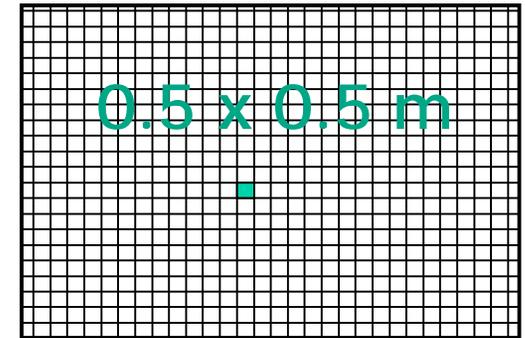


Global Warming Predictions



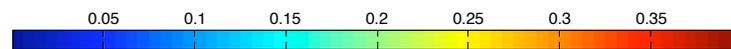
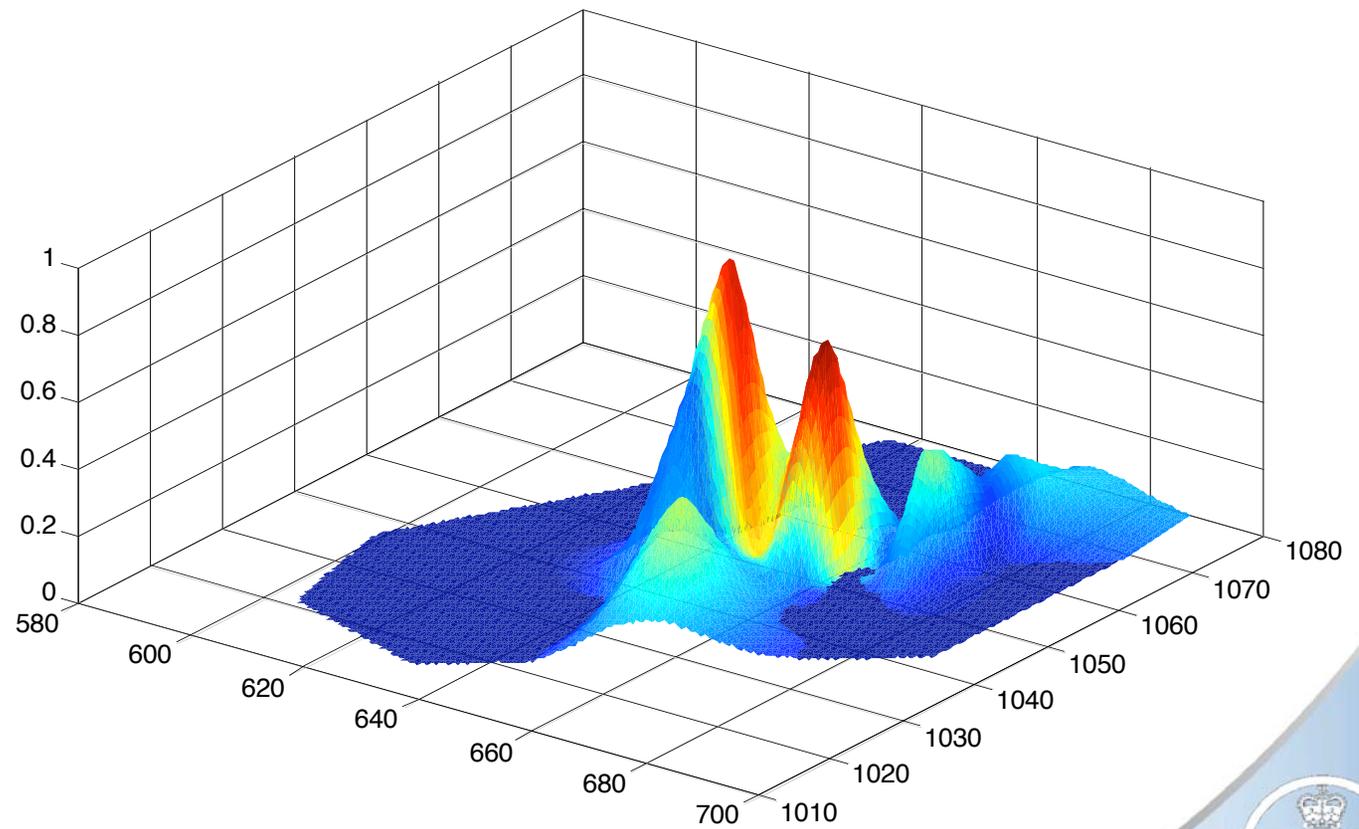
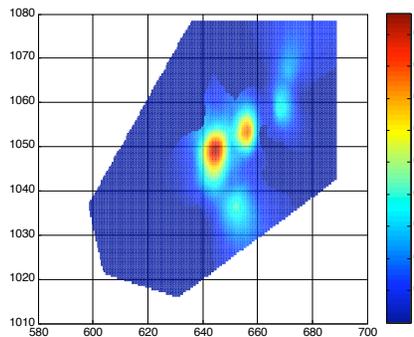
Existing Development Costs Protected

Uncertainty



Occupied
Volume
Uncertainty

(m³)



Uncertainty

- Both the uncertainty of individual models
- And the combined uncertainty of multiple models



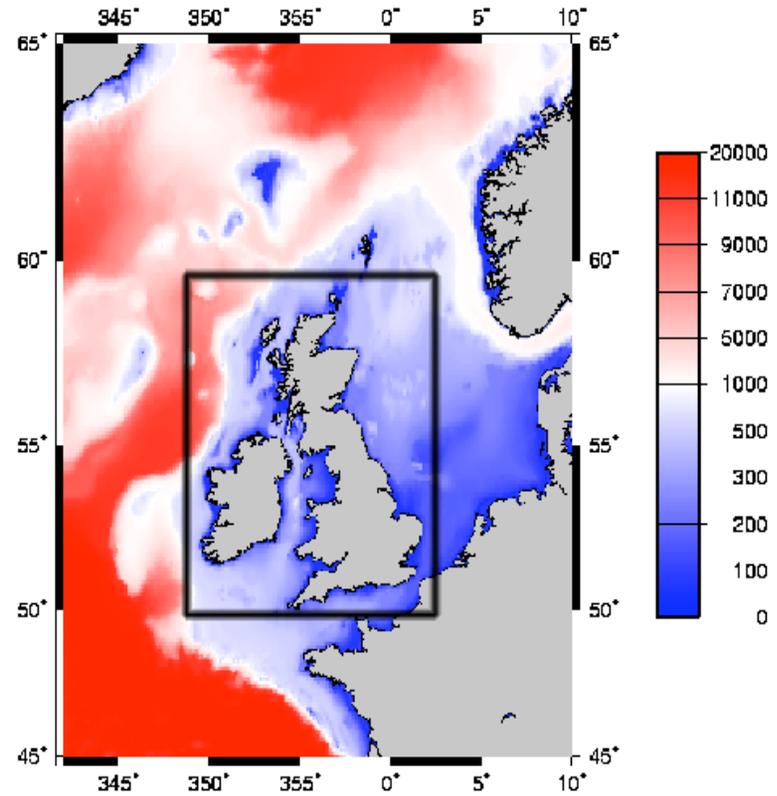
Requirements

- System needs to be truly OPEN
- Acknowledge the sources of the data
- Predictive, parameterised models
- Communicate to customers/users
- Semantic interoperability of data
- Increased availability of digital data
- Understand anthropogenic factors
- Dynamic/updateable - “Future proof”

Requirements

- A “system” to **encourage** and facilitate the flexible integration of diverse spatial and temporal data, models and processes to provide whole-earth simulations and responses to “what if” scenarios





SCOPING STUDY OUTCOME

Products – A Report

A Scoping Study

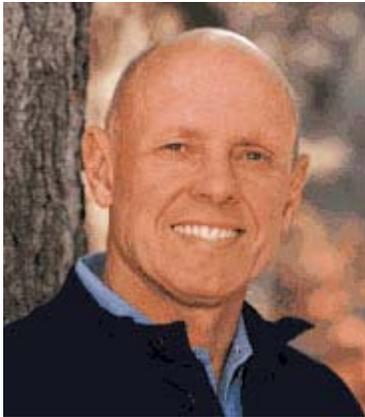
- Where are we
- Where do we want to be
- How will we get there?
- What will it cost



Products –
Envisage a Clear Outcome

Habit 2:

Begin with the End in Mind



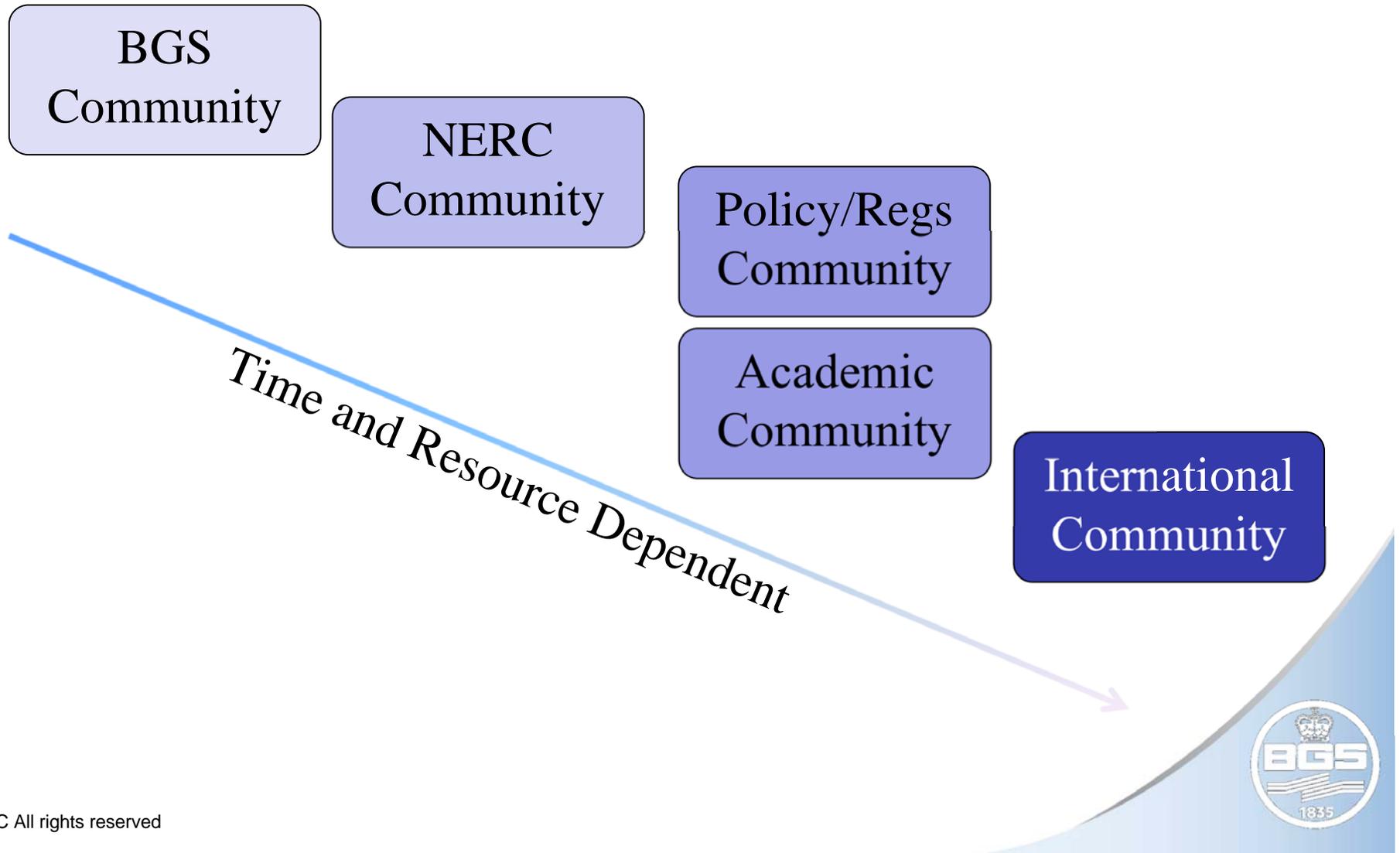
Stephen Covey

Products – a Community

- BGS as part of a community
- BGS as a leading member of that community



Community Building



Don't Reinvent the Wheel

- NERC
- Other GSOs
- Oil industry
- Bioinformatics
- Medical informatics
- Others



Don't Reinvent the Wheel



The screenshot shows the OpenMI website homepage. At the top left is the OpenMI logo, which consists of a stylized globe with a blue and red path and the text "OpenMI" in blue and red. To the right of the logo is a decorative blue banner with abstract water and digital patterns. Below the banner is a navigation menu with the following items: "The OpenMI Association", "About OpenMI", "OpenMI Standard", "Users", "Developers", "Download", "Training", "Events", and "FAQs".

Latest News

- 13 February 2009 **NEW**
OA Technical Committee settles on planned version 2 standard interfaces during the Trento, Italy meeting.
[Read more](#)
- 20 January 2009
The annual OpenMI Association General Meeting will take place in Deltares, Delft (NL) on Thursday, 5th March, 2009.
- 27 November 2008
The OpenMI Association's chairman, Roger Moore will be giving a keynote address at the Integrated Assessment of Agriculture and Sustainable Development (AgSAP) Conference, 10th-12th March 2009, Hotel Zuiderduin, Egmond aan Zee, The Netherlands.
For more information, please see:
www.conference-AgSAP.org
- 24 November 2008
The OpenMI Association's chairman, Roger Moore has been invited to speak at the PEER on 28-29 January 2009 at CEH, Wallingford, UK.
[Read more](#)

Welcome to the OpenMI Association

The OpenMI Association is an entirely open international group of organizations and people dedicated to taking the OpenMI forward into the future. Currently funded under the EC LIFE Environment program, the Association is an independent not for profit organisation. It's primary objectives are to develop, maintain and promote the OpenMI. These are being achieved by the provision of a small core team and the building of an active worldwide user community. The core team responds to and is guided by the community. To learn more about both the OpenMI and the Association, please browse down the main menu.

- [Read more about OpenMI Association](#)
- [Read more about the OpenMI-Life project in the EC LIFE Environment program](#)

OpenMI Founders

Five organizations played instrumental role in the conception and development of the OpenMI standard



- Deltares
- CEH Centre for Ecology & Hydrology
- Wallingford Software
- DHI
- (Circular logo)

[Read more about OpenMI Association](#)

Download OpenMI Source Code

Current Version 1.4.0.0

Which models & components are OpenMI Compliant?

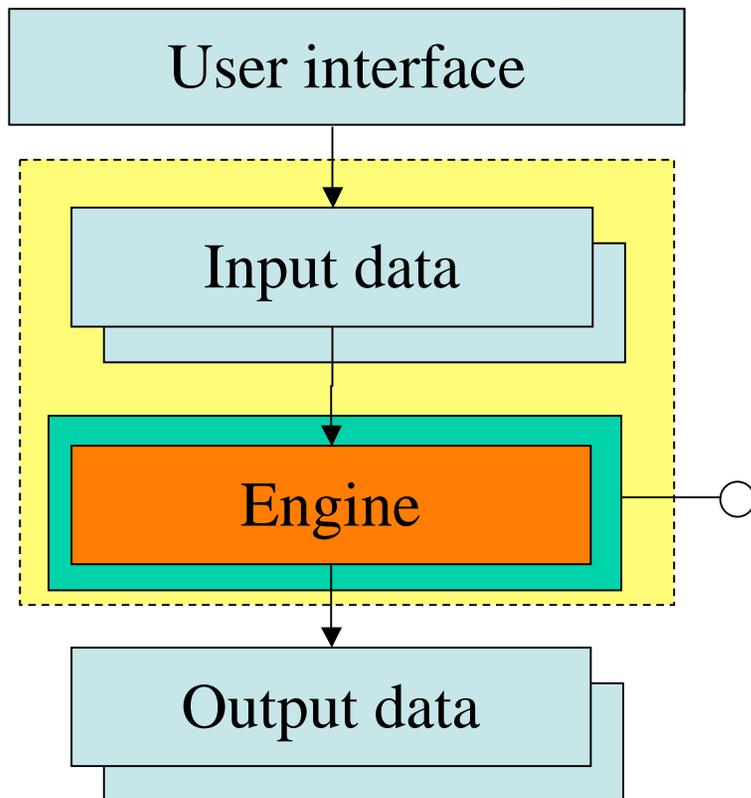
Find The Experts

in OpenMI model migration and linking

Wiki

OpenMI.org

This is what we did



- **Engine** converted to an **engine component**
- Engine component **provides** and **accepts** data through an **interface**
- **OpenMI** defines a **standard interface**
- If an engine component implements the standard interface, it becomes **OpenMI compliant** and is called a **Linkable Component**

The OpenMI interface functions



Descriptive

- To provide information that allows other components to find out what items this **Linkable Component** can exchange :
 - **Quantities** (What)
 - **ElementSets** (Where)

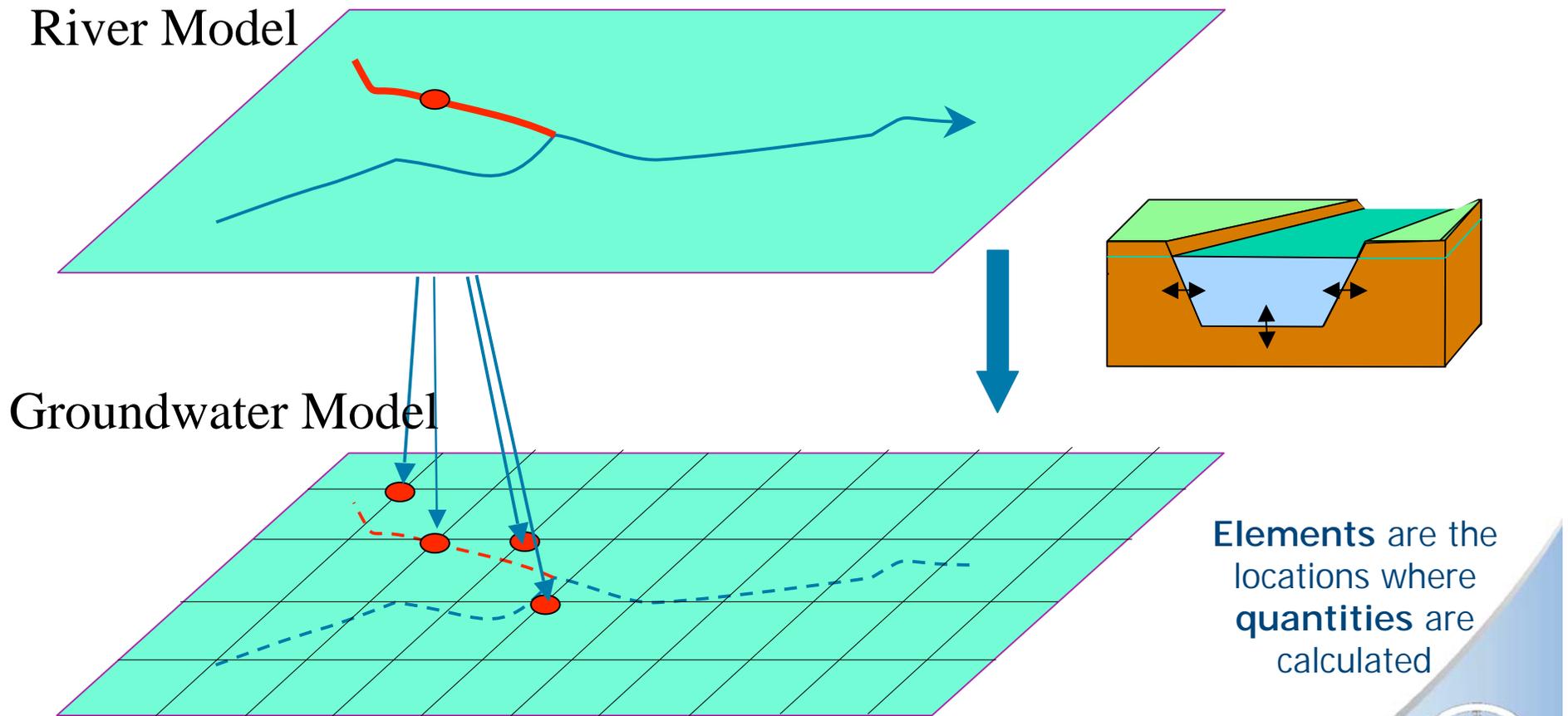
Configurative

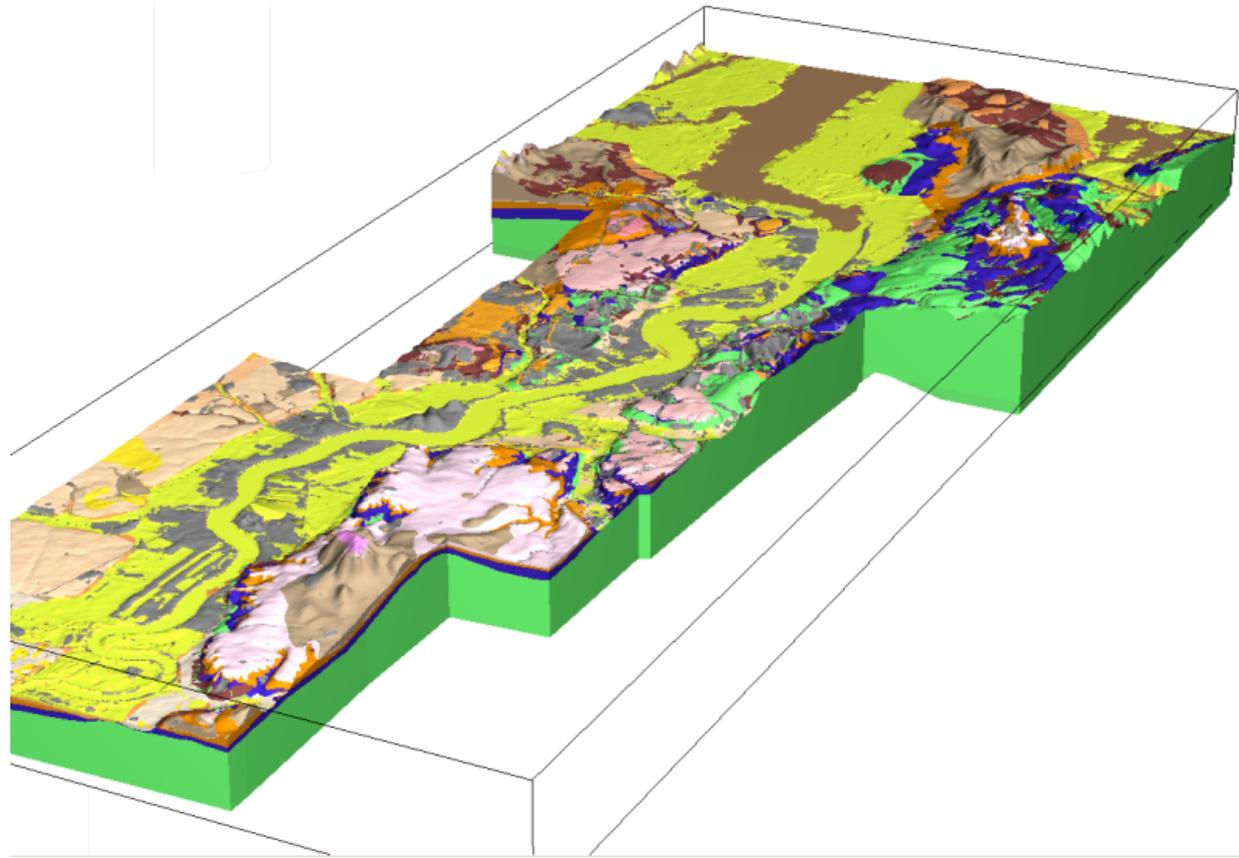
- To define what *will* be exchanged

Run time

- To enable the model to **request** and **receive** data at **run time**

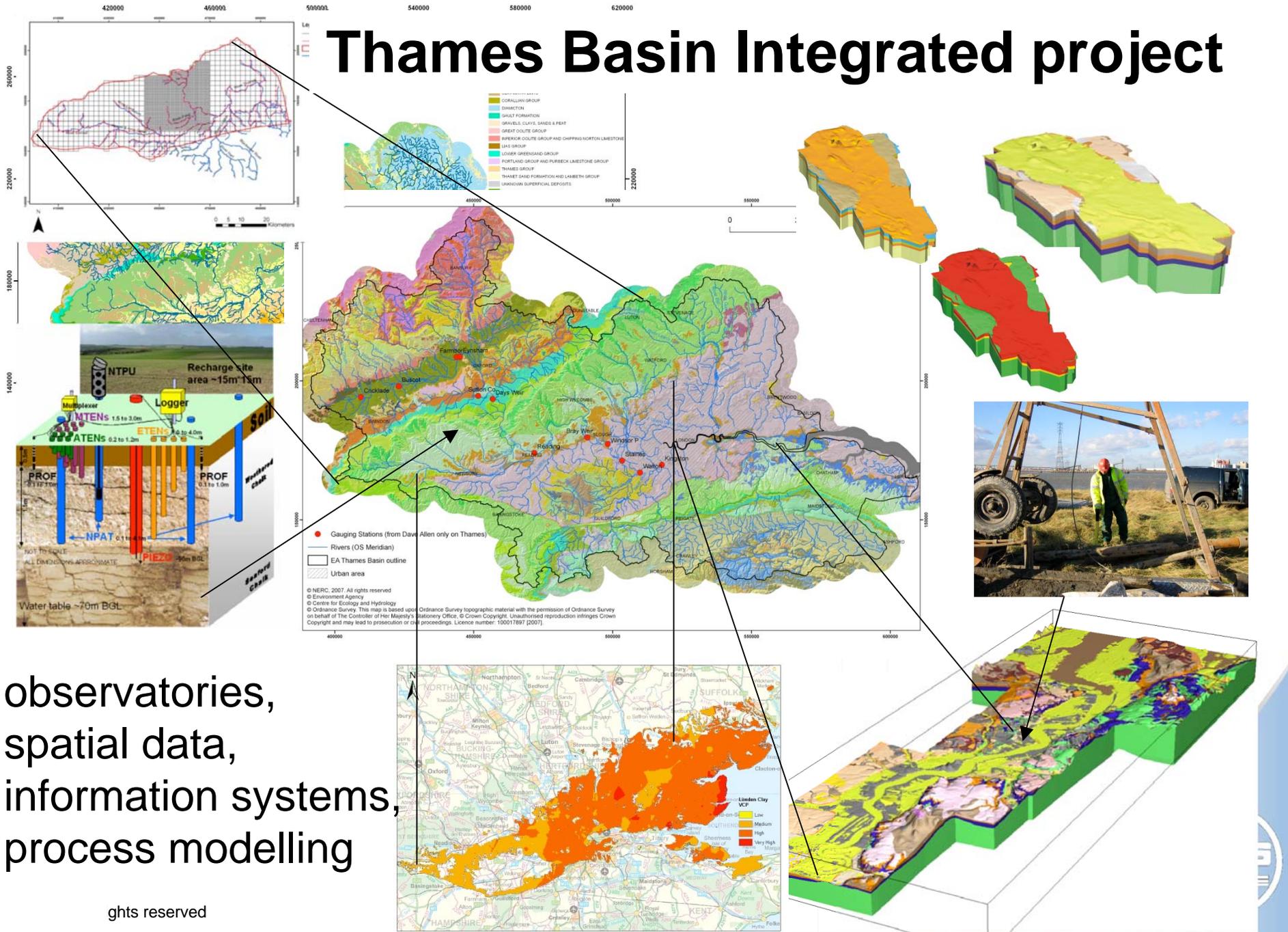
Linking element sets





TEST BEDS IN THE UK

Thames Basin Integrated project



observatories,
 spatial data,
 information systems,
 process modelling

rights reserved



Strategically Important Formations for Secure and Sustainable Resources



Permo-Trias Aquifers
spatial data and
information systems,
property characterisation,
process models.

Contributions

- Prof. Denis Peach
- Dr. Andrew Howard
- Dr. Andrew Hughes
- Roger Moore
- Andrew Kingdon
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Contributions & Questions

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