



The University of Vermont

*GEOGRAPHY, April 20, 2011
200 Old Mill, 94 University Place*

Visualising Cities Through Models, Maps & Machines

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Outline

A Little Bit of History: The Origins of Visual
Computing: Computation is changing everything!

Four Examples:

- Symbolic Modelling: Land Use Transportation
- Iconic Modelling: Virtual London
- Representation and Data Modelling: Web2, Online Maps, Online Data and Crowdsourcing
- Representational Modelling: Fine Scale Motion and Sensing

Next Steps: Web 2.0 Simulation and Beyond



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We should not be surprised that computers are everywhere as right at the beginning, their originators and the philosophers of computation told us they were “universal machines”

Alan Turing in 1936: “It is possible to invent a single machine which can be used to compute any computable sequence.”

Alan Turing in 1948: “A man provided with paper, pencil, and rubber, and subject to strict discipline, is in effect a universal machine.

Alan Turing in 1952: “I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted.



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And They Can Draw Pictures: A Little Bit of History: The Beginnings of Visual Computing

Whirlwind at MIT



MIT Whirlwind

close



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1951

MIT's Whirlwind debuted on Edward R. Murrow's "See It Now" television series. Project director Jay Forrester described the computer as a "reliable operating system," running 35 hours a week at 90-percent utility using an electrostatic tube memory.

Start of 1945 project:
Completed: 1951









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The earliest computer movie I found in










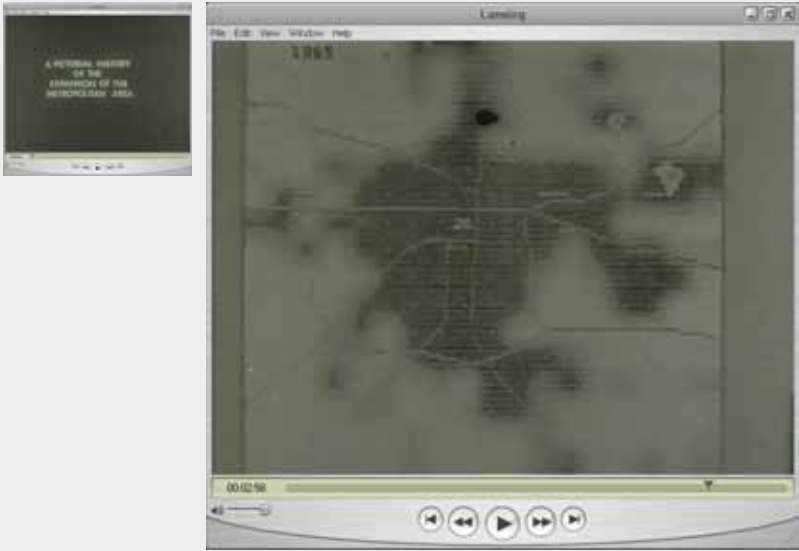
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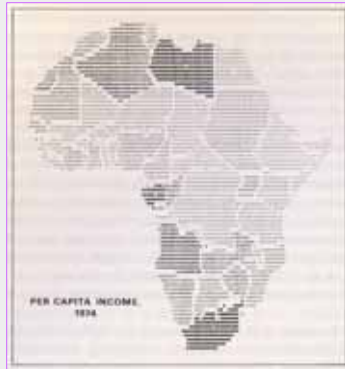
The first computer movie of urban development we have discovered was produced in 1967 at Michigan State University in East Lansing by Alan Schmidt

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Line Printers – Before the age of interactive graphics

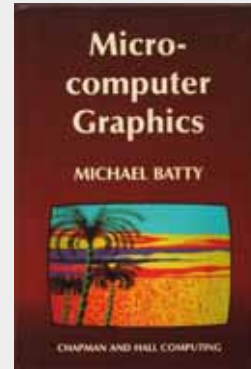


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Program 1.1 'Mickey Mouse' line printer program.plt
© 1987 The Walt Disney Company

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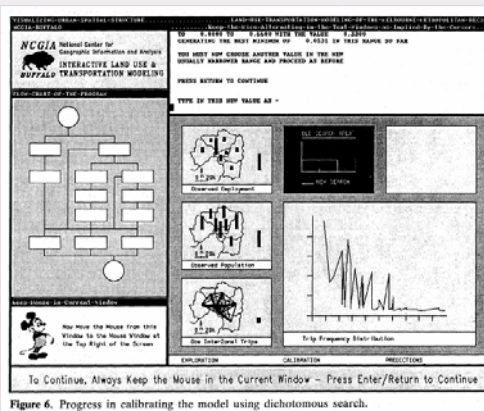
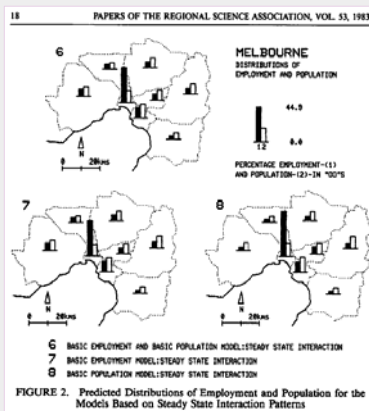
Early versions of interactive graphics that I worked on in Melbourne in 1982 and then the development of a WATFor77 version in 1986. It is primitive and not nice to look at ...

But the 1986 version is better and it still runs on this computer, just Let me show you



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From a VAX Terminal – A Raster 1982

From a Sun Workstation – Simple Windows - 1991

And then we moved fast to workstations and entered the world of graphics that we take for granted today

Enough of History although we ignore it at our peril

Let me move on to

Visualisation, Interaction and Communication

Despite the technology, the focus in computing has become

- Interactive, spontaneous, immediate.
- visual, iconic, participative.
- communicative, remote, networked

Currently our representations and simulations are being rapidly developed as I will show

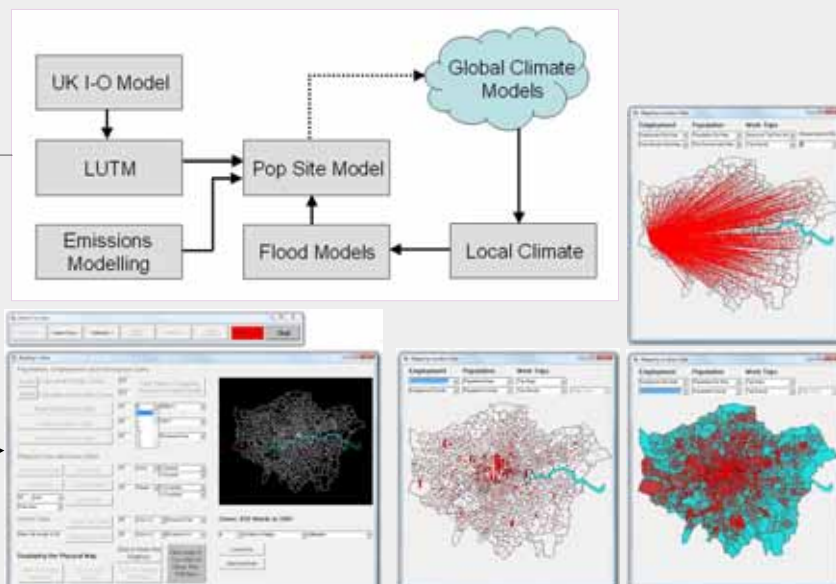
My first example: how do we model the city
symbolically, mathematically.

Let me explain what we are doing about simulating
the impact of climate change on London as part of
the Tyndall Centre's research on cities. I talked
about this yesterday but I will quickly sketch it and
show the model running

We are building a land use transport model as part of
a process of integrated assessment. The key issue
is that the model is interactive, immediate, visual
and communicates ideas to other professionals
involved in the process.

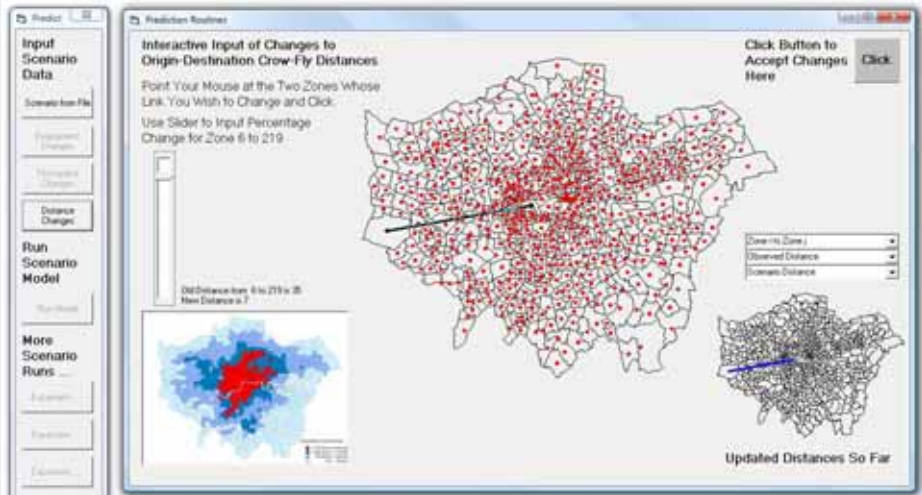


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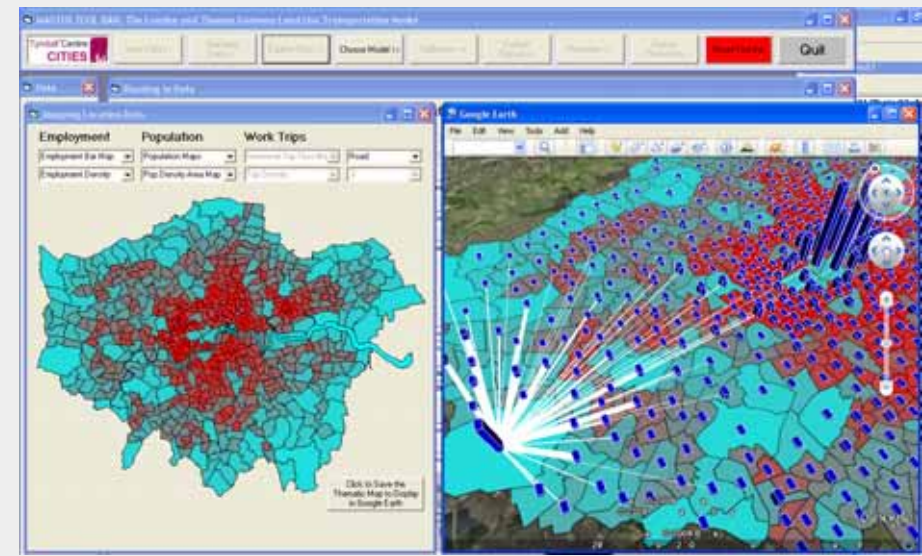
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Building scenarios visually in the presence of stakeholders
– a dialogue

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Exporting data and predictions to external software on the fly

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Let me show you how all this works. The great thing about what we are saying is we can demo it.



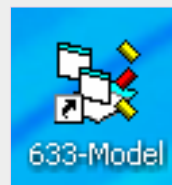
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But I probably need to leave PowerPoint as my program doesn't like to run within this medium....

It's written in VB within Visual Studio and for some inexplicable reason the paths get screwed up when I run so many different things in PowerPoint

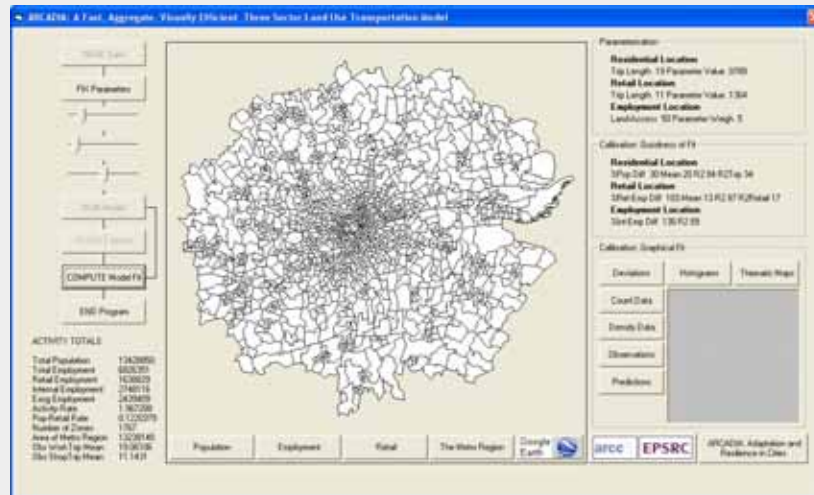
So bear with me



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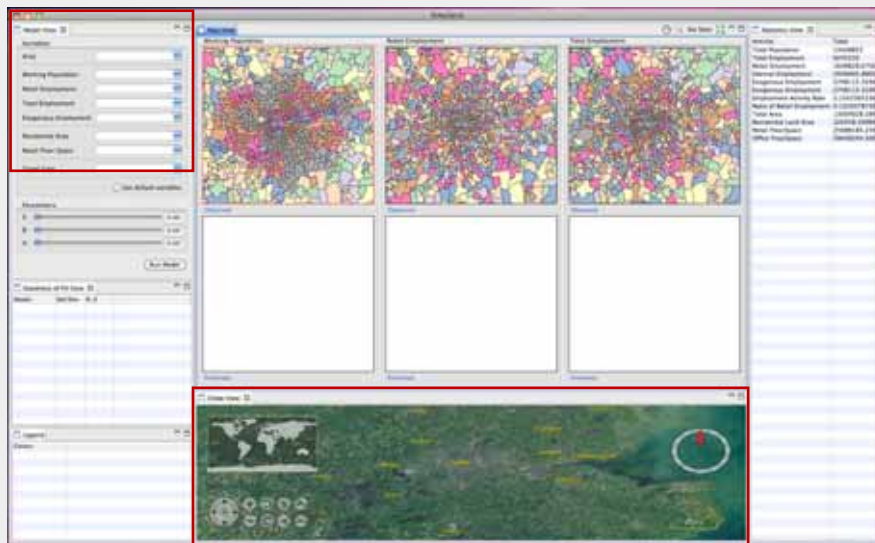
The new model is bigger and we are developing a web 2 version all in open source software



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The LTUMi Eclipse RCP can look like



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My second example: how do we model the city
iconically, visually.

Fifty years ago iconic models were barely conceived as very being digital but our Virtual London model is now a routine digital 'architects' model of the physical form of the city.

It is built in 3D-GIS, ArcGIS, ported in and out of CAD and Games software, into Google Earth, Second Life, and so on.

We use it as our test bed for multimedia. This is linked to much of our representational and multimedia work that I will tell you about later.



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What can we do with the model, flood it, visualise land use, simulate pollution, test the impact of high buildings on the skyline



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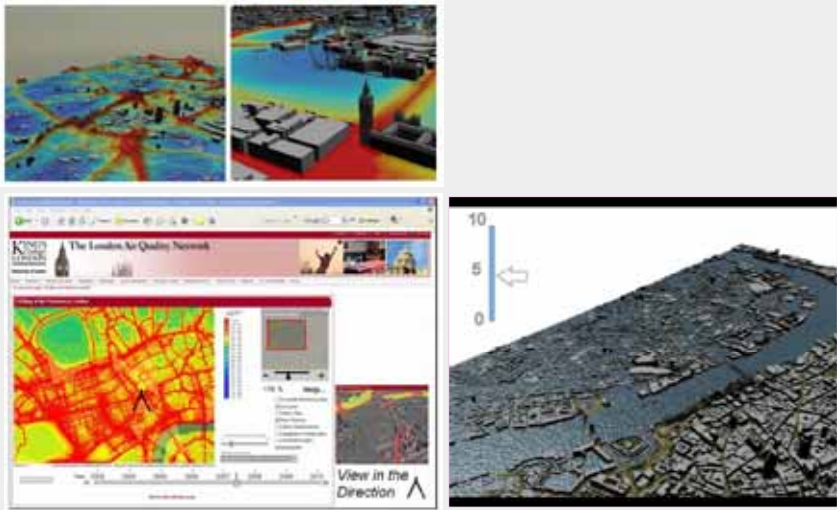




2D to 3D: GIS to CAD and back and on the web

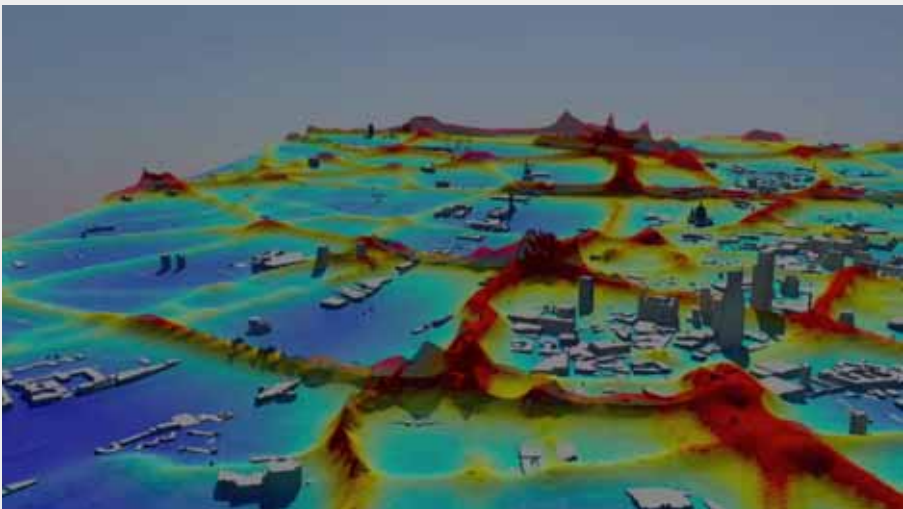


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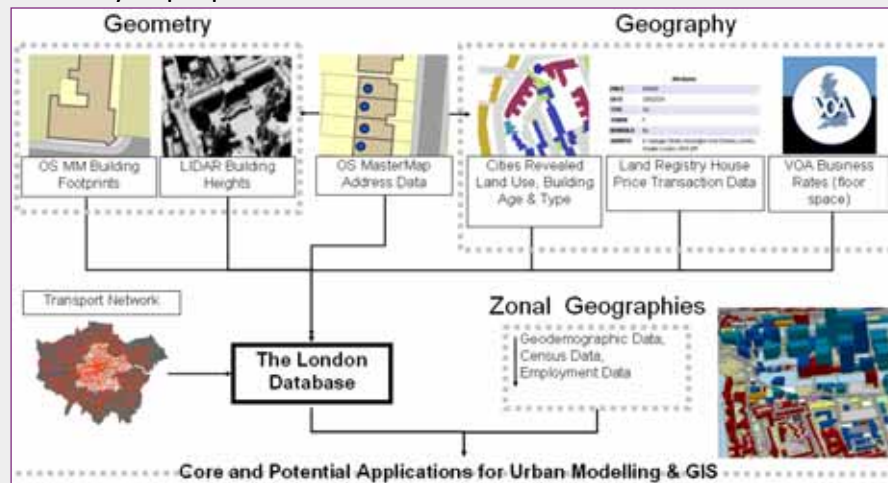
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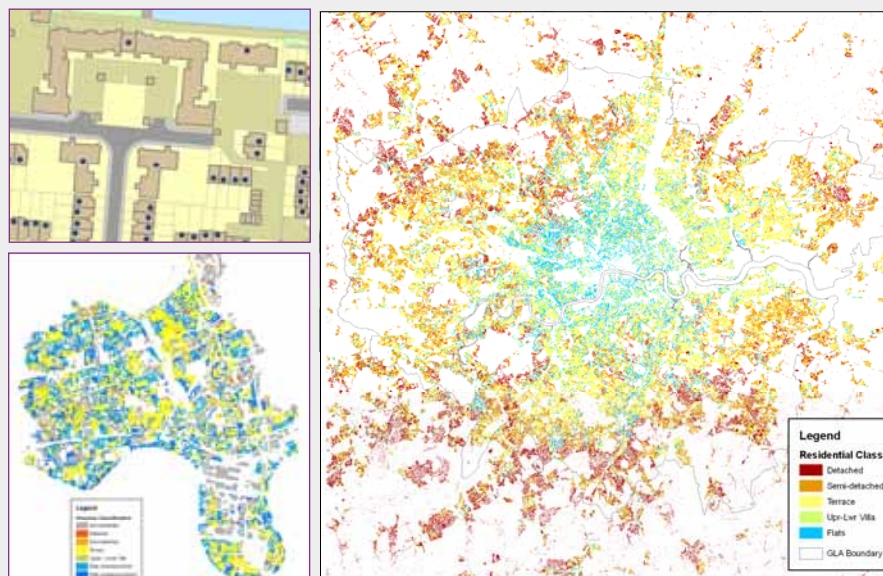
[movie](#)

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From geometry to geography and back – populating really large spatial data bases and using the model as a visualisation tool for analytic purposes

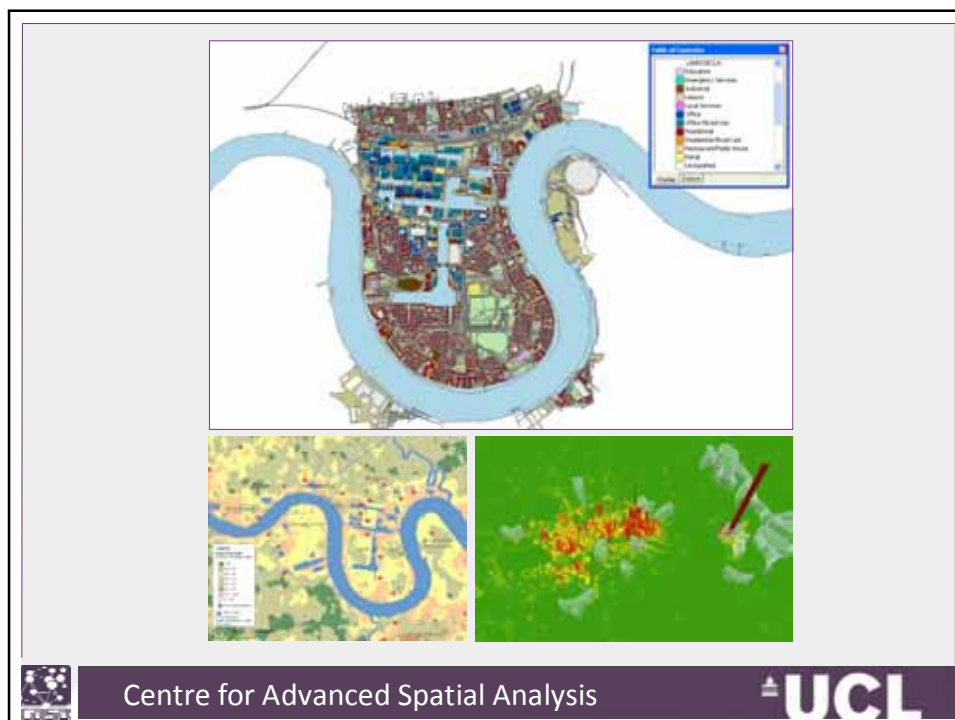
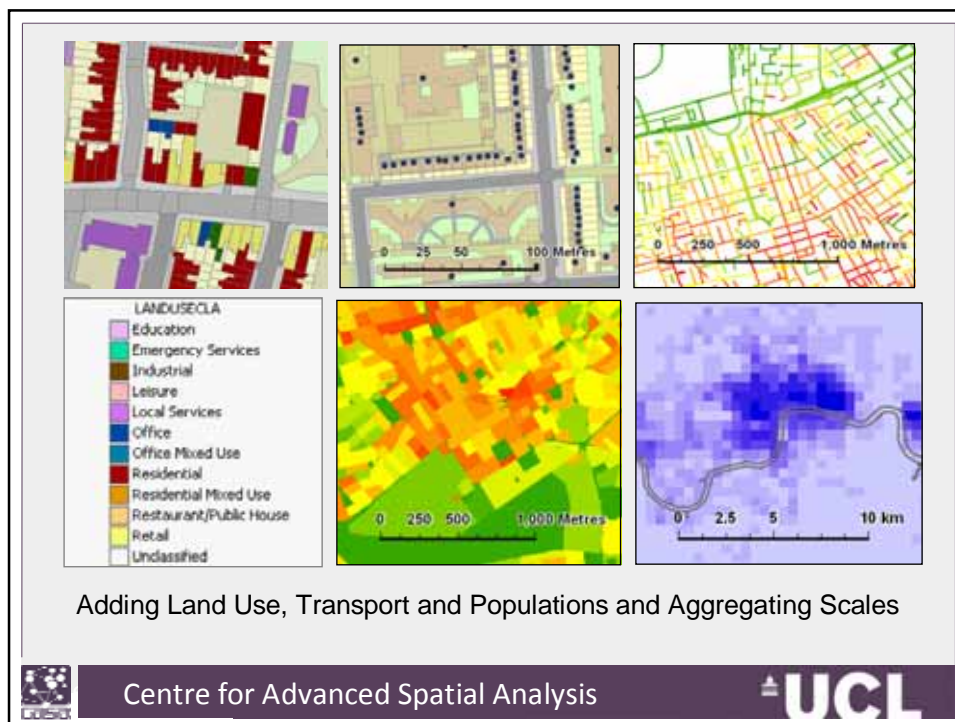


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Moving it into related media

Into games engines, virtual worlds, and into back into the material world by printing the model e.g.



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index.glt - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media Print

http://www.casa.ucl.ac.uk/index.glt

Google

Search Web

Options

LONDON



Use your arrow keys or mouse to move in the Virtual World.

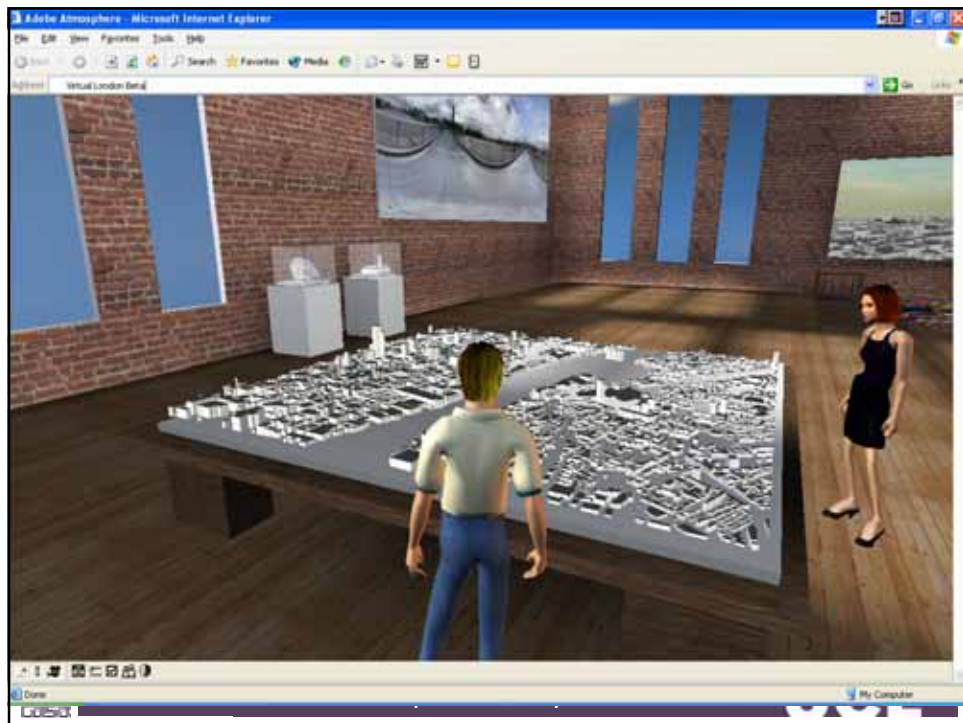
To tilt your view, hold down the Ctrl key and use the arrow keys or mouse.

Ctrl

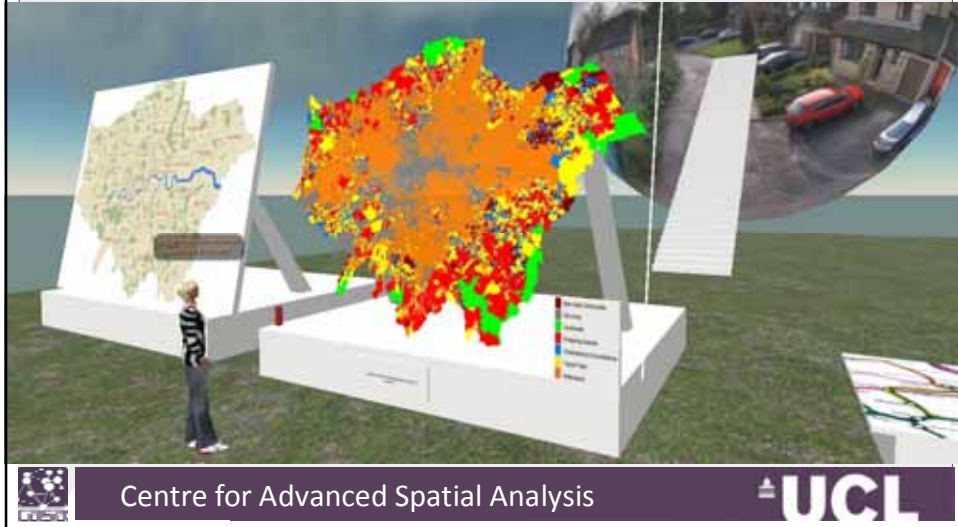
Welcome to the Virtual London 'multi-user' gallery. If it's your first visit the software will automatically install on your machine. Its simple to use and provides insight into the development of Virtual London at the Greater London Authority.

Virtual London was developed at the Centre for Advanced Spatial Analysis, University College London. Please contact cas@ucl.ac.uk for help or further information.

We can show a movie of this



Our recent forays are into **Second Life** where maps from our geodemographics project are being ported as 'geographic media' into these virtual worlds



Let me show you some movies from our recent work with virtual worlds which we are rapidly developing for geographic information and virtual cities - worlds within world, illustrating the essential notion that geographic information, indeed any information can generate *insights into real worlds from dialogues in virtual worlds*

Second Life
Basic Demo



Let me show you some movies from our recent work with virtual worlds which we are rapidly developing for geographic information and virtual cities - worlds within world, illustrating the essential notion that geographic information, indeed any information can generate *insights into real worlds from dialogues in virtual worlds*

Second Life
Build Demo



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Back to Reality: Fabricating the Material World

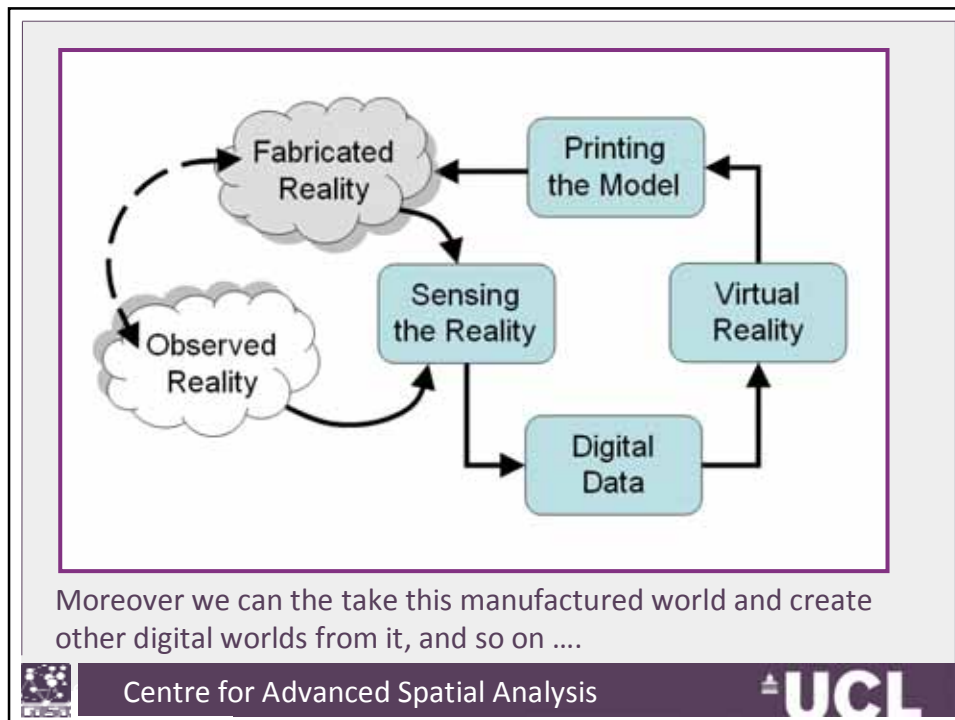
So far, we have moved only one way – ever deeper into digital worlds, but we can move the other way. We can use the digital world we have created to fabricate or manufacture a world in material terms.

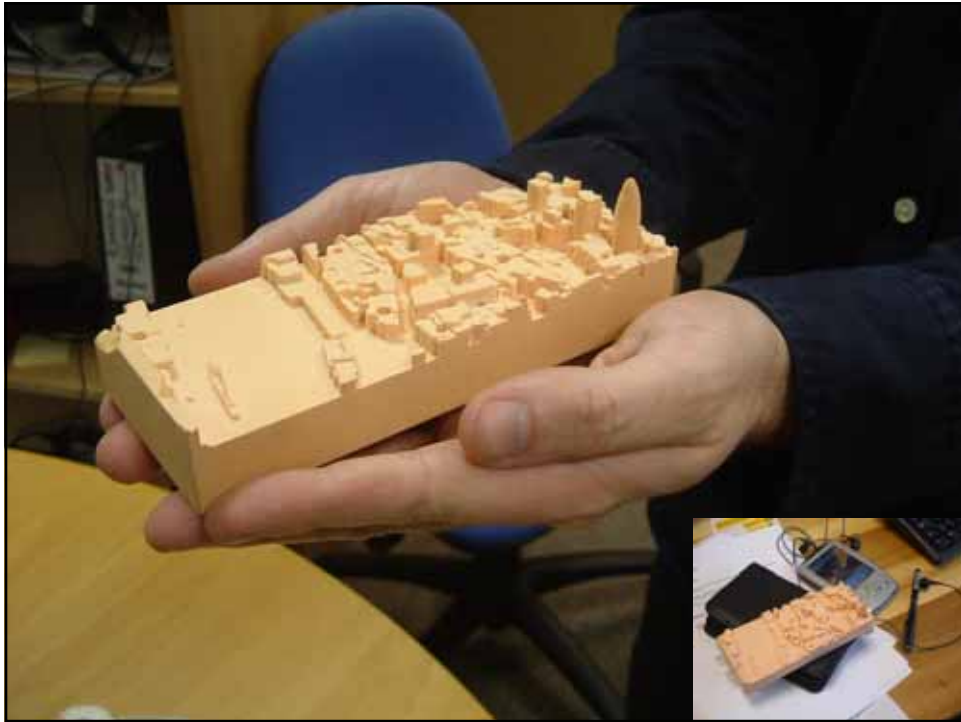
This may be closer to the world from which the digital objects and their environment were created in the first place but it is not the original world and in this sense, diverges in a different way from it.



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A small inset image showing a person interacting with a large, 3D-printed model of a city. The person is wearing a dark jacket and is holding a small object, possibly a remote control or a small device, near the model.

Other Virtual London's

A small inset image showing a virtual cityscape with a large, white, curved structure, possibly a bridge or a large building, set against a dark background.

A small inset image showing a virtual cityscape with a large, white, curved structure, possibly a bridge or a large building, set against a dark background.

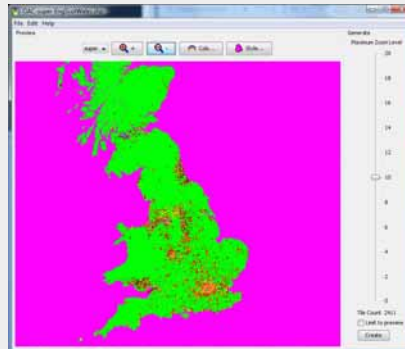
Delivering the Simulacra: Desktop, Web, CAVE, Theatre, Hand-held, Touch Table, Holograph and so on Over the net or wirelessly ... Many other plays on this theme of recursion that we don't have time to develop here but they are relevant

A small inset image showing a virtual cityscape with a large, white, curved structure, possibly a bridge or a large building, set against a dark background.

A small inset image showing a virtual cityscape with a large, white, curved structure, possibly a bridge or a large building, set against a dark background.

My third example: is all about representation in terms of data and maps and web 2 – how to present all of this, in Google maps and other open data

The Google Map Creator creates Google Maps websites from thematic data contained in shapefiles. It effectively layers your map on top of a Google Map or the Google Map



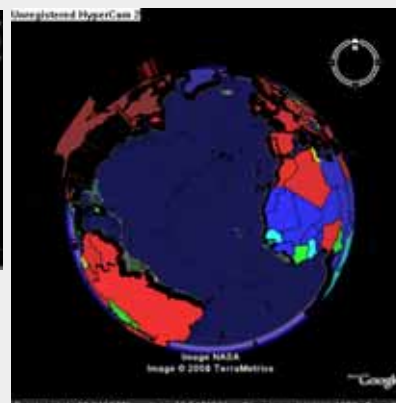
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We can do the same sort of thing in 3D of course with **GEarthCreator** – the key is to convert the shapefiles to KML files – and there are many other maphacks using similar open map bases like **Open Street Map**

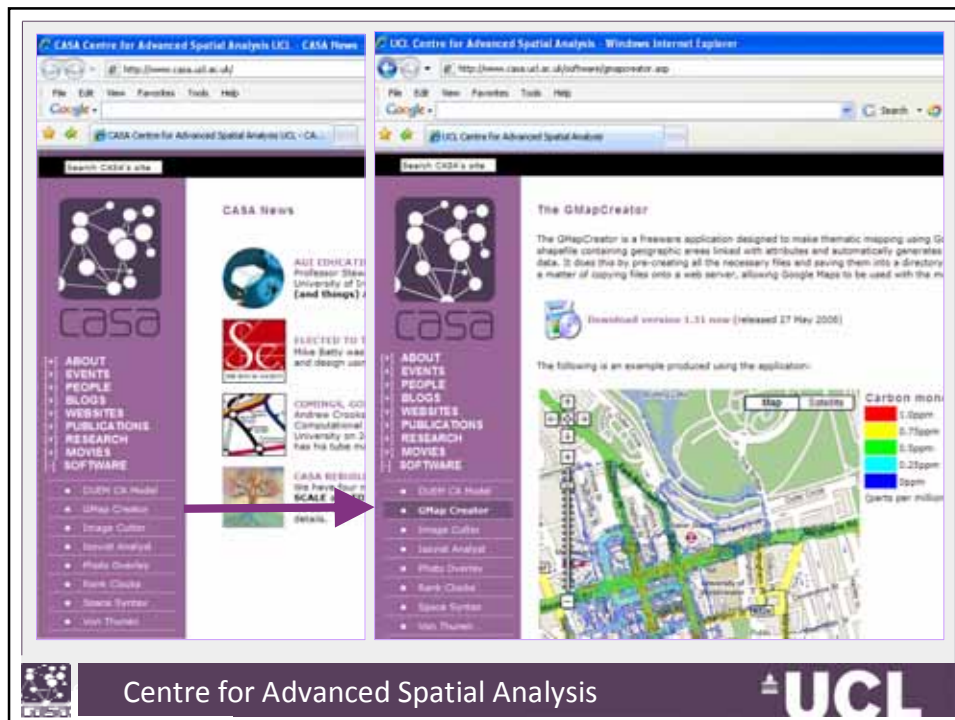


From all of this we have devised an open resource for maps called **MapTube**



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MapTube: a kind of **YouTube** + **Napster**

Let me explain: every time someone downloads our software, there is a high probability they make a map.

As it sits on a common base – a **Google Map** – if they create the map of some place and someone else creates another map of the same place, it would be nice if we or they could compare them as layers

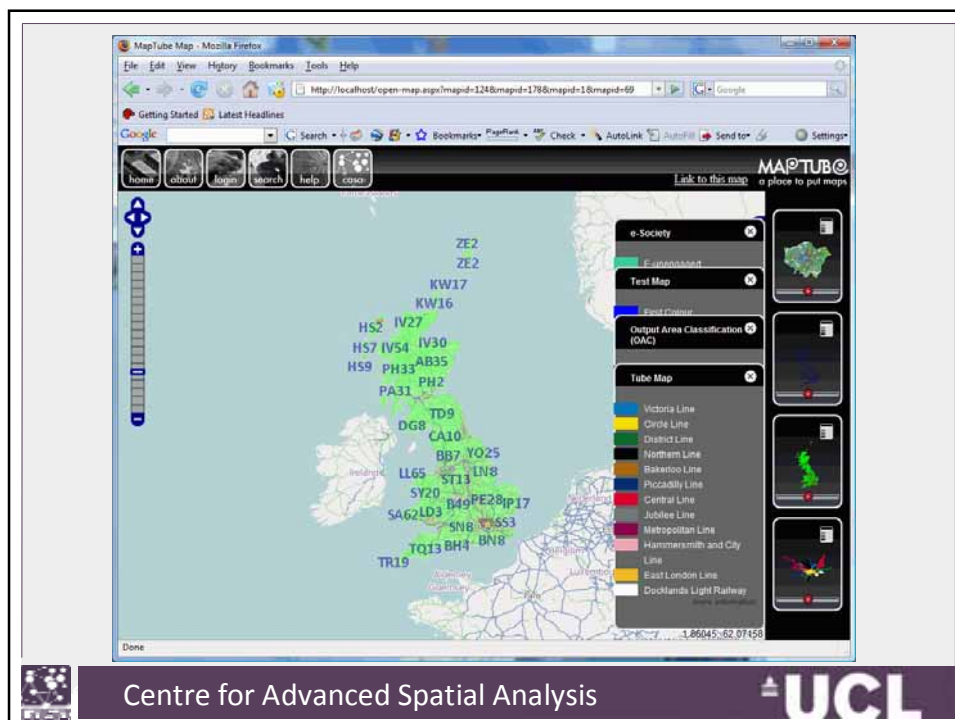
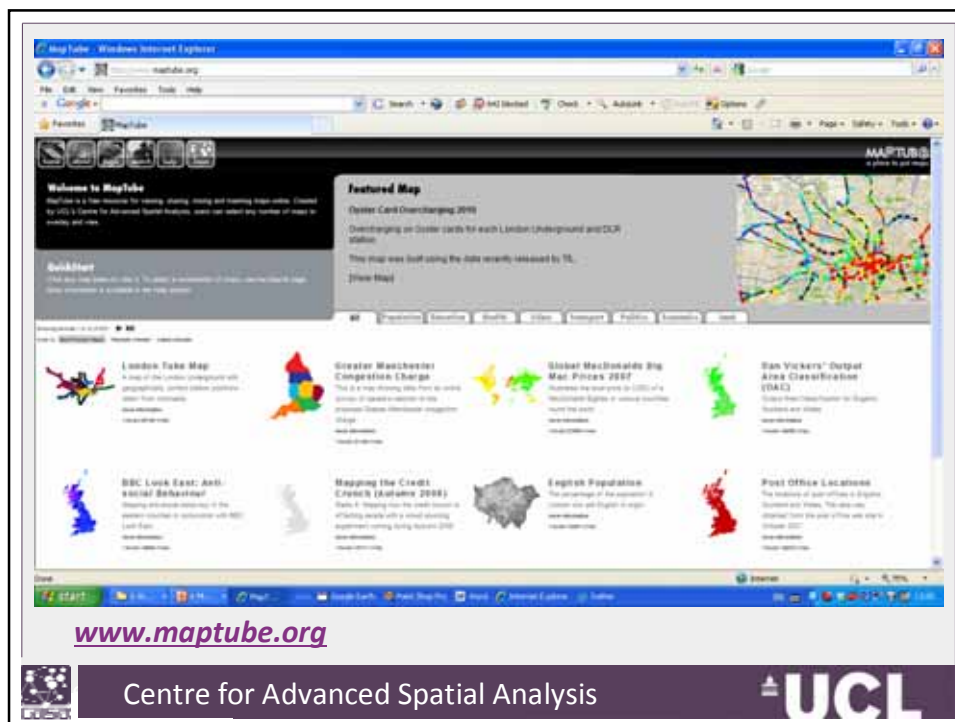
However, in the UK map bases are copyrighted – you can't do for copying OS map data and it is serious –

So we ask the user not to put their map created from our software on our site, but to give us their URL where their map is and thus **MapTube** is a bunch of pointers to URLs - this is what it looks like with demo

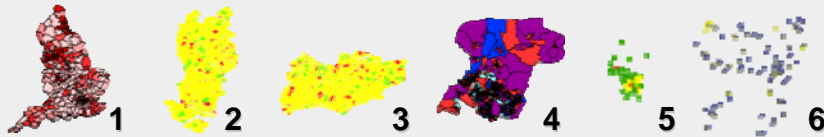


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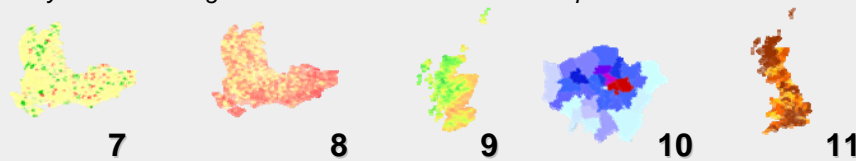


Here are some of the user map data in/on MapTube



1. Knife Crime Update, 2. SC IMD Score, 3. SEC IMD Score, 4. PCT Obesity, 5. NO₂ Bristol, 6. AGFC Wildlife

The data behind the knife crimes map (1) has been in the news the last few days after it emerged that the Government had manipulated the data.



7. Southeast IMD, 8. Southeast IMD (LSOA), 9. Wild Land Quality Scotland, 10. NSSeC L8 (never worked)%, 11. CO₂ index



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Pulling pictures – pulling spatial data – crowd-sourcing

We have turned all this around and basically used the system to record spatial responses to topical questions

We broadcast the questions through TV and radio and then ask users to respond and key in their post code – 7 digit in UK but actually only record postcode sector – first three or four digits

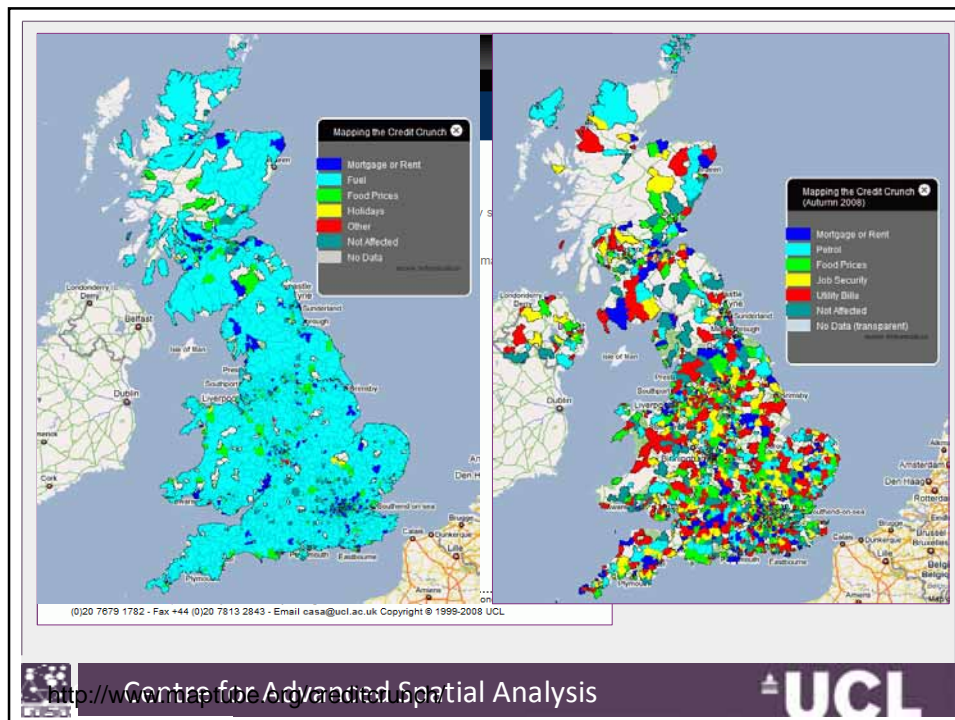
Then our server issues a request to scan the continually refreshed database and rebuilds the map on the fly so to speak, every half hour, using GMapCreator etc

We have so far looked at the credit crunch, antisocial behaviour and the Manchester road pricing proposal

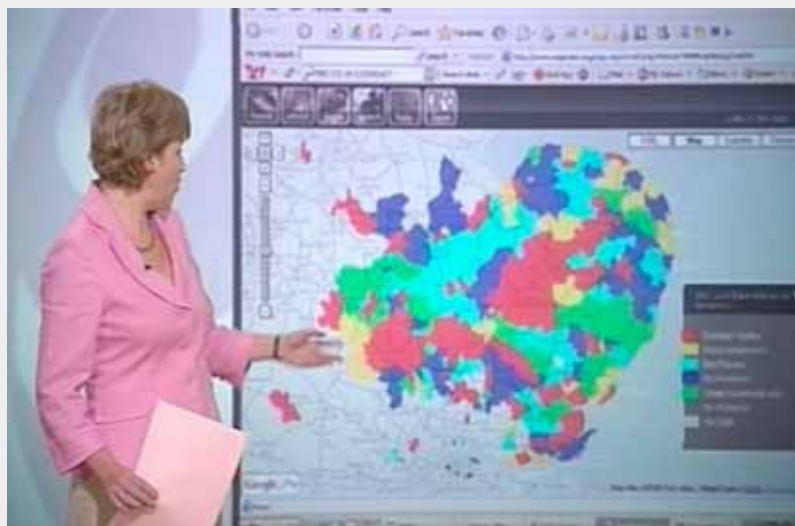


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BBC Look East: Anti-Social Behaviour



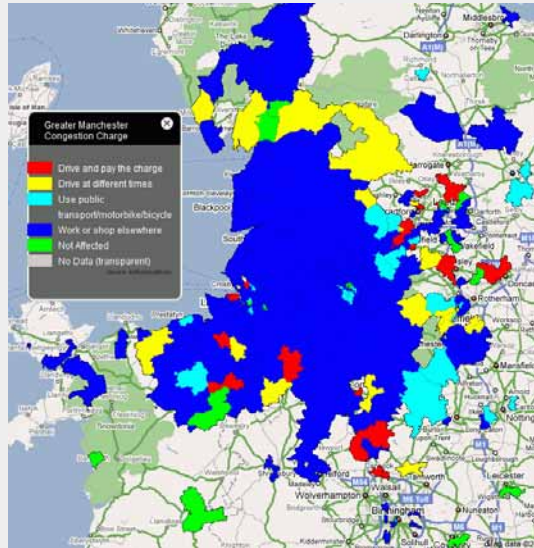
<http://www.maptube.org/lookeast>



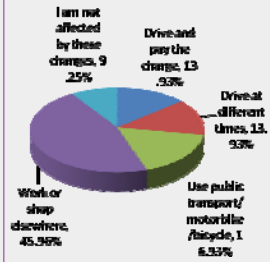
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Manchester Congestion Charge



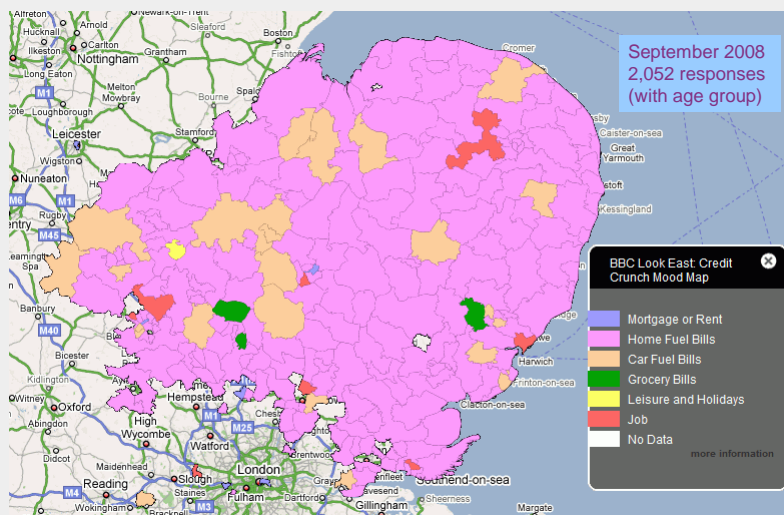
15,902 responses
October to December 2008



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BBC Look East: Credit Crunch



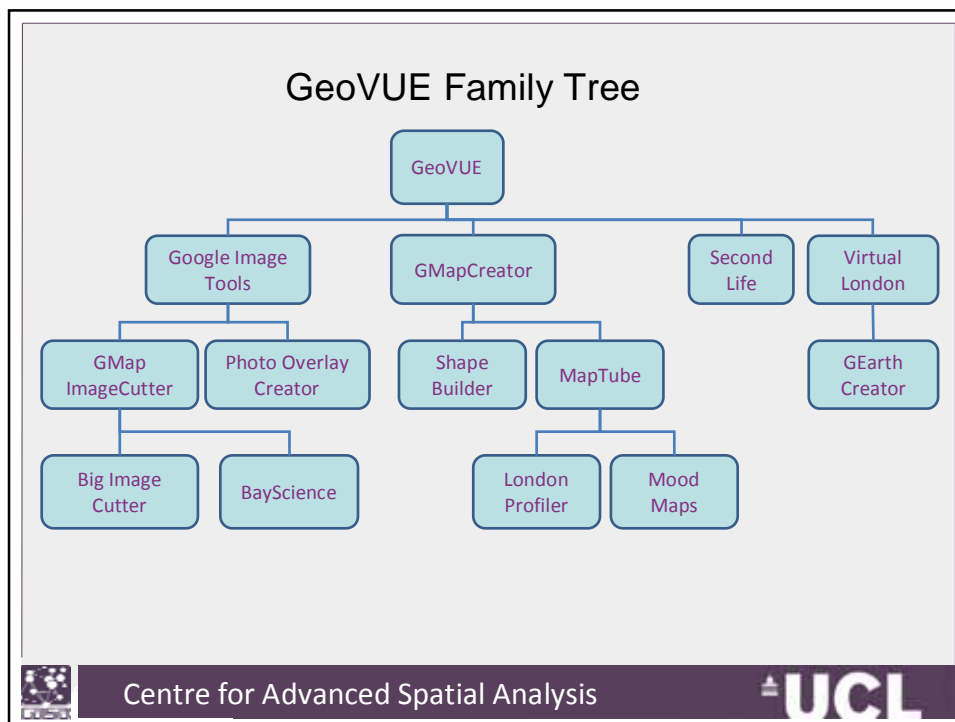
September 2008
2,052 responses
(with age group)

<http://www.maptube.org/LookEastCreditCrunch/>



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My fourth example: is representational – how to present all of this, in Google maps as we have seen and also in terms of motion, sensing

Our EPSRC CAPABLE project involves us in representing and modelling movements at the small scale, pedestrian movements, children walking to school, and using energy.

The project is about communicating these ideas to ourselves and to the wider constituency that is involved in these issues – walkability, obesity, safety.

I have backups as the network here runs slow but let me try to show you these examples from our web site, first www.casa.ucl.ac.uk

But in case I can't...



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Enough of me and onto the real stuff...how do we do this stuff, how do we present and communicate it to ourselves and to others.

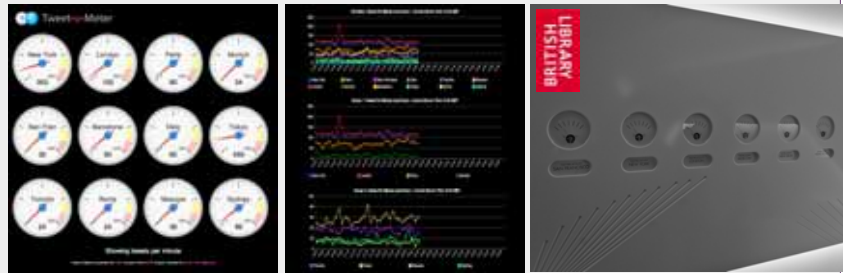


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And like everyone else we are working with geocodes data from social networks

Many traffic data sets – Oyster card, Garmin GPS and so on but here we will look at Tweets – the Tweet-o-Meter



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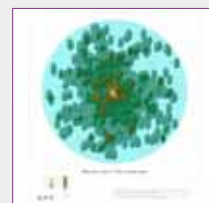
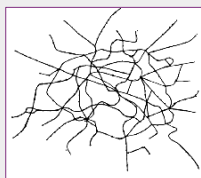
New York



London



Paris

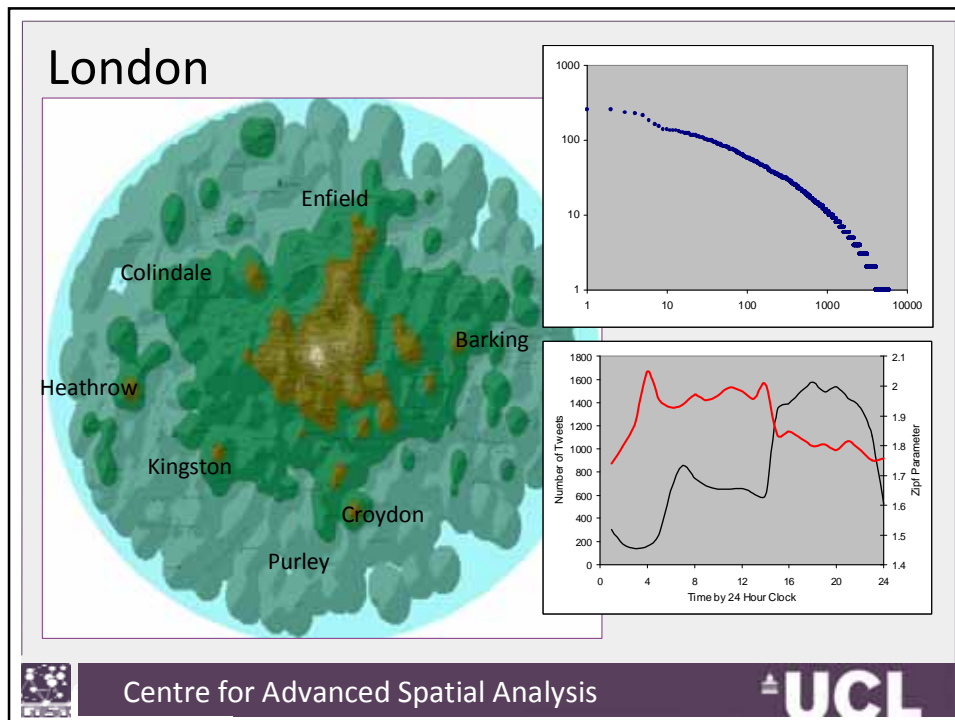


Moscow



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A long talk I know

Questions, & Discussion?

www.casa.ucl.ac.uk

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