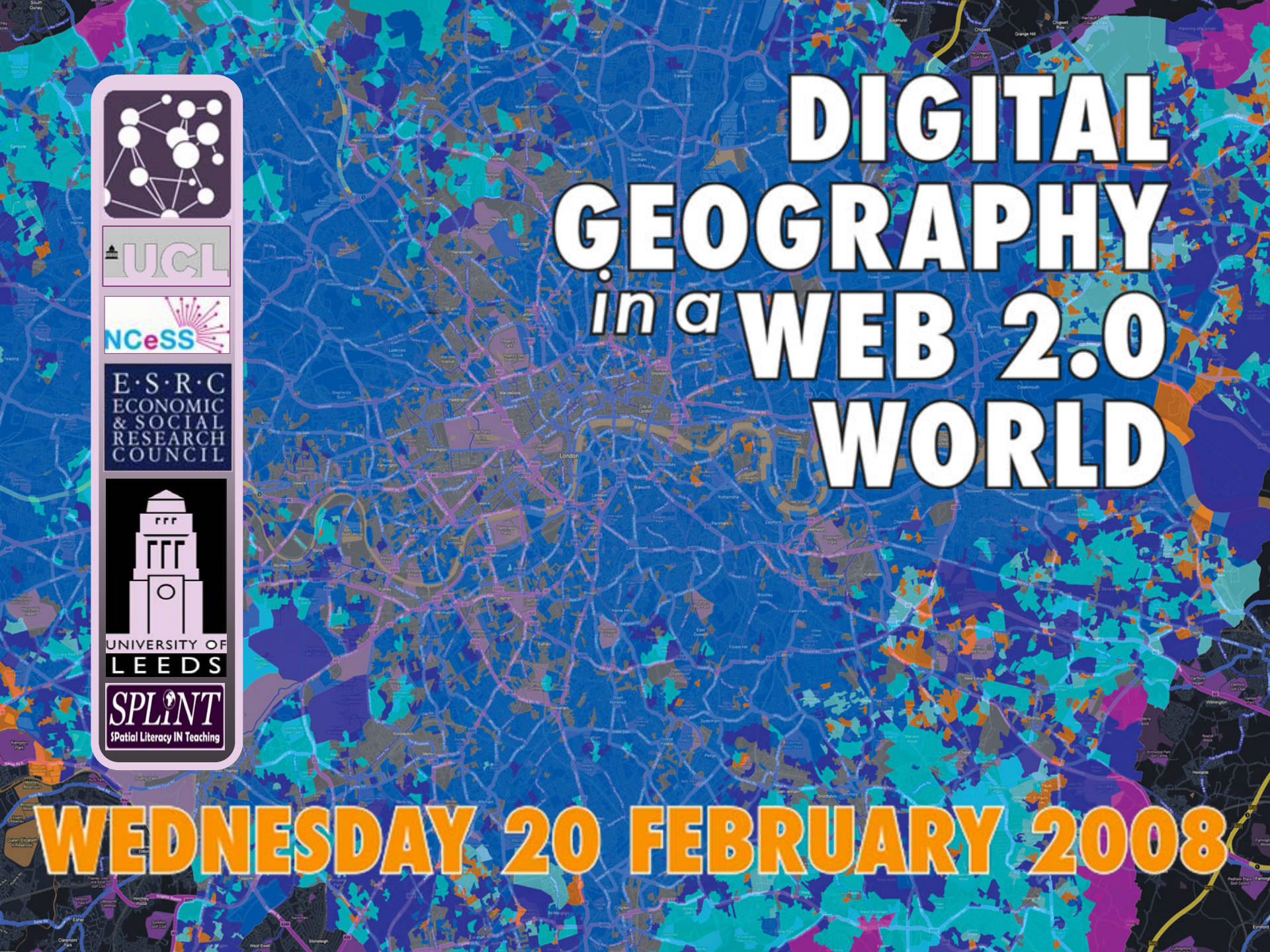

DIGITAL
GEOGRAPHY
in a WEB 2.0
WORLD
UCL
NCeSS
E·S·R·C
ECONOMIC
& SOCIAL
RESEARCH
COUNCIL
UNIVERSITY OF
LEEDS
SPLINT
SPatial Literacy IN Teaching
WEDNESDAY 20 FEBRUARY 2008

3D Visualisation: From Lab to Field

Gary Priestnall, Andy Burton,
Jack March and Gemma Polmear

University of Nottingham
http://www.nottingham.ac.uk

Introduction

- Experiences from case studies in using Virtual Geographic Environments in a Teaching and Learning context

- Modes of interaction include:
  - semi-immersive lab environments
  - web-based via the desktop
  - GPS-enabled mobile devices in the field.

- Studies mix virtual and the real through field work

- Appreciate uses and limitations of virtual environments and digital GI

- Explore issues of Orientation and Navigation

A Centre for Excellence in Teaching and Learning (CETL) funded by the Higher Education Funding Council for England (HEFCE).

A collaboration between the University of Leicester (lead), University College London and the University of Nottingham aiming to explore and enhance spatial thinking in HE and beyond.

The focus at Nottingham (Geography and IESSG) is on:

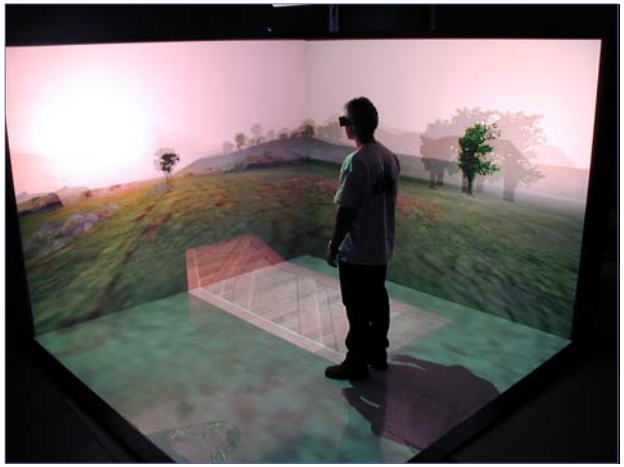
Lab-based Visualisation

Mobile Computing

Degrees of immersion in Virtual Environments

Head-Mounted Display

Cave



Curved screen

Flat Screen

Semi-immersive Visualisation Environment

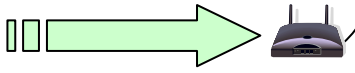
Passive stereo projection system with 5m x 2.5m screen

Image Generators and Blending Unit

Virtual Reality Lab

Further VR and model loading controls via keyboard

Navigation via wireless joypad



Bluetooth transmission of user's position in model mimics GPS NMEA string

User

Optional synchronised mapping on mobile device via Bluetooth

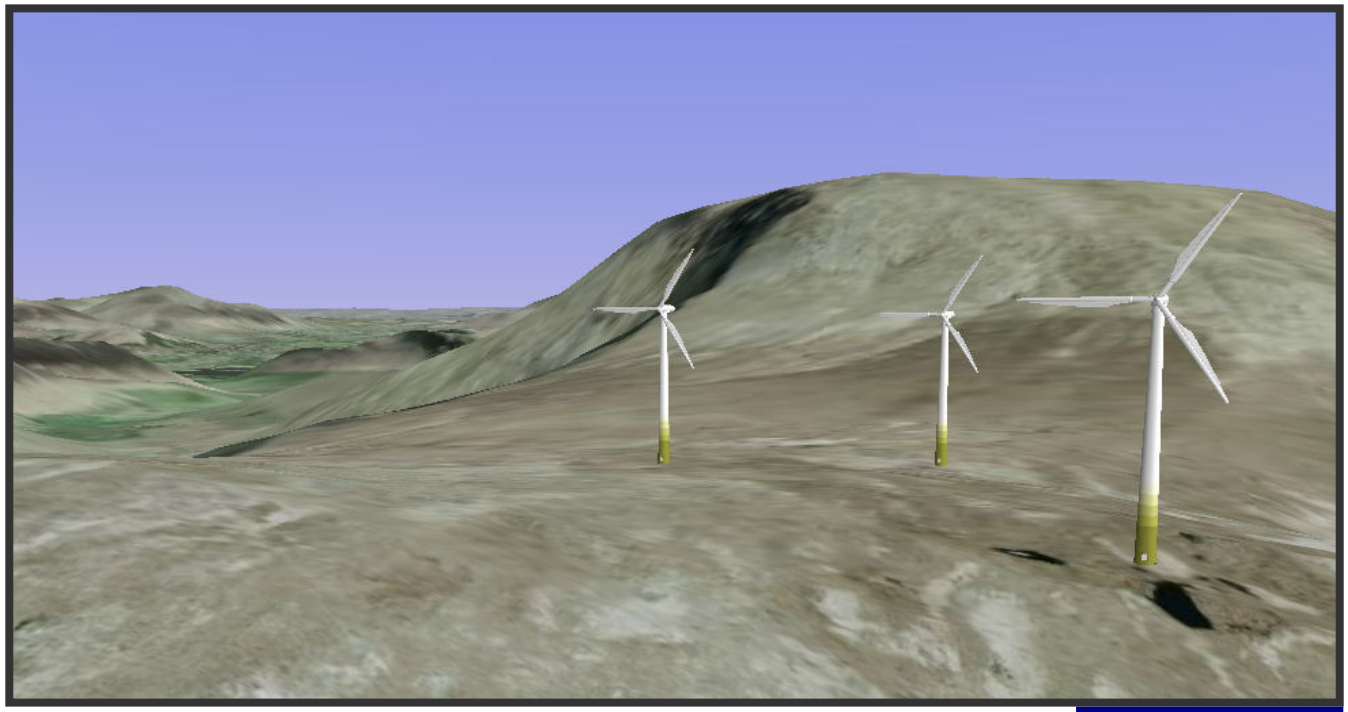
Example Application: Wind Farm Location

MSc in GIS / MSc in Environmental Management
Group Project Autumn 2007

Improving interaction

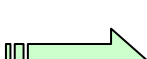
- Requirement to change viewpoint in ad-hoc fashion is important. Free flight is the default but constrained navigation and orientation aids may be required.
- Users bring experience and expectations of gaming interactions
- Context mapping application is being implemented at Nottingham, Leicester SPLINT team exploring artificial symbols
- Other techniques being explored in parallel on the desktop and in field-based applications

Context Mapping Application



Context Map shows position & cone of vision

Visual Basic application maps simulated GPS information



Vega-Prime Real-time Virtual Environment

Virtual Geographic Environments on the Web

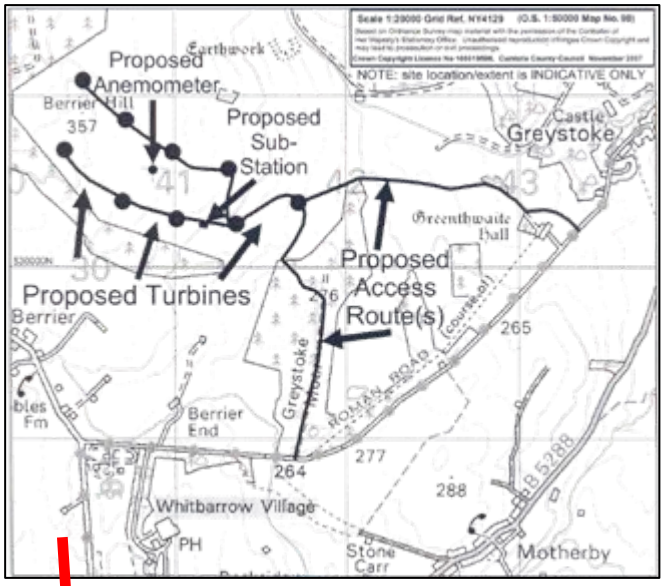
- Exploring the virtues of virtual globes
- Example: Modelling the visual impact of a current wind farm proposal in Google Earth
- Students also create Virtual Field Guides for areas they will visit and have visited

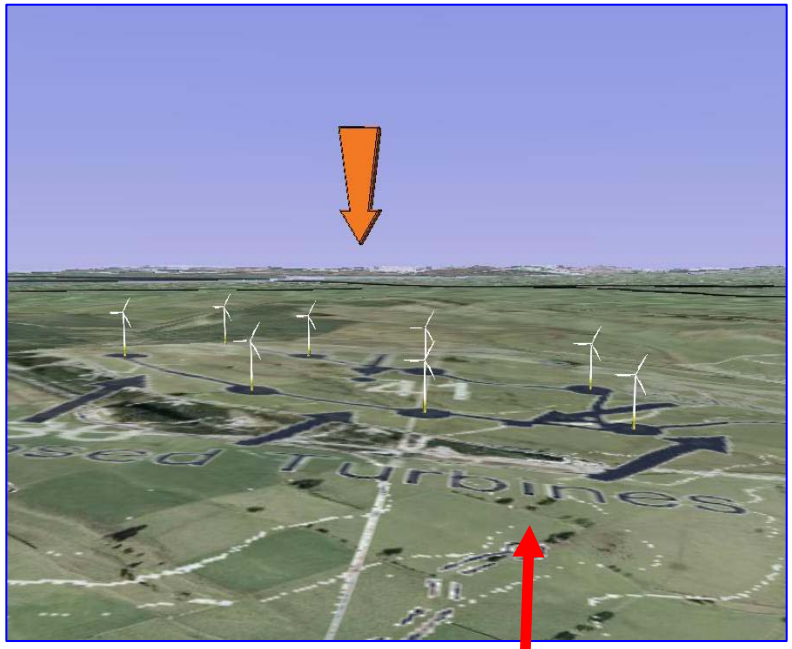
EXAMPLE APPLICATION: WIND ENERGY

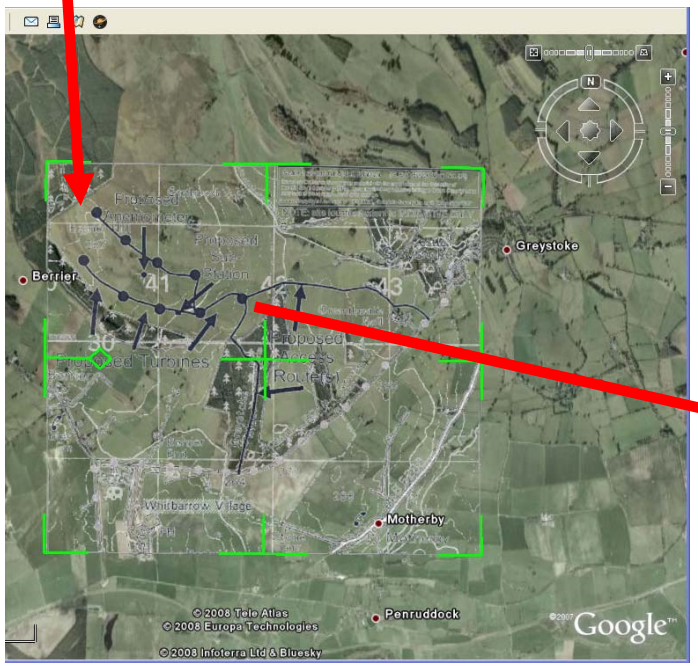
www.blencathra.net

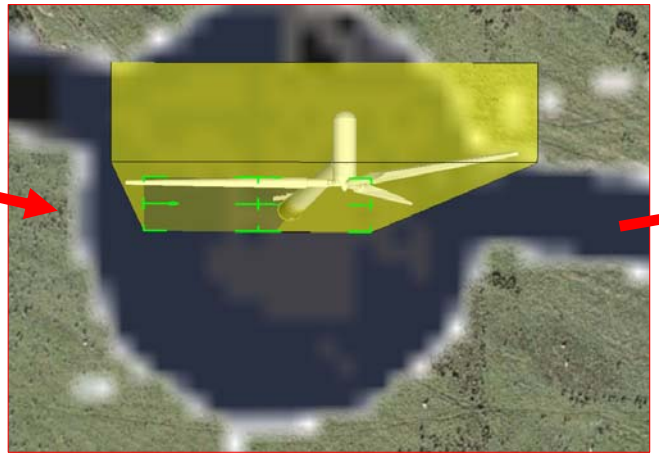
Berrier Hill Proposal Cumbria

Building the Wind Farm









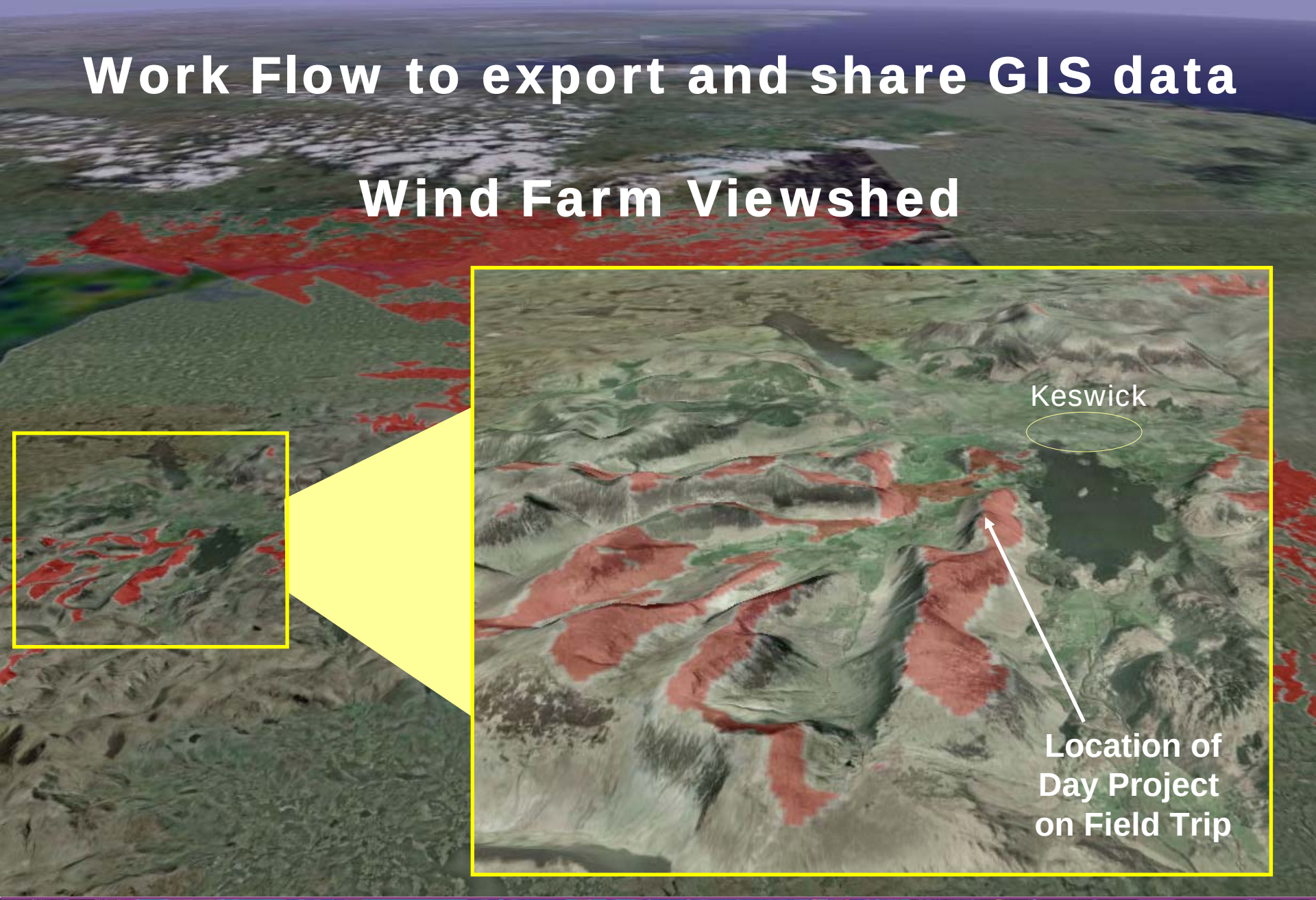
Important Viewpoints

The proposed turbines will be visible from:
The Helvellyn Range // The Scafell massif // High Street // Great Gable // the A74 at the Scottish border // Shap // Penrith // Hartside, Pennines and many other key locations throughout the Lake District and Dumfriesshire.

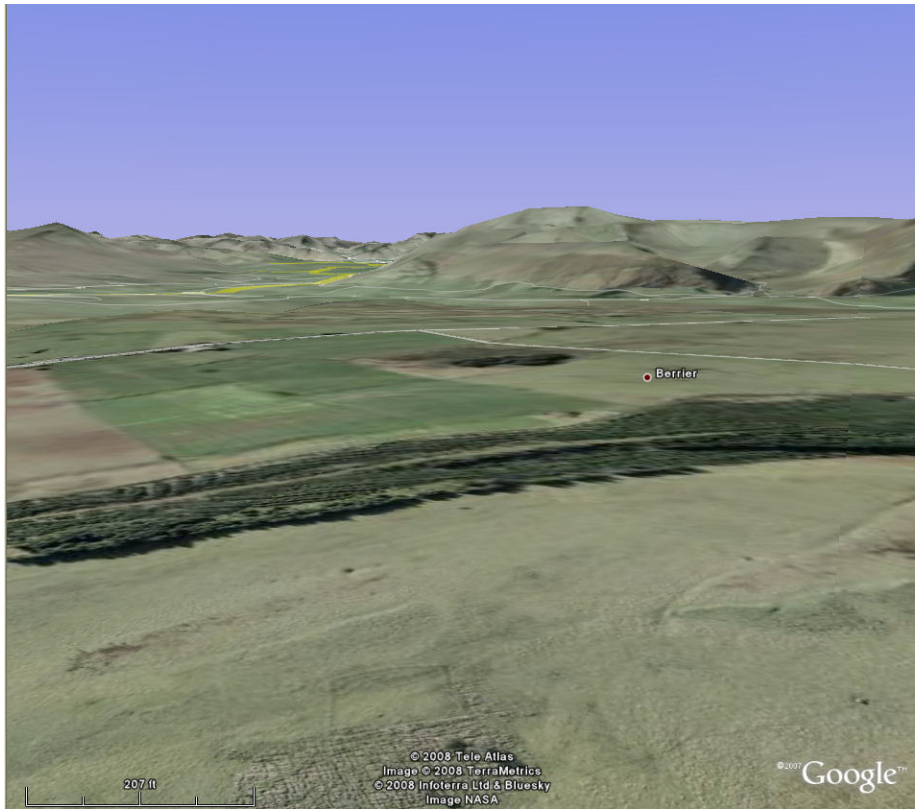
Great Dodd
Great Dod
Cumbria
Helvellyn
High Street
Thirlmere
Master View
High Rai
ttermere
Cumbrian Mountains
Great Gable
cafell Pike
Scafel Rites
Bow Fell
Sca Fell

Work Flow to export and share GIS data

Wind Farm Viewshed

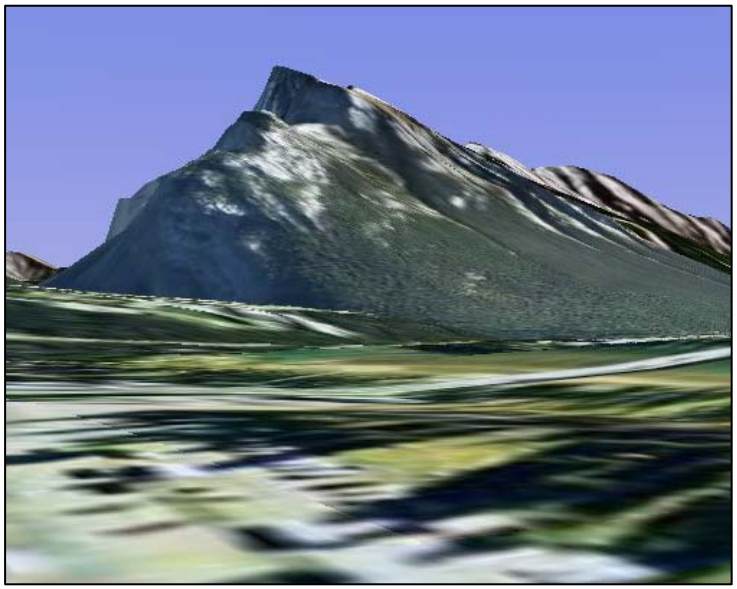


‘3D’ Placement of Photos

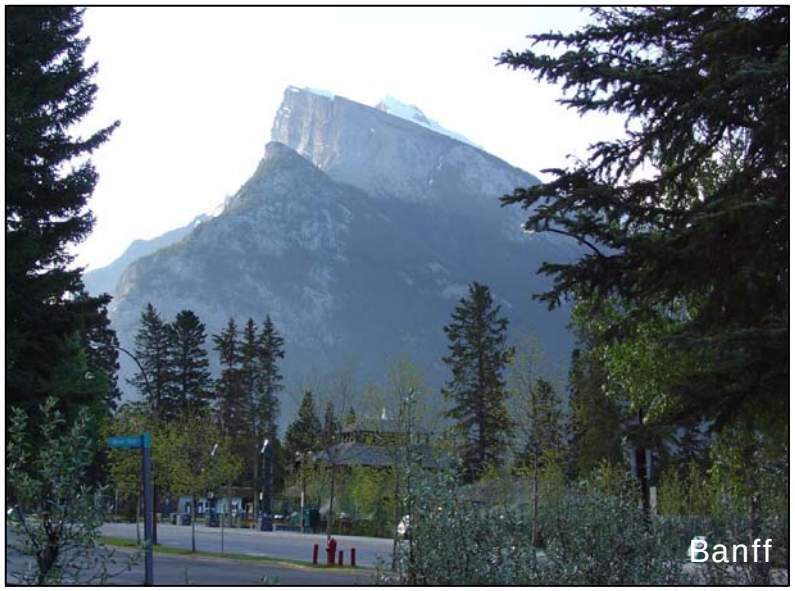


Give spatial context to photos, montages, sketches, paintings…
Explore role of Flickr + Google Earth for post-fieldwork projects

Surface detail is important!



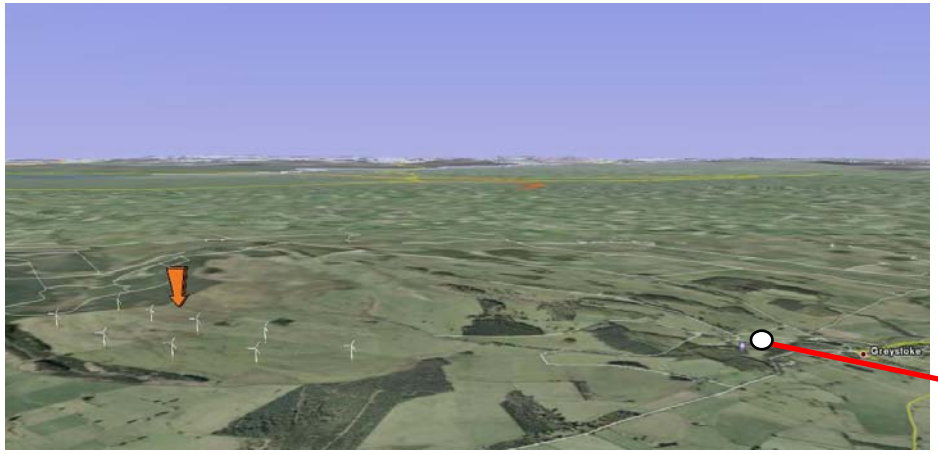
Google Earth (v4.2)



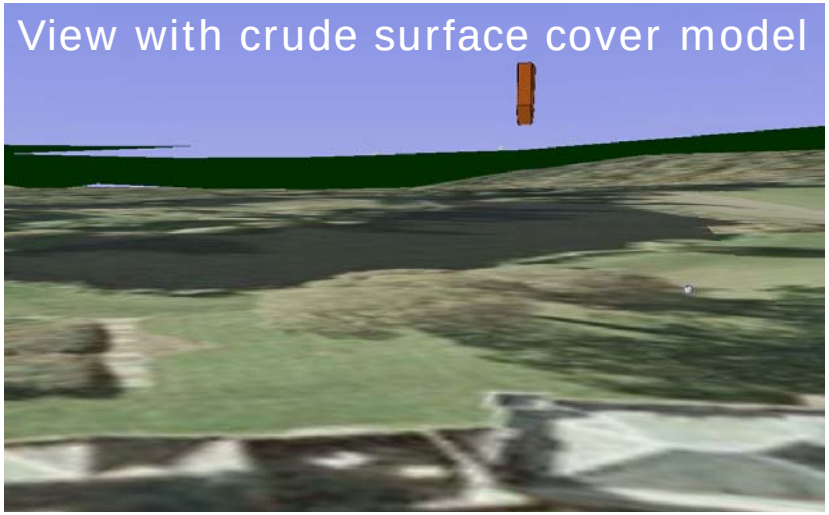
Earth (v1.0)

Never more so than when intervisibility is a concern.
Without it we could over-estimate visual impact.

Acknowledging the influence of surface cover



Digitise and extrude woodland polygon

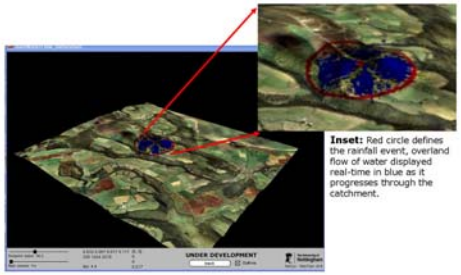


The Visual Learning Lab (VLL) is a CETL which acts as a test-bed for developing prototype visual learning scenarios.

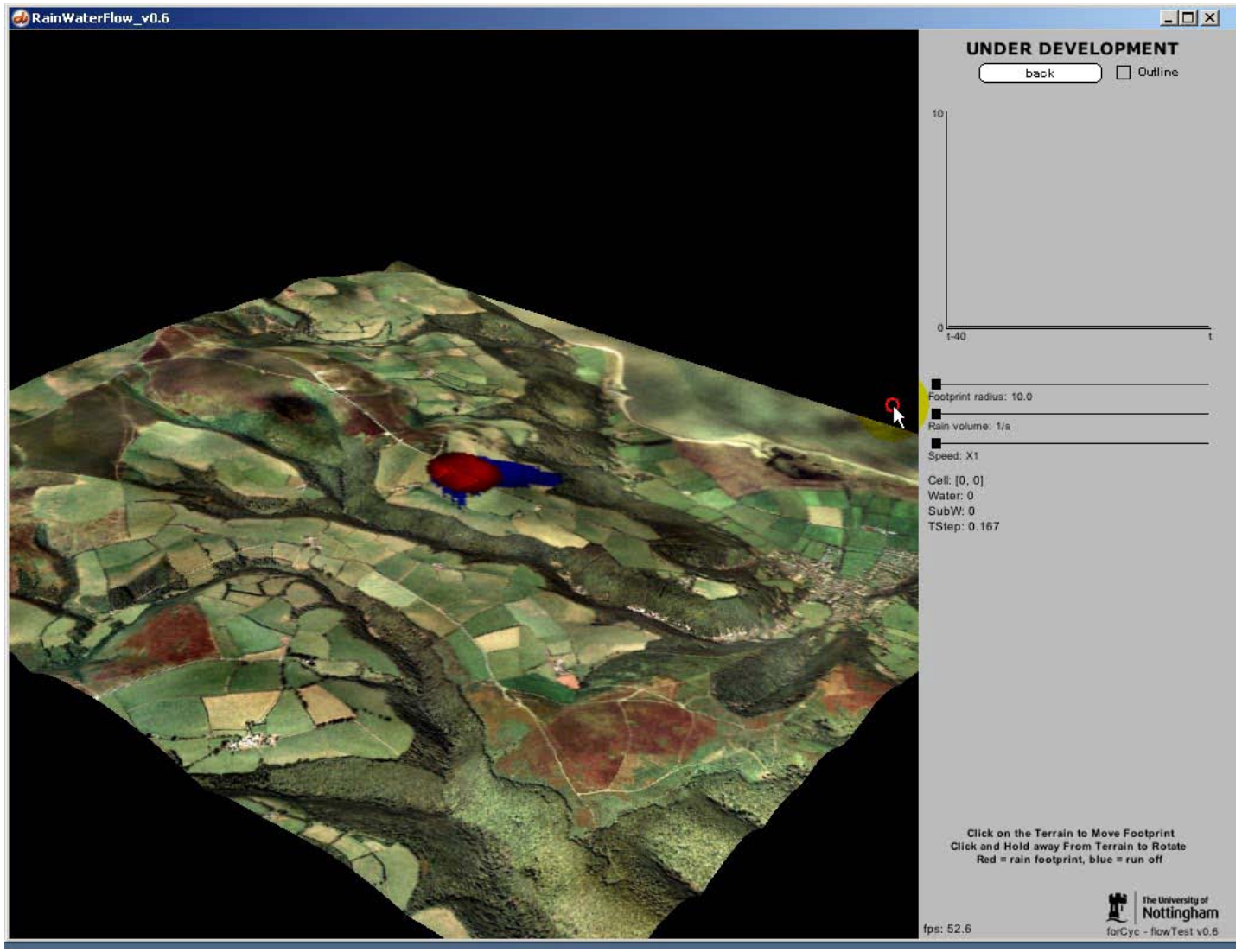
geoSpatialWidgets

developing geographical games and simulations

Creating interactive 3D 'game-like' geographical applications



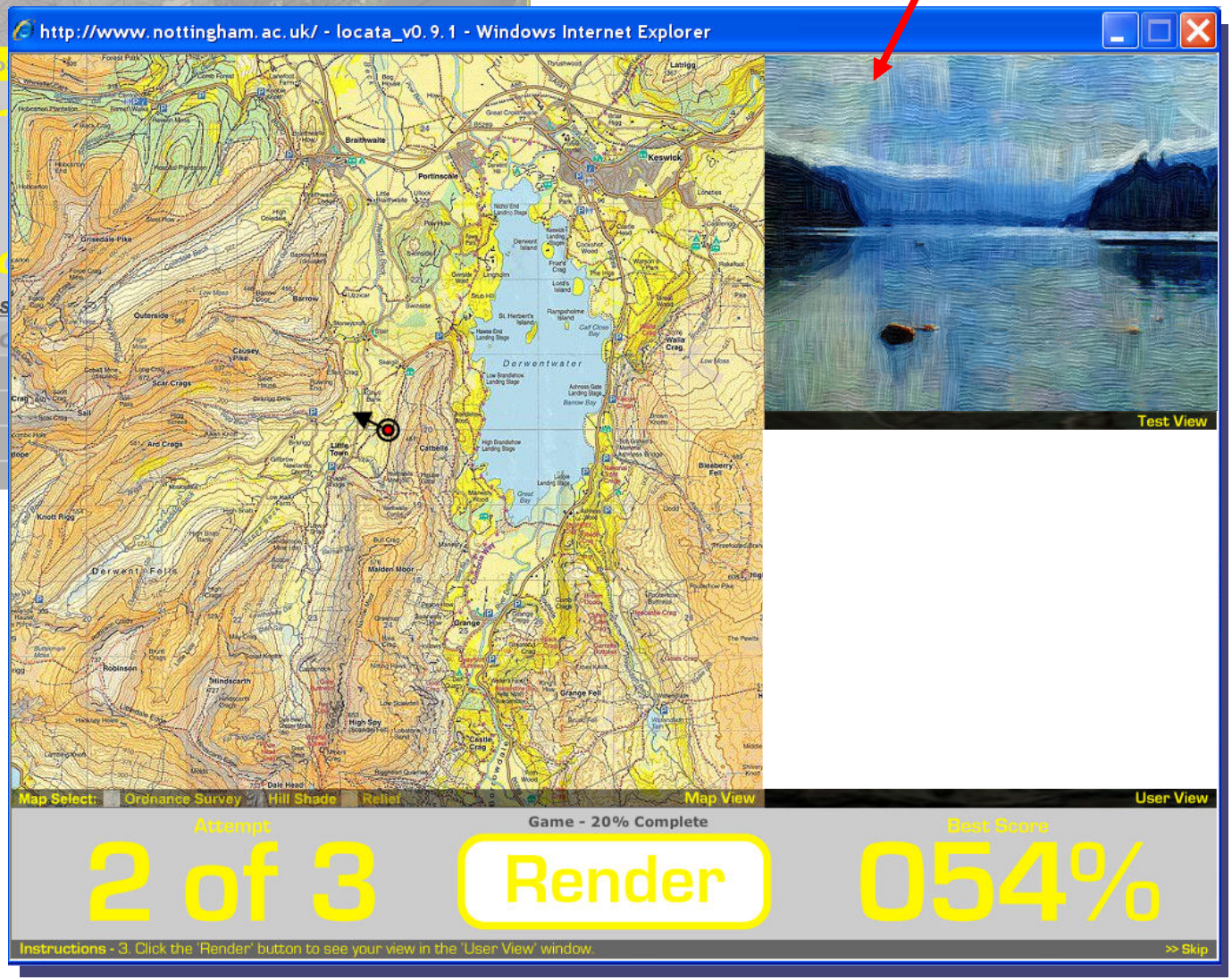
First VLL application: - model and visualise flow in ‘real-time’



Locata: An Orientation Test

Data used with Permission: © 2008 Harveys, © 2006 Intermap, © 2006 Getmapping

Paintings, Field Sketches, Photos..



Mobile Learning?

Can we augment field work in other ways?

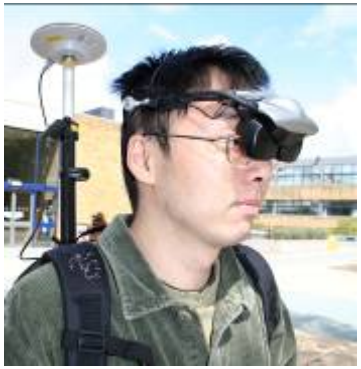
Augmenting Reality?

Full Augmented Reality

2001 **2006**

Wayne Piekarski, Wearable Computer Lab, University of South Australia, wearables.unisa.edu.au

Partial Augmented Reality



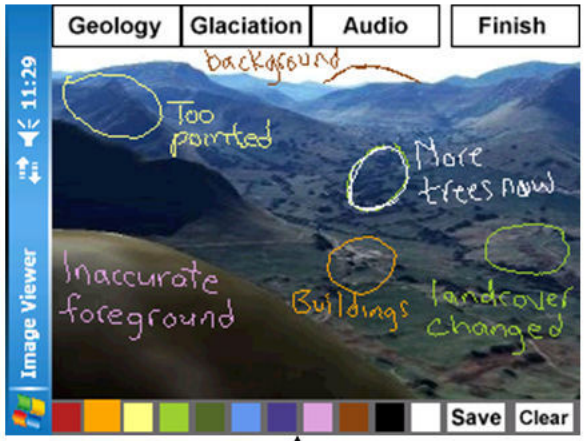
Leicester/Nottingham SPLINT (Claire Jarvis & Jing Li)

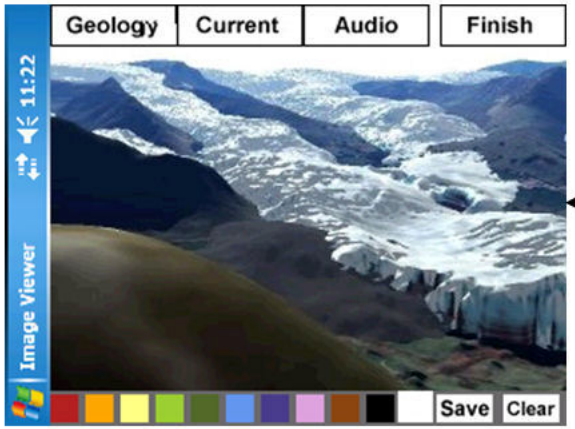
Spatially-Aware Mobile Computing

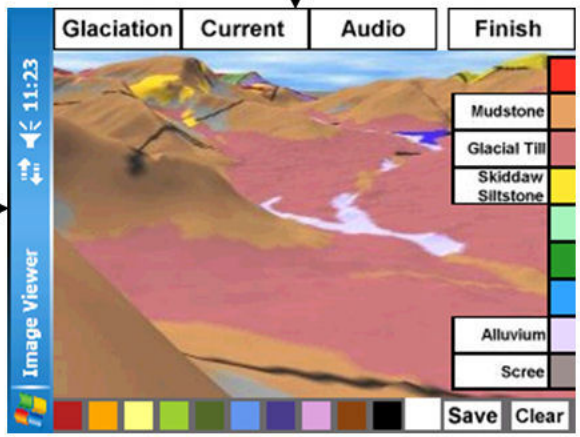
Cumbria PDA Field Application

© 2007 Ordnance Survey via Edina

Navigation screen displays locations and directions of viewpoints, loaded images are automatically shown as user approaches that point.





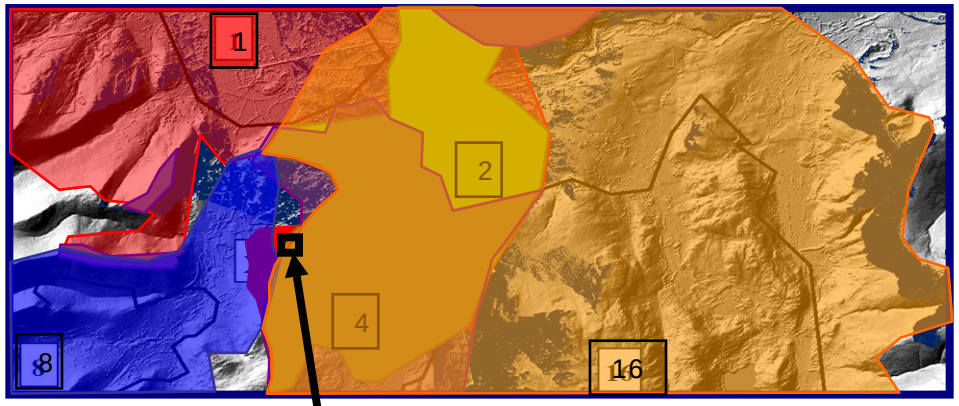


Audio according to Visual Context

Automatically play audio clips according to landscape features which should be visible..

… but also capture information

Composite Visibility Map



Encoding: Cell X: 1 +2 +4 +16 = **23**

Easy to de-code on PDA

Student Video Diary

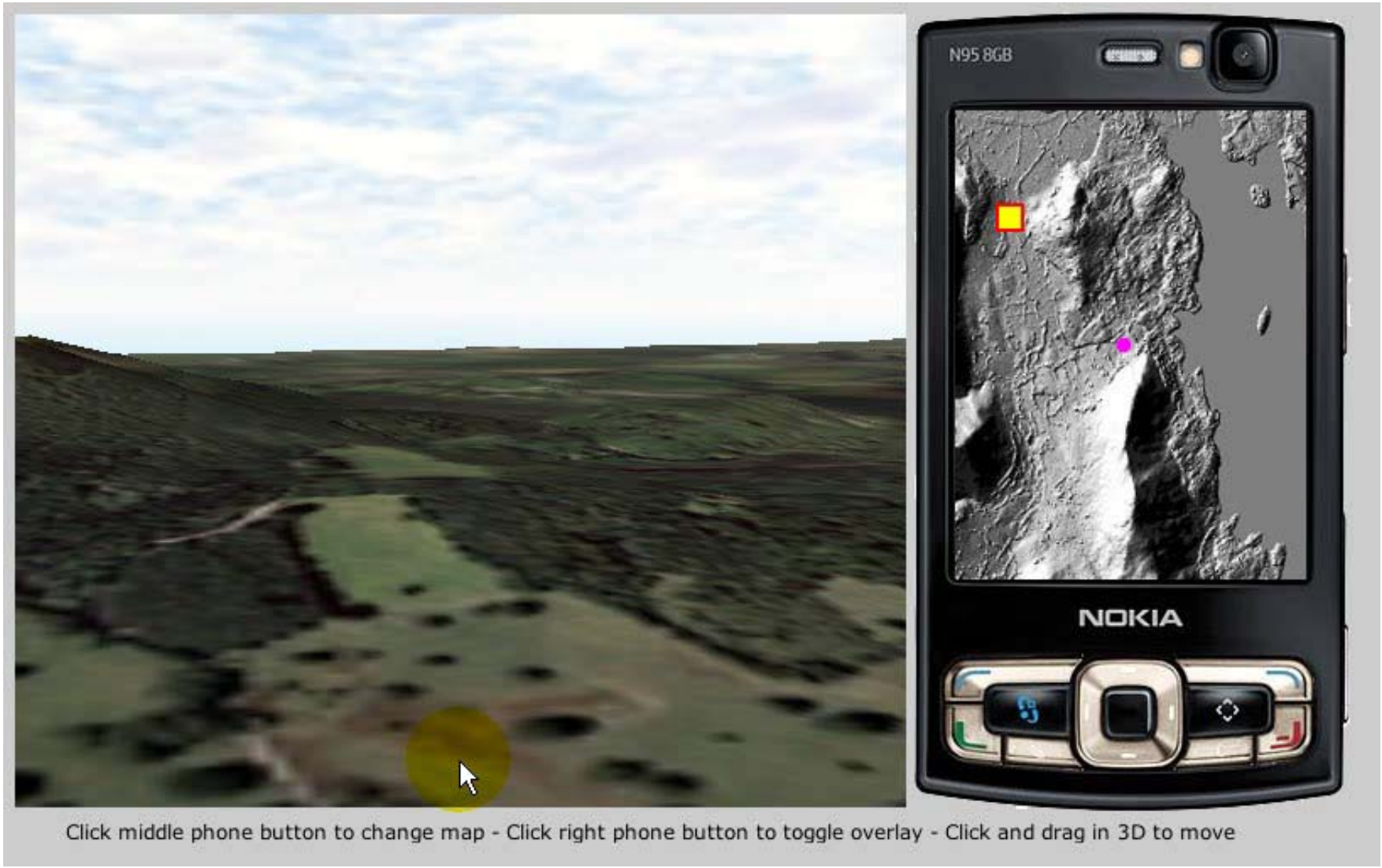
Cumbria, March 29th 2007

Thanks to the Year 1 Geographers 2006-2007

Linking Google Earth and PDA exercises

Google Earth ‘To Go’?

Mobile Application Emulator

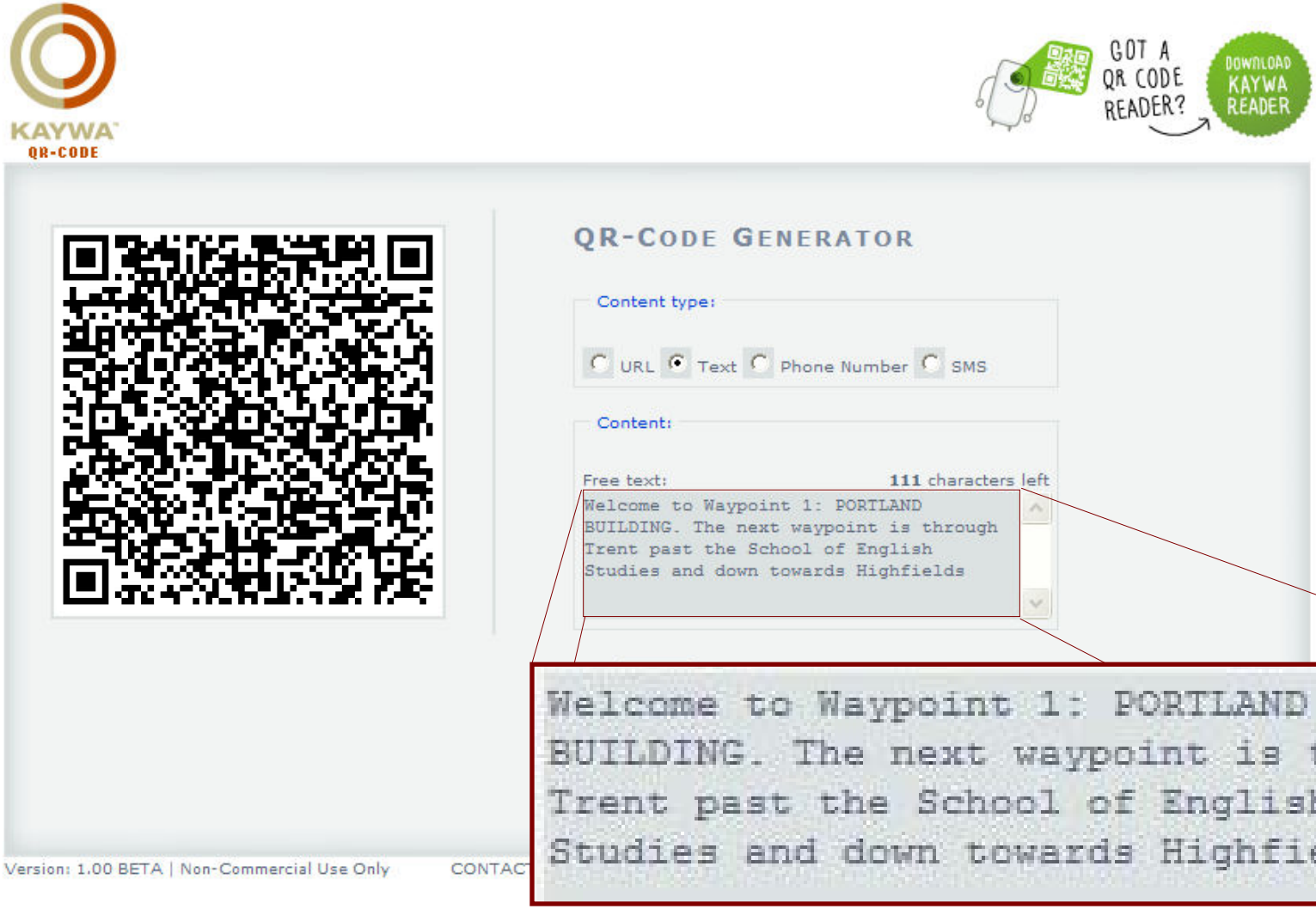


GeoCode: Multi-player Orienteering Game

Click middle phone button to change map - Click right phone button to toggle overlay - Click and drag in 3D to move

- **Hidden QR codes trigger directional clues**
- **Multi-user positioning uses *Flash Remoting***

Coded Waypoints



http://qrcode.kaywa.com/

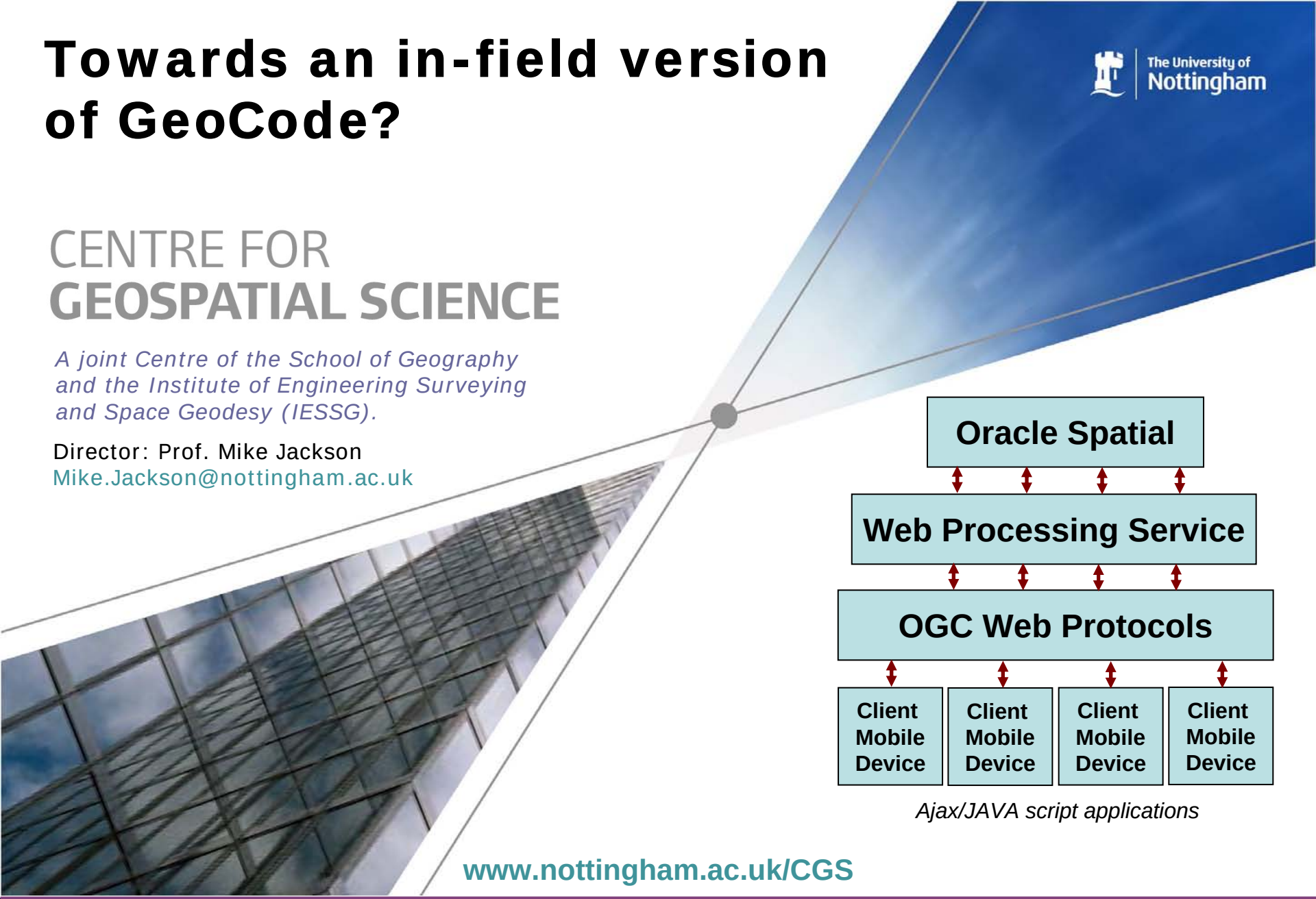
Towards an in-field version of GeoCode?

The University of Nottingham

CENTRE FOR
GEOSPATIAL SCIENCE

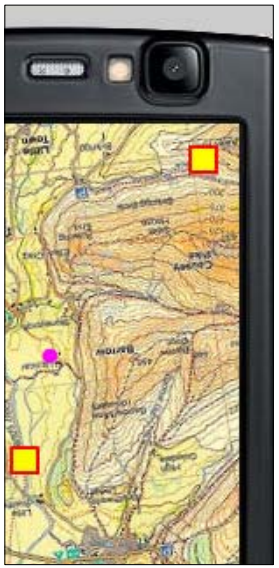
A joint Centre of the School of Geography and the Institute of Engineering Surveying and Space Geodesy (IESSG).

Director: Prof. Mike Jackson
Mike.Jackson@nottingham.ac.uk



www.nottingham.ac.uk/CGS

Summary



- Presented a series of case studies using Virtual Geographic Environments in a Teaching and Learning context

- Modes of interaction vary but an element of real world interaction through field work is common.

- Exploring issues of orientation and navigation, may be longer term implications for the design of collaborative virtual worlds.

Thank You!

gary.priestnall@nottingham.ac.uk