Smart Cities

SESSION V: Lecture 1: Modelling The City:
GIS, 3D and Virtual Reality Representations

Michael Batty
m.batty@ucl.ac.uk
@jmichaelbatty

http://www.spatialcomplexity.info/
http://www.casa.ucl.ac.uk/

There are a number of movies within this power point that will not display in the PDF – if you need any of the movies email me at john.batty@asu.edu

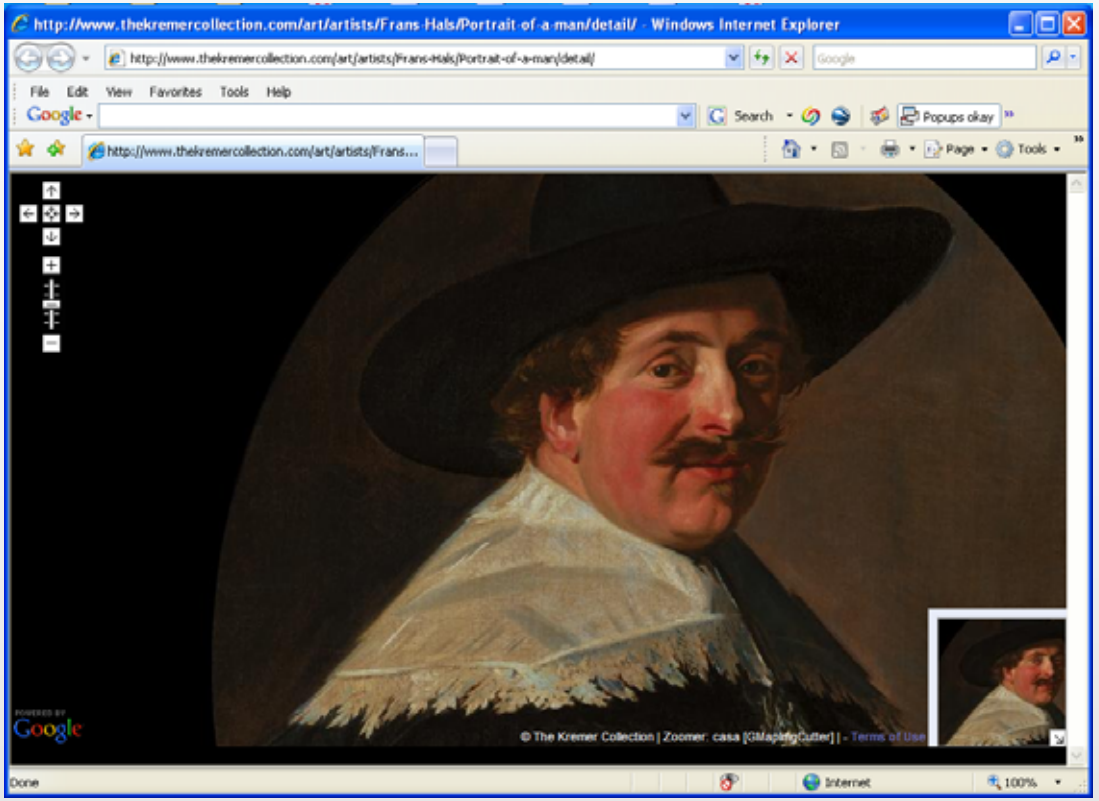
This is true of other lectures in this series. When I have time I will insert the movies into the web site

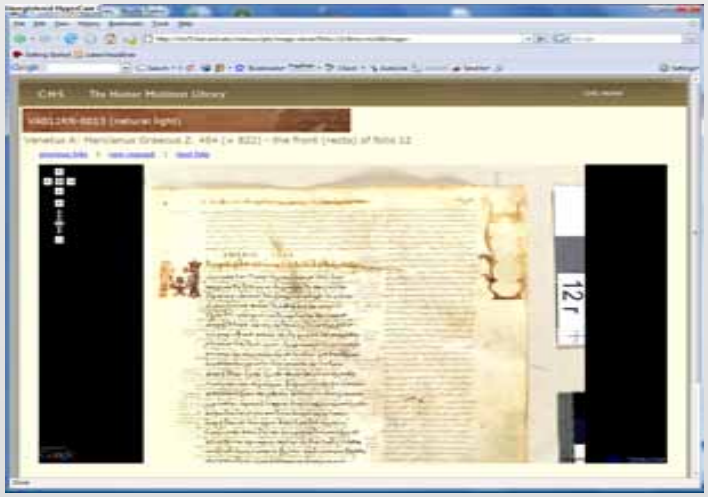
This is a visualisation of a ‘tooth’ using ImageCutter and displayed using the Google Maps as a Picture Viewer

Tooth courtesy of
Johan Lundin
Biomedical Informatics Research Group
Department of Oncology
University of Helinski
http://www.webmicroscope.net/

The Kremer Collection

http://www.thekremercollection.com/





http://chs75.harvard.edu/manuscripts/

One of my key points in this talk is that software being developed for a particular spatial application often easily generalises to a quite different one ….. But let me first outline my talk before elaborating

Outline

Pushing pictures – displaying and communicating data, spatial data – it's all about Web 2.0! Maptube again

GMapCreator and ***ImageCutter***

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

Pulling pictures – pulling spatial data – crowdsourcing

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

From geometry to geography and back – populating really large spatial data bases

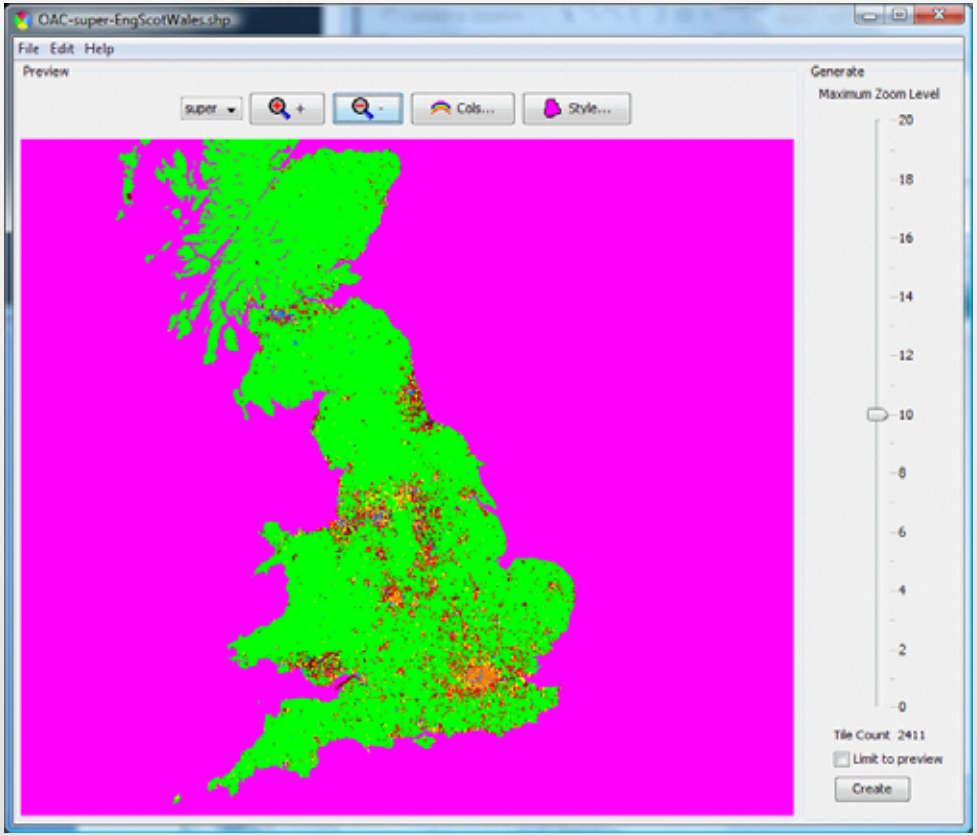
The future – disseminating spatial data in multimedia – games and virtual worlds

GMapCreator and ***ImageCutter***

The ***Google Map Creator*** creates ***Google Maps*** websites from thematic data contained in shapefiles.

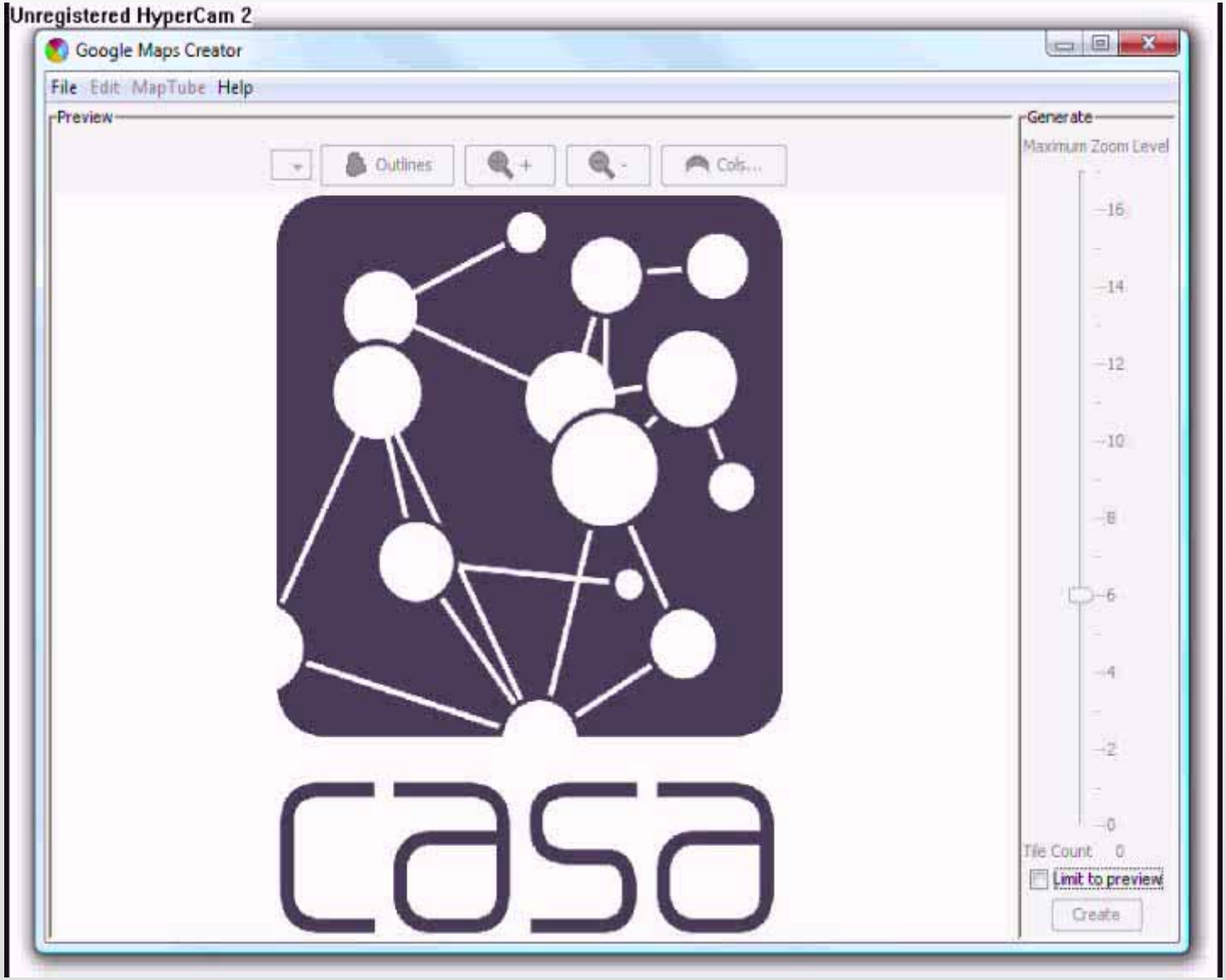
It effectively layers your map on top of a ***Google Map*** or the ***Google Map***

Don't be misled – a map is not a picture – it is a bunch of vector geometries and a set of attributes – and a



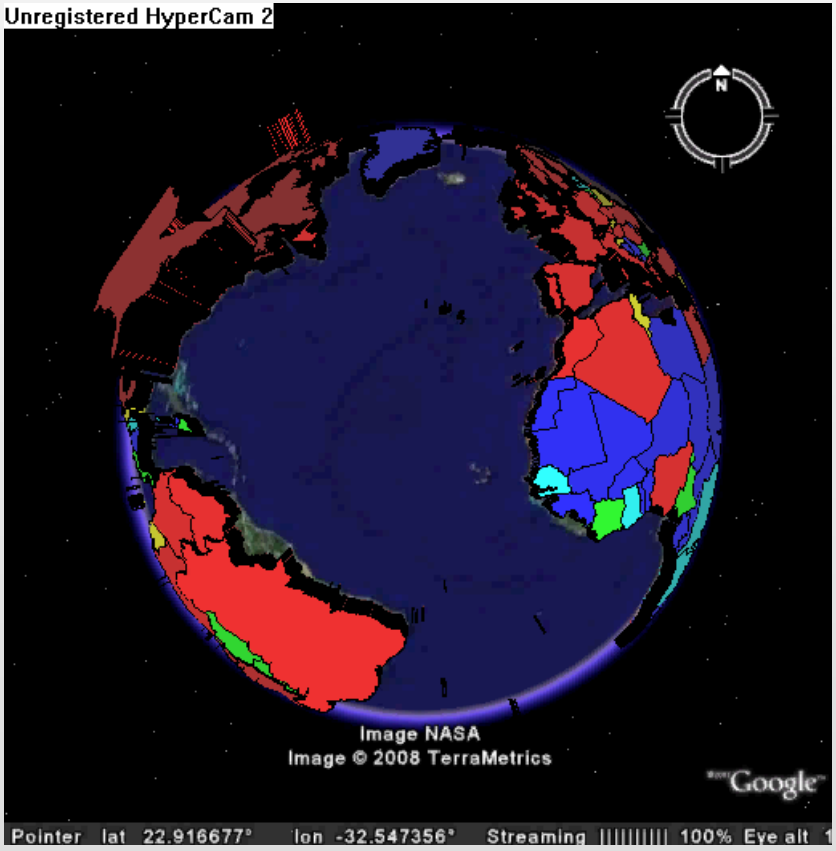
shape file is a proprietary but widely used format by ESRI – the makers of **ArcGIS** – that map files can be converted to prior to use in ***GMapCreator***

Let us see how it works

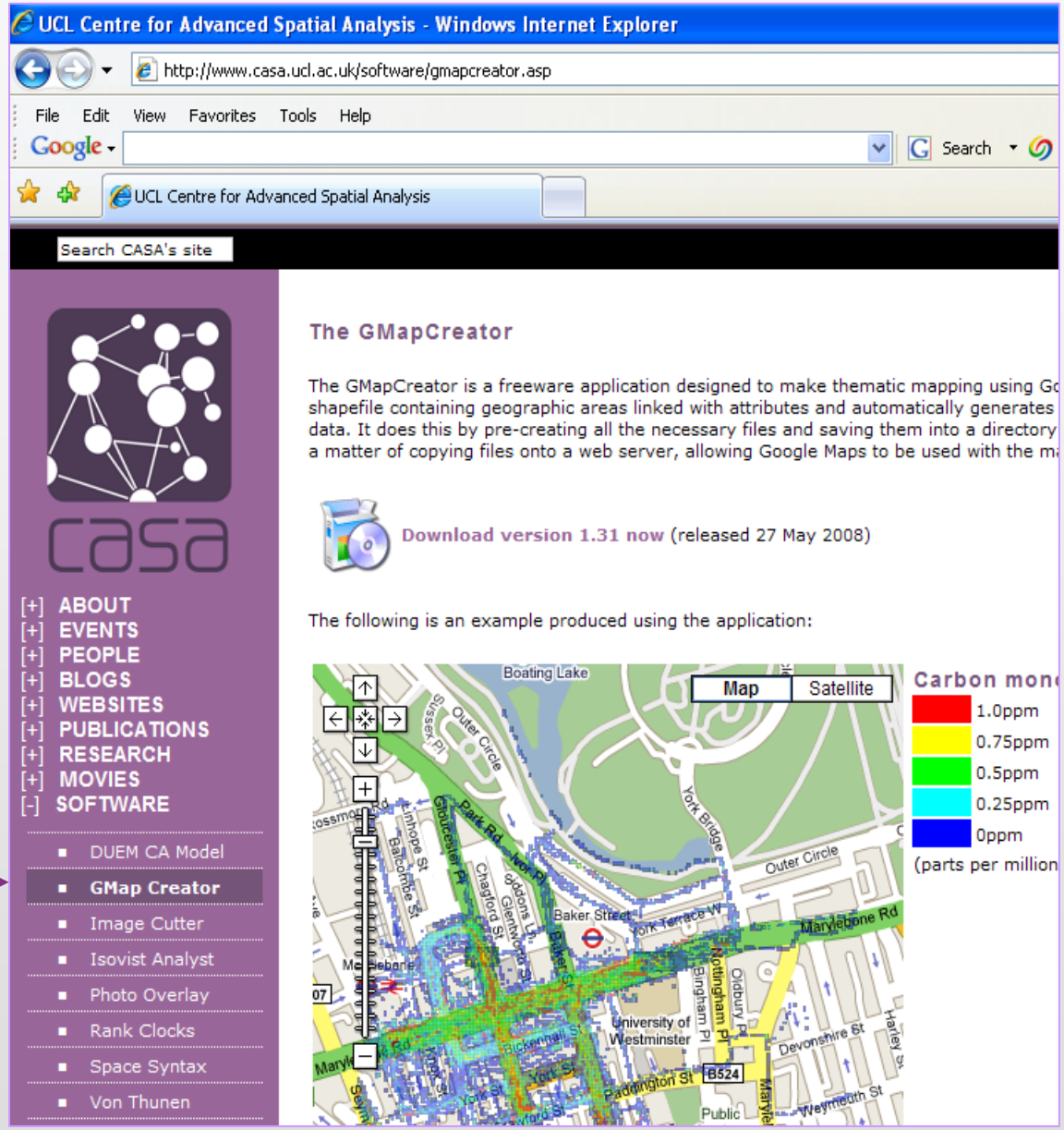

Unregistered HyperCam 2
Google Maps Creator
File Edit MapTube Help
Preview
Outlines
Cols...
Generate
Maximum Zoom Level
16
14
12
10
8
6
4
2
0
Tile Count 0
Limit to preview
Create
casa

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***




CASA Centre for Advanced Spatial Analysis UCL - CASA News -
http://www.casa.ucl.ac.uk/
File Edit View Favorites Tools Help
Google
CASA Centre for Advanced Spatial Analysis UCL - CA...
Search CASA's site
CASA News
AGI EDUCATI
Professor Stew
University of Ir
(and things) A
ELECTED TO T
Mike Batty was
and design usin
COMINGS, GO
Andrew Crooks
Computational
University on 2
has his tube ma
CASA REBUILD
We have four n
SCALE a
details.
[+] ABOUT
[+] EVENTS
[+] PEOPLE
[+] BLOGS
[+] WEBSITES
[+] PUBLICATIONS
[+] RESEARCH
[+] MOVIES
[-] SOFTWARE
DUEM CA Model
GMap Creator
Image Cutter
Isovist Analyst
Photo Overlay
Rank Clocks
Space Syntax
Von Thunen


UCL Centre for Advanced Spatial Analysis - Windows Internet Explorer
http://www.casa.ucl.ac.uk/software/gmapcreator.asp
File Edit View Favorites Tools Help
Google
Search
UCL Centre for Advanced Spatial Analysis
Search CASA's site
[+] ABOUT
[+] EVENTS
[+] PEOPLE
[+] BLOGS
[+] WEBSITES
[+] PUBLICATIONS
[+] RESEARCH
[+] MOVIES
[-] SOFTWARE
DUEM CA Model
GMap Creator
Image Cutter
Isovist Analyst
Photo Overlay
Rank Clocks
Space Syntax
Von Thunen
The GMapCreator
The GMapCreator is a freeware application designed to make thematic mapping using Go
shapefile containing geographic areas linked with attributes and automatically generates
data. It does this by pre-creating all the necessary files and saving them into a directory
a matter of copying files onto a web server, allowing Google Maps to be used with the ma
Download version 1.31 now (released 27 May 2008)
The following is an example produced using the application:
Map
Satellite
Boating Lake
Outer Circle
York Bridge
Park Rd
Baker Street
Marylebone Rd
University of Westminster
Carbon mono
1.0ppm
0.75ppm
0.5ppm
0.25ppm
0ppm
(parts per million

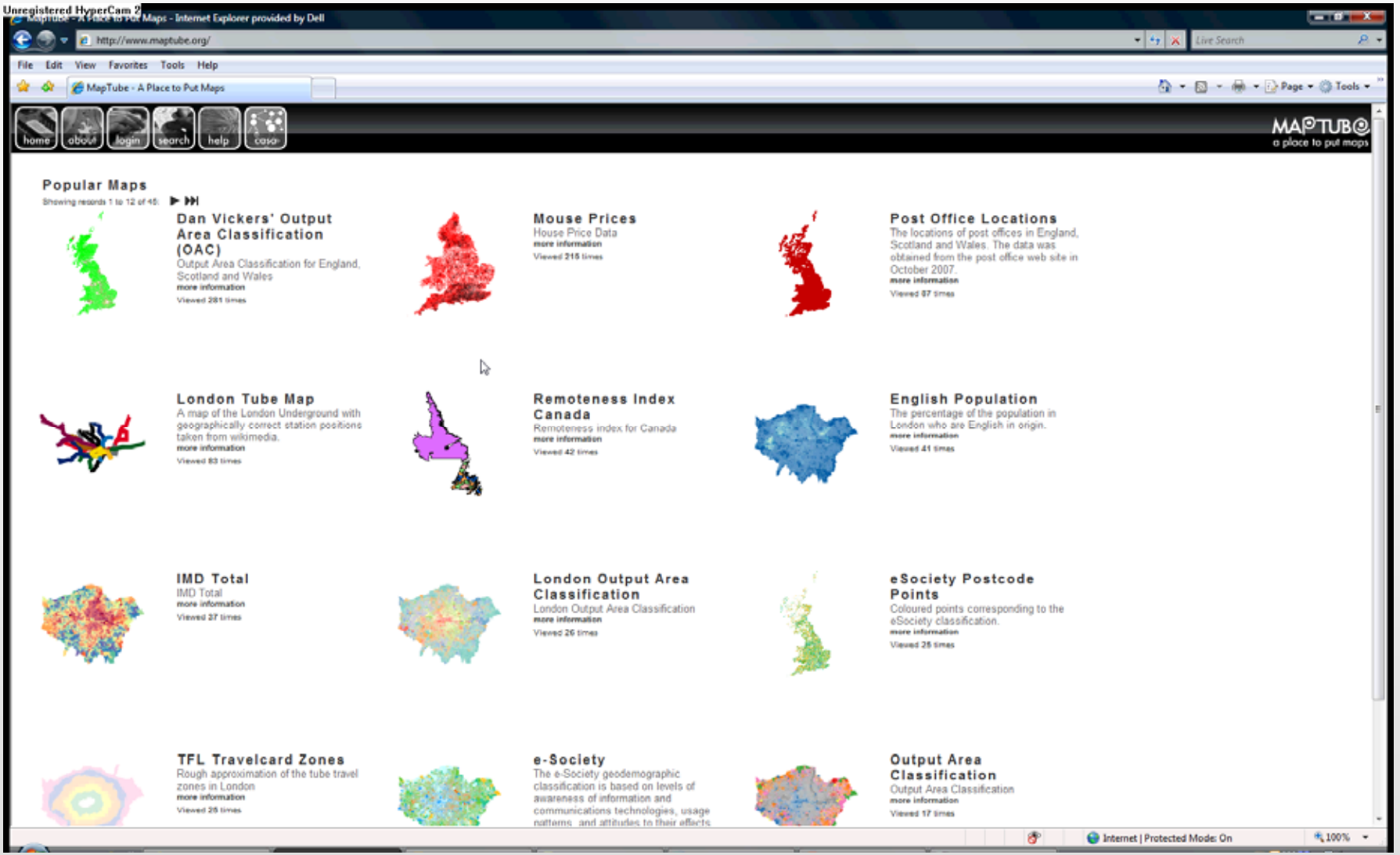
MapTube: a kind of ***YouTube*** + ***Napster***

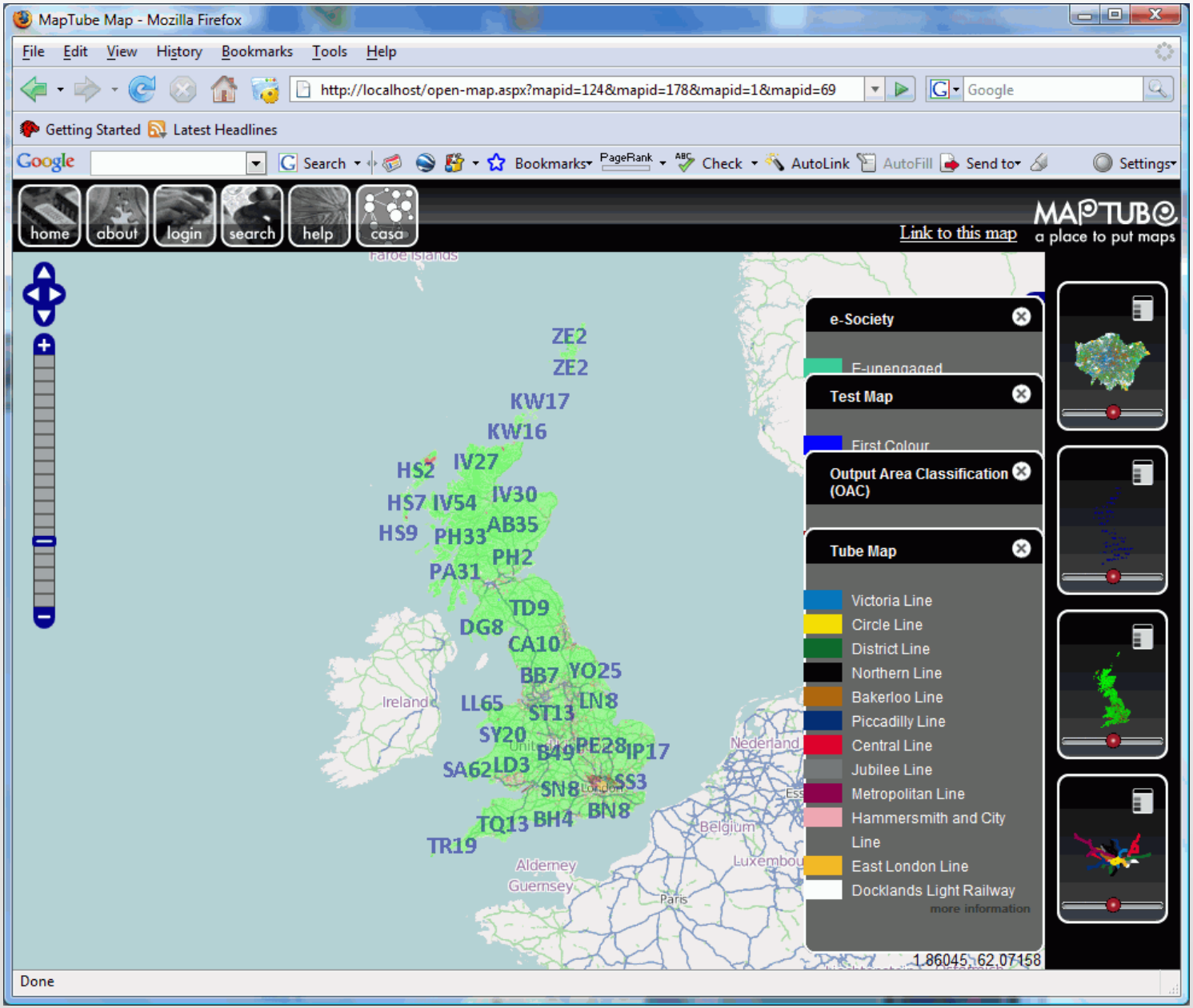
Let me explain: every time someone downloads our software, there is a high probability they make a map.

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

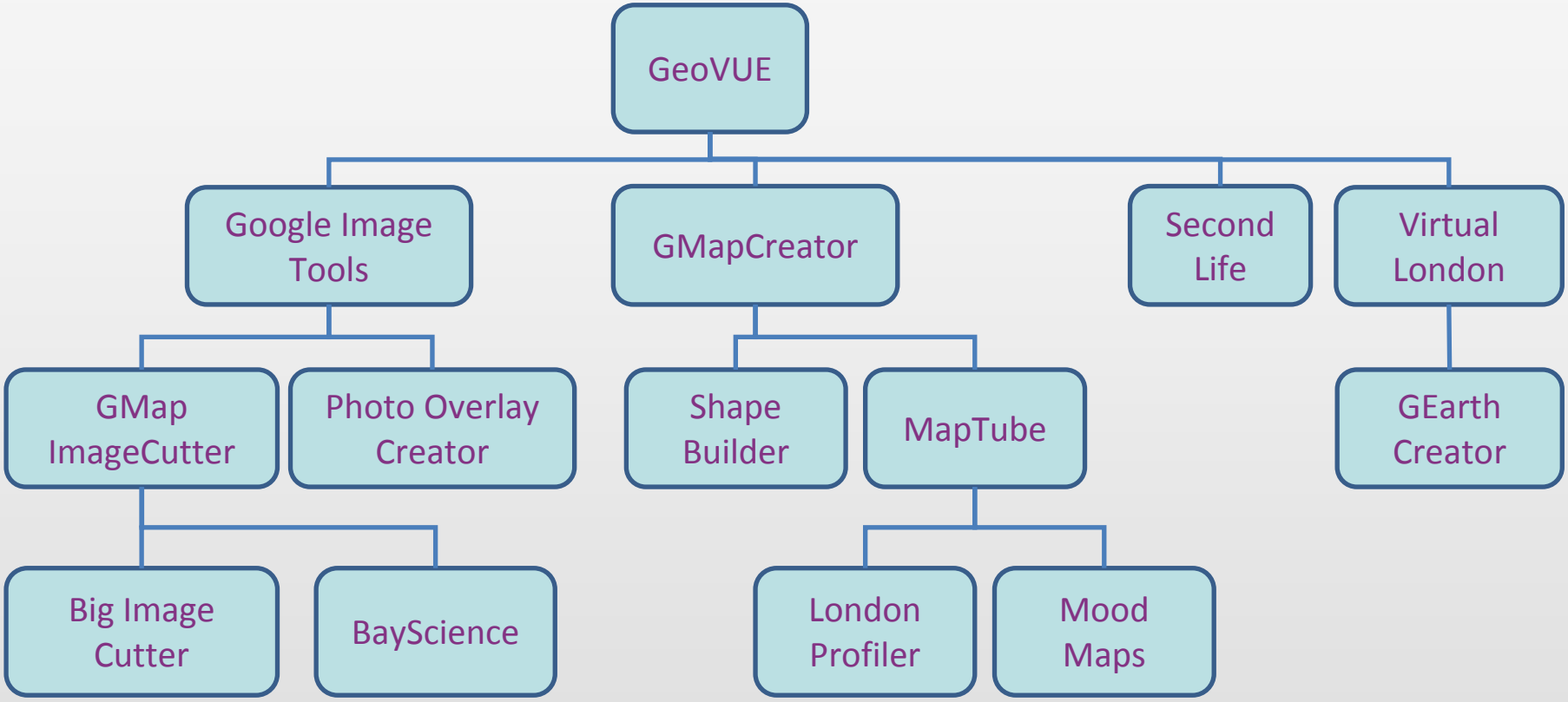
However, in the UK map bases are copyrighted – you can done for copying OS map data and it is serious –

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

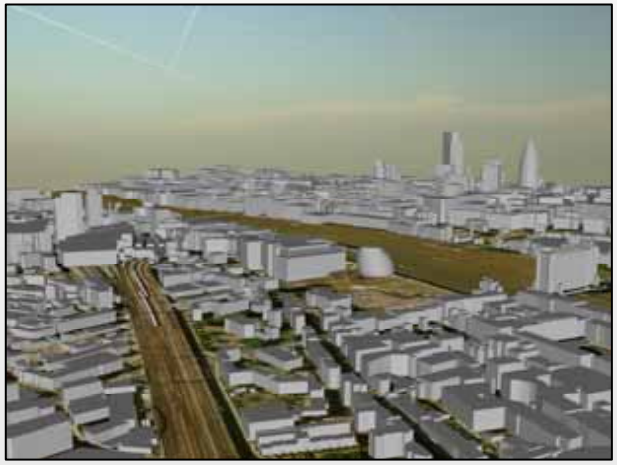

Unregistered HyperCam 2
MapTube - A Place to Put Maps - Internet Explorer provided by Dell
http://www.maptube.org/
File Edit View Favorites Tools Help
MapTube - A Place to Put Maps
home about login search help casa
MAPTUBE
a place to put maps
Popular Maps
Showing records 1 to 12 of 45:
Dan Vickers' Output Area Classification (OAC)
Output Area Classification for England, Scotland and Wales
more information
Viewed 281 times
Mouse Prices
House Price Data
more information
Viewed 215 times
Post Office Locations
The locations of post offices in England, Scotland and Wales. The data was obtained from the post office web site in October 2007.
more information
Viewed 87 times
London Tube Map
A map of the London Underground with geographically correct station positions taken from wikimedia.
more information
Viewed 83 times
Remoteness Index Canada
Remoteness index for Canada
more information
Viewed 42 times
English Population
The percentage of the population in London who are English in origin.
more information
Viewed 41 times
IMD Total
IMD Total
more information
Viewed 37 times
London Output Area Classification
London Output Area Classification
more information
Viewed 26 times
eSociety Postcode Points
Coloured points corresponding to the eSociety classification.
more information
Viewed 25 times
TFL Travelcard Zones
Rough approximation of the tube travel zones in London
more information
Viewed 25 times
e-Society
The e-Society geodemographic classification is based on levels of awareness of information and communications technologies, usage patterns, and attitudes to their effects
Output Area Classification
Output Area Classification
more information
Viewed 17 times
Internet | Protected Mode: On
100%

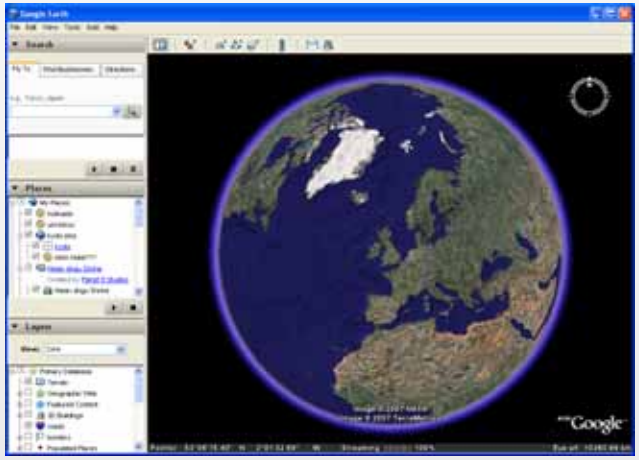

MapTube Map - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost/open-map.aspx?mapid=124&mapid=178&mapid=1&mapid=69
Getting Started Latest Headlines
home about login search help casa
Link to this map
MAPTUBE
a place to put maps
e-Society
E-unengaged
Test Map
First Colour
Output Area Classification (OAC)
Tube Map
Victoria Line
Circle Line
District Line
Northern Line
Bakerloo Line
Piccadilly Line
Central Line
Jubilee Line
Metropolitan Line
Hammersmith and City Line
East London Line
Docklands Light Railway
more information
ZE2
KW17
KW16
IV27
HS2
HS7
IV54
IV30
HS9
PH33
AB35
PH2
PA31
TD9
DG8
CA10
BB7
YO25
LL65
LN8
ST13
SY20
PE28
IP17
SA62
LD3
SS3
SN8
BN8
TQ13
BH4
TR19
Ireland
Nederland
Belgium
Alderney
Guernsey
Paris
1.86045, 62.07158
Done

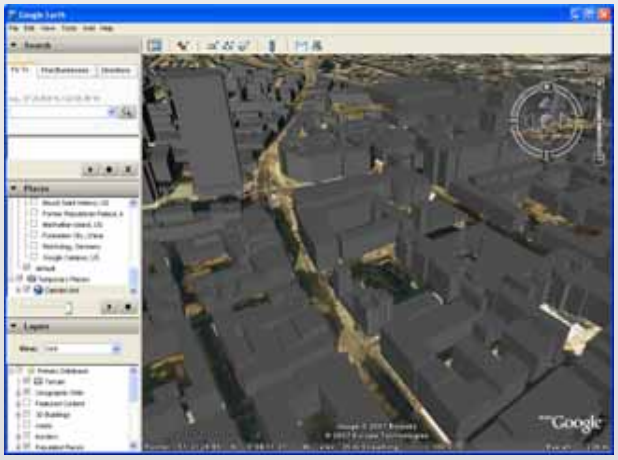
GeoVUE Family Tree

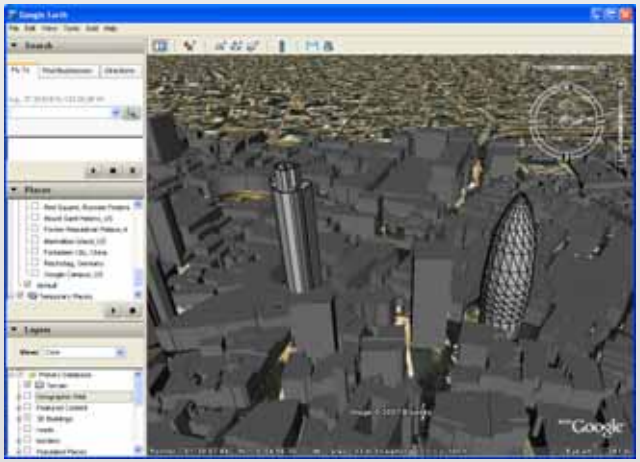


2D to 3D: GIS to CAD and back and on the web





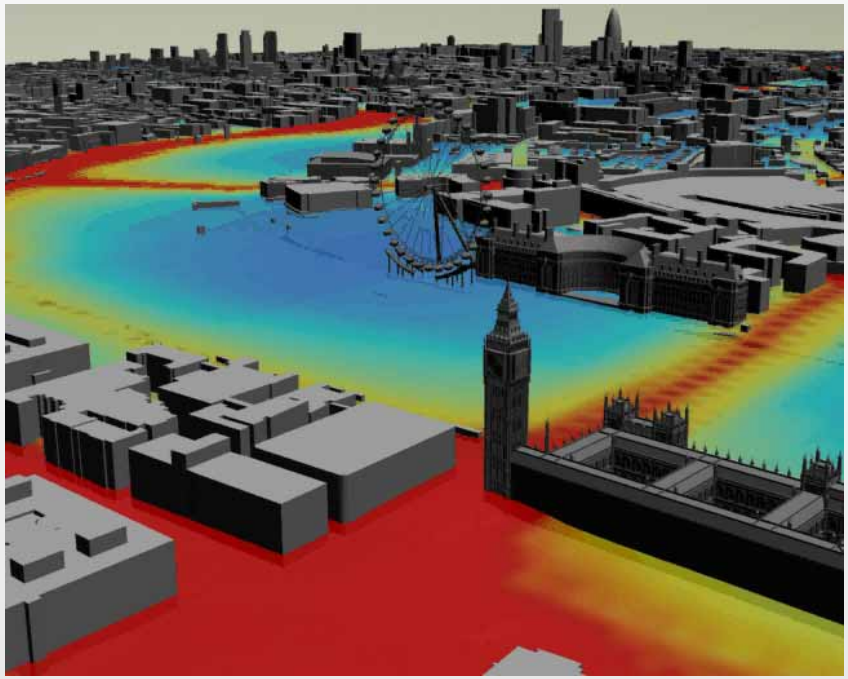


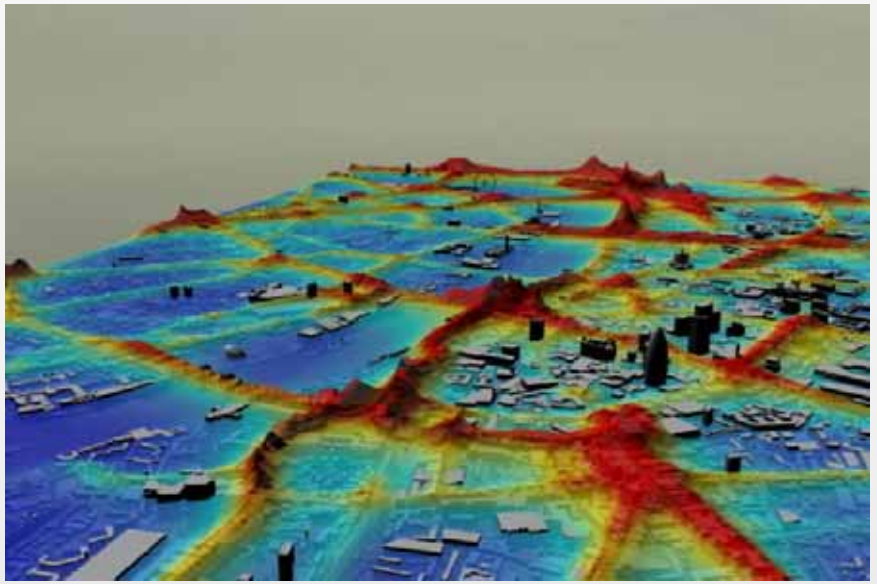


Maps in 3D are rather abstract and thus ***GEarthCreator*** is rather contrived –

True 3D exists at a finer scale and one of our workhorses to develop such data is our 3D block model of Greater London

This is built in ArcGIS, 3D Max etc. and is run in ***Google Earth***

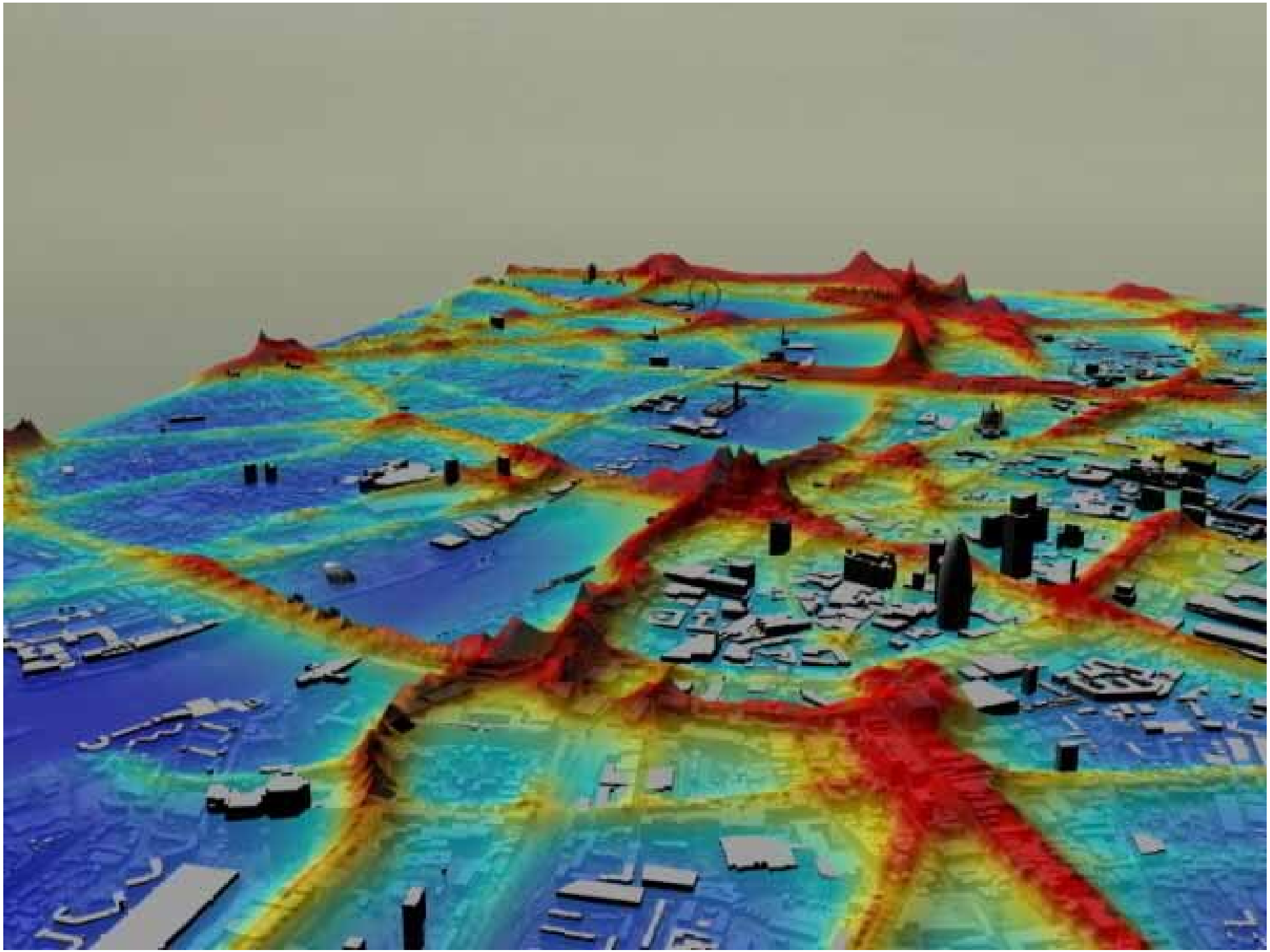




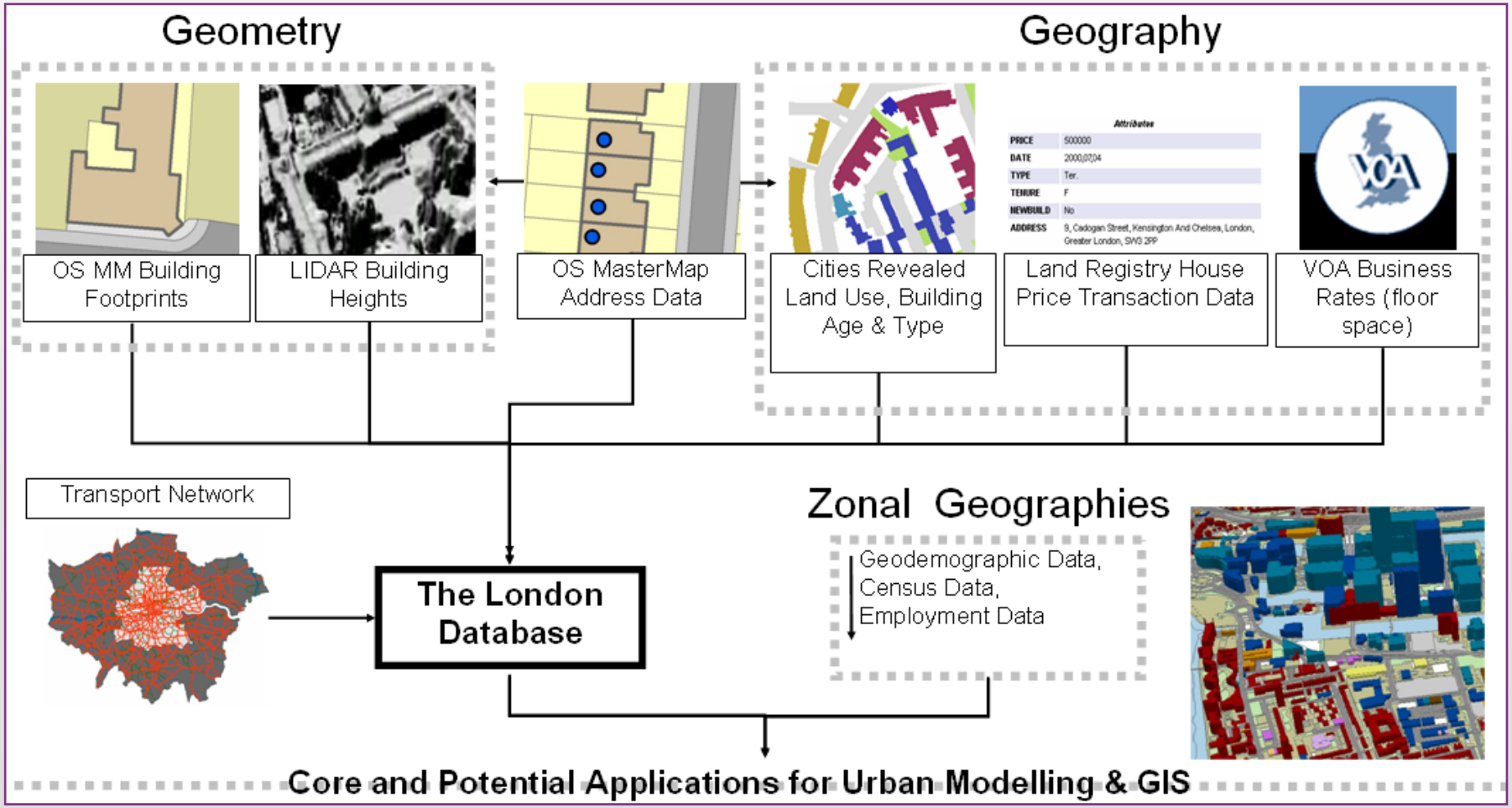
The key issue for us is to populate this data base of 3.6 million building blocks with socio-economic data

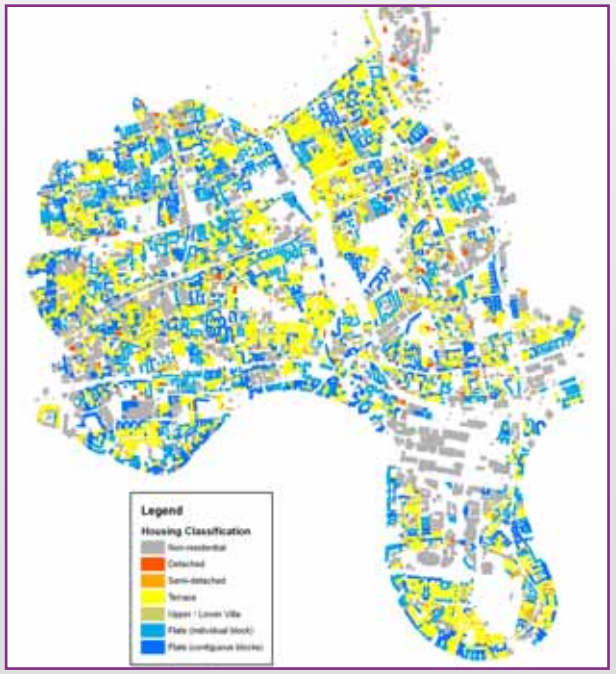
This is linking geometry to geography in a way that will explode the data base to levels much more reminiscent of large scale databases in the physical sciences than the rather modest social data bases based on aggregates of population

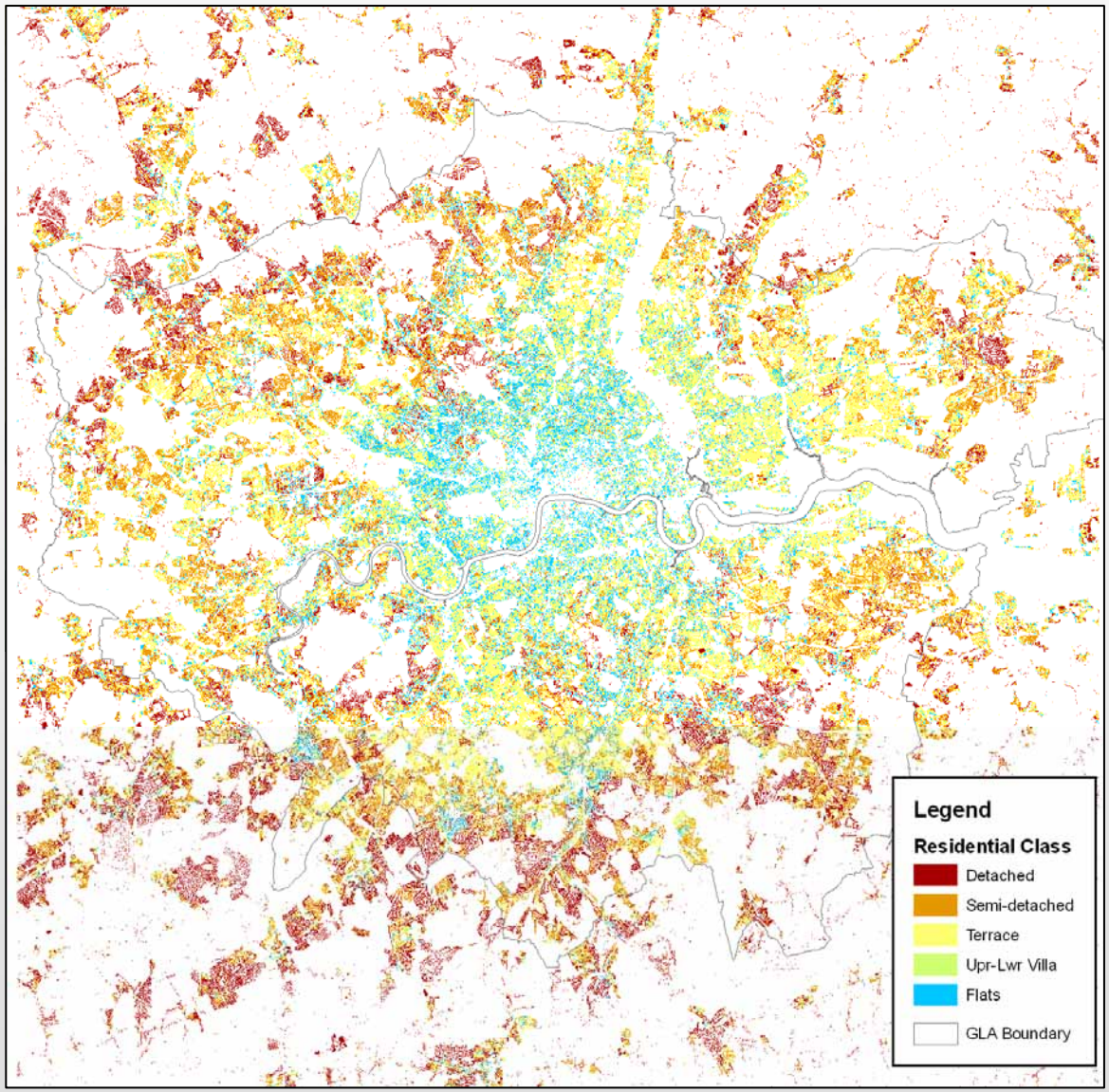
Linking these to individual address point data is another related issue too as well as tagging buildings to populations

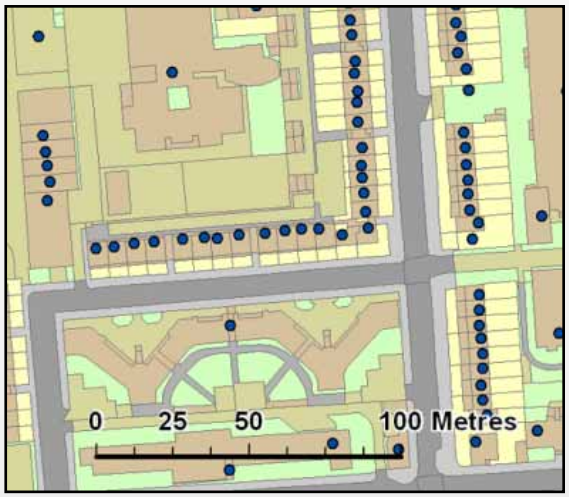


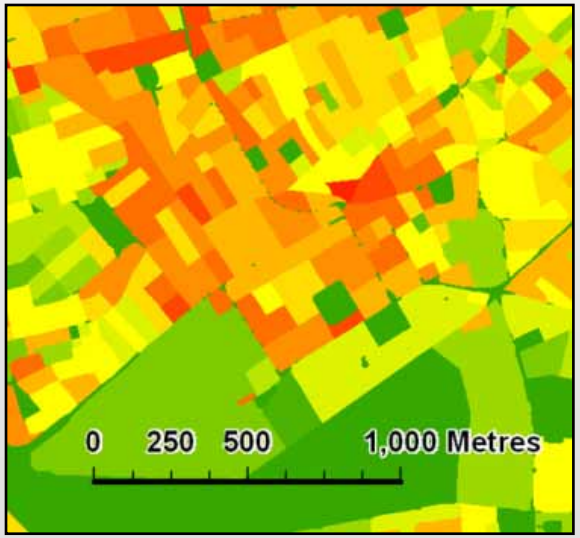
From geometry to geography and back – populating really large spatial data bases

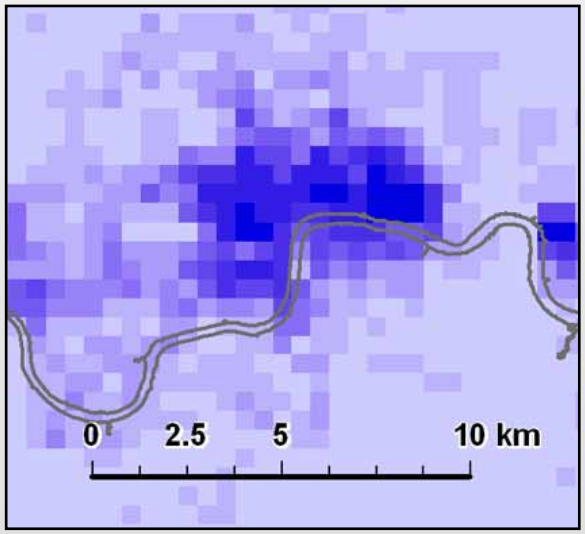



Legend
Housing Classification


Legend
Residential Class
Detached
Semi-detached
Terrace
Upr-Lwr Villa
Flats
GLA Boundary







Adding Land Use, Transport and Populations and Aggregating Scales

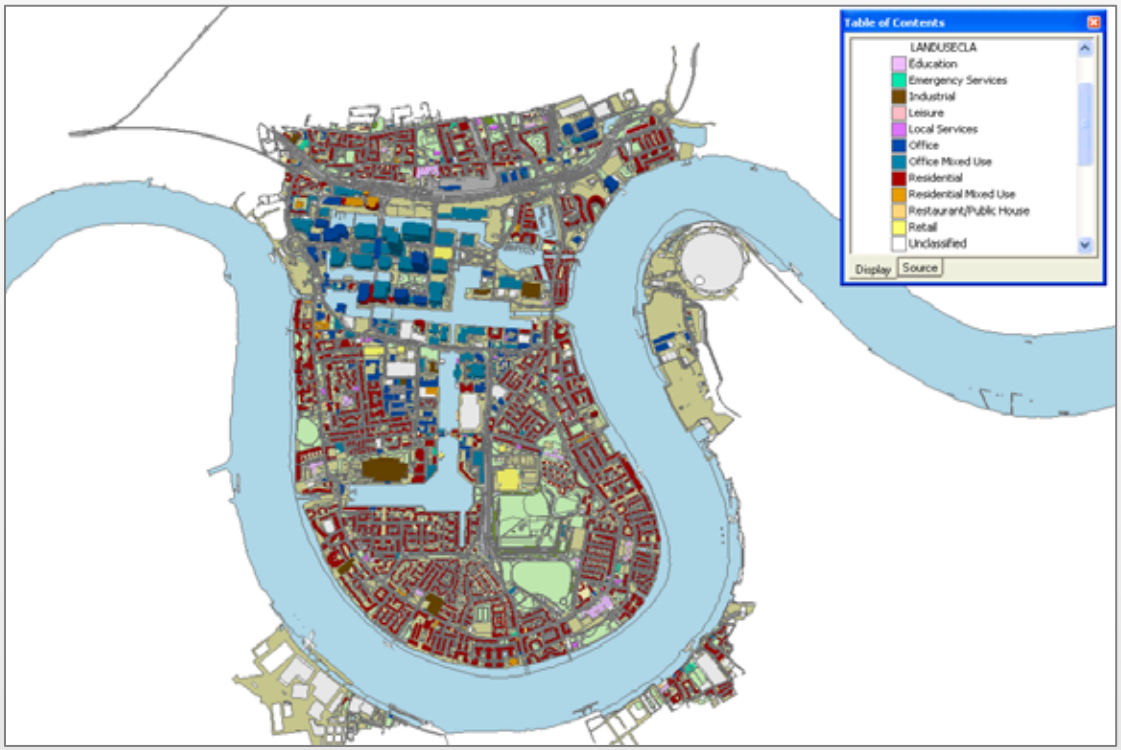
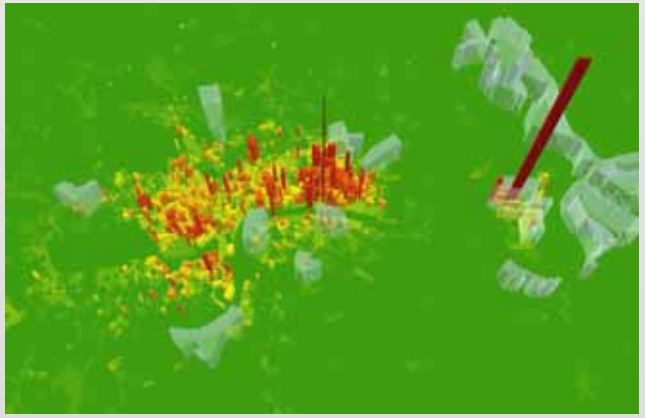
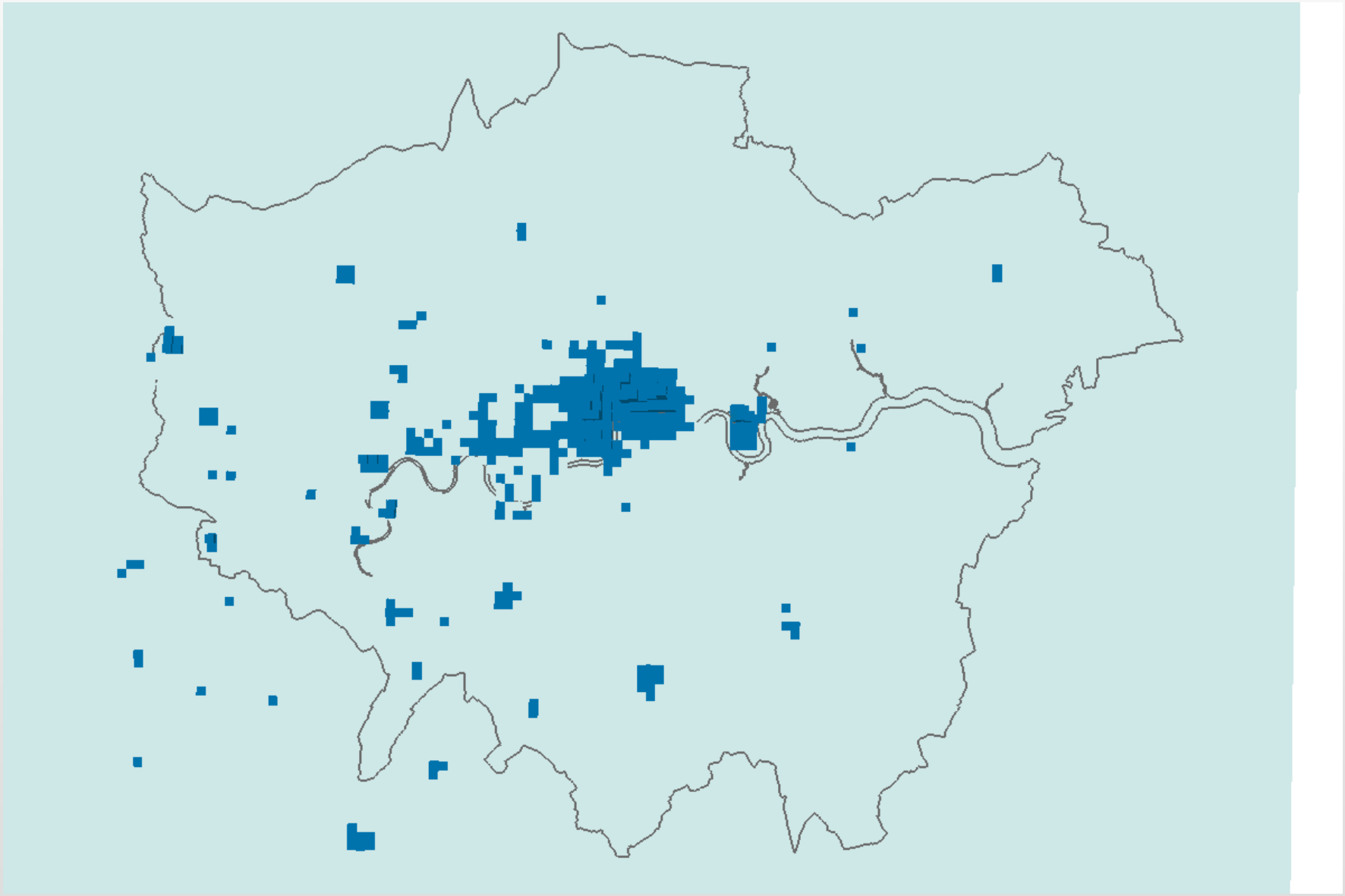


Table of Contents
LANDUSECLA
Education
Emergency Services
Industrial
Leisure
Local Services
Office
Office Mixed Use
Residential
Residential Mixed Use
Restaurant/Public House
Retail
Unclassified
Display
Source





The future – disseminating spatial data in multimedia – games and virtual worlds

index.gif - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://www.casa.ucl.ac.uk/atmos/ Go Links

Google Search Web 86 blocked AutoFill Options

LONDON

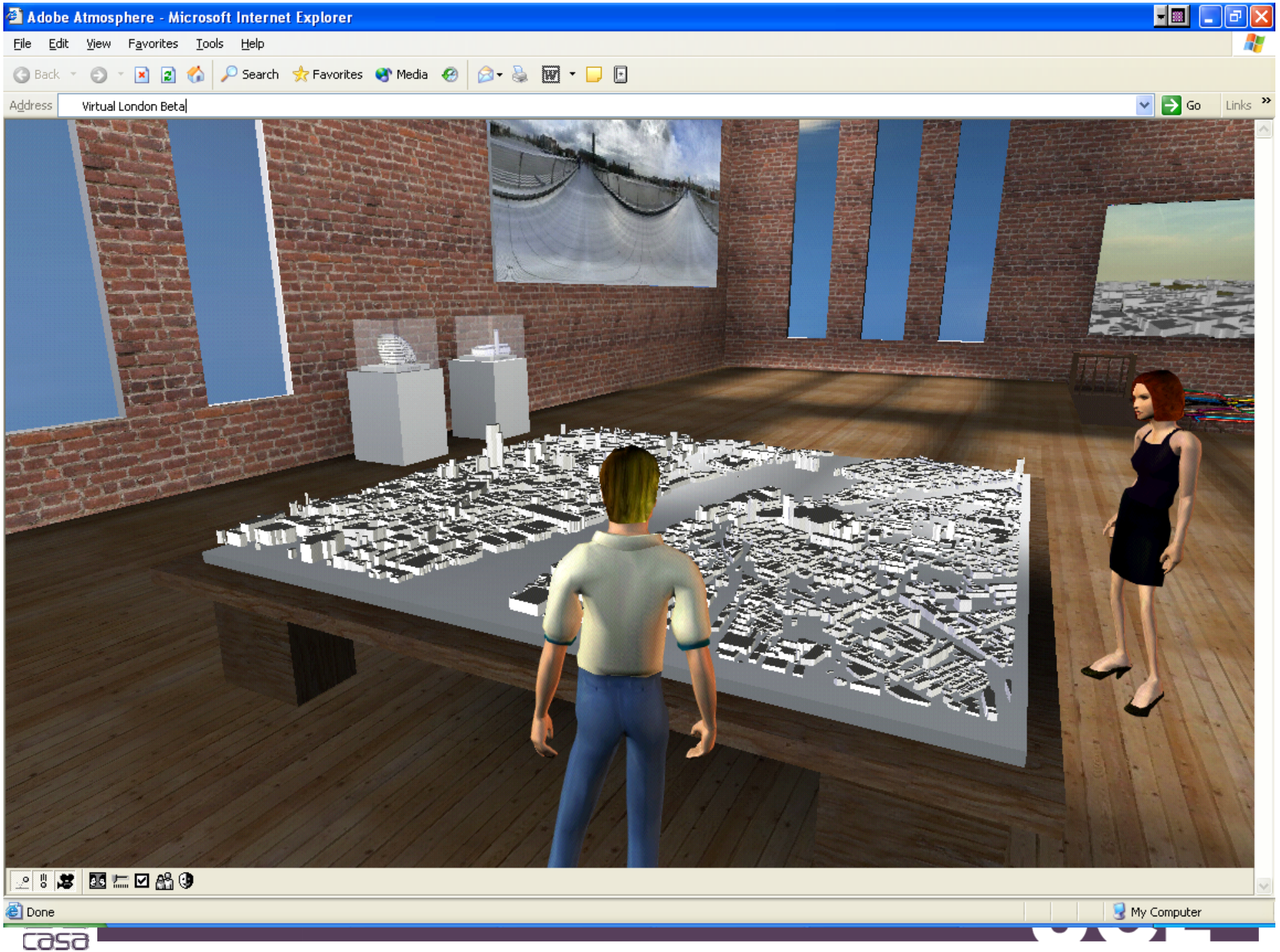
Use your arrow keys or mouse to move in the Virtual World.

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

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

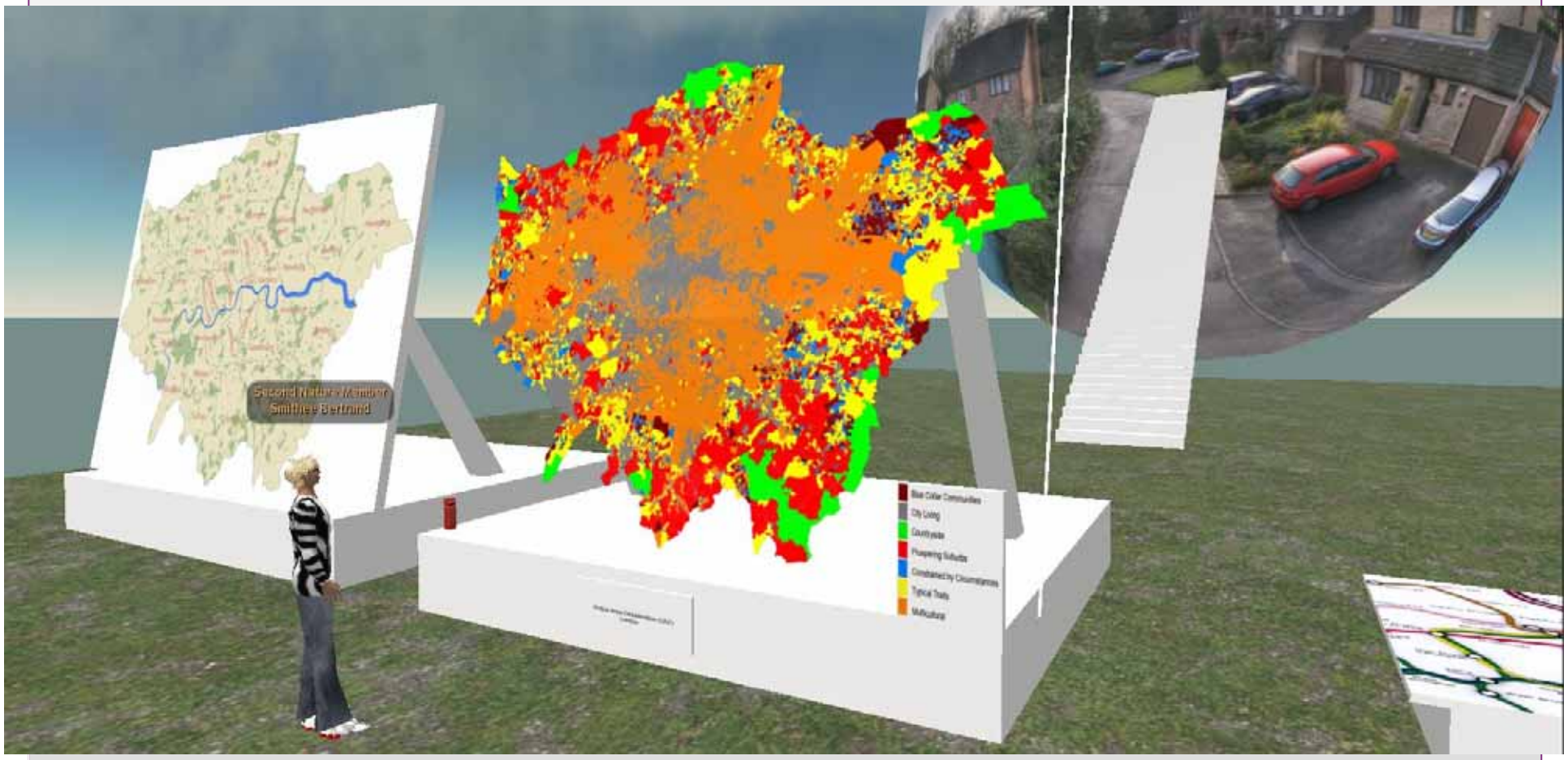
Virtual London was developed at the Centre for Advanced Spatial Analysis, University College London. Please contact asmith@geog.ucl.ac.uk for help or further information.

We can show a movie of this

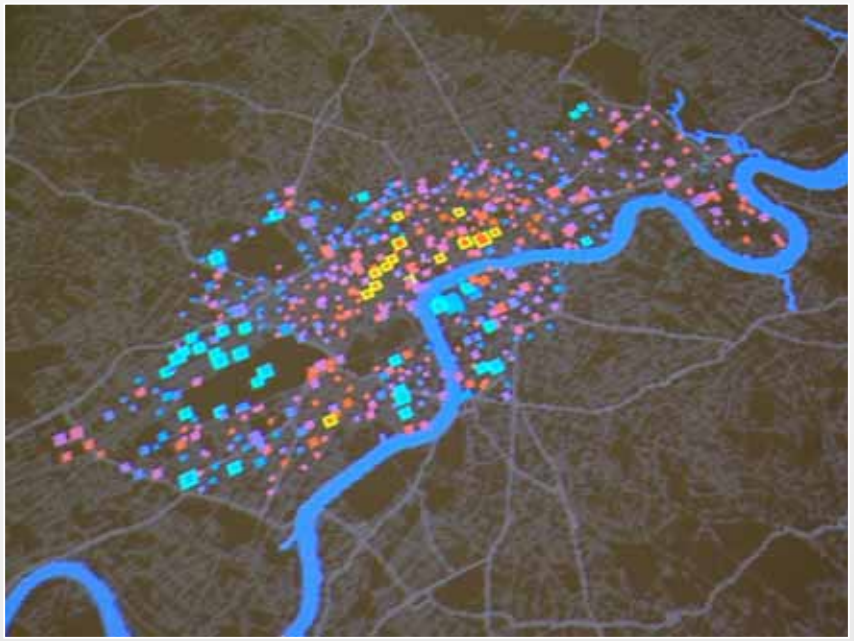

Adobe Atmosphere - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address Virtual London Beta
Go Links
Done
My Computer

Real and Virtual Design Studios

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




UCL
London Data Table
www.casa.ucl.ac.uk




River Levels - PLA
Traffic Cameras - TfL
Air Quality Monitors - Defra
Road Information Signs - TfL


UCL
Pigeon Sim
Pigeon Sim harnesses 3D vision and rendering technology to provide an interactive fly-through of London (and beyond), augmented with real-time data as it is sensed throughout the city. It gives a bird's eye view of tides, pollution levels, traffic and more.
casa
CASA Smart Cities