# The Future of Teaching Geocomputation


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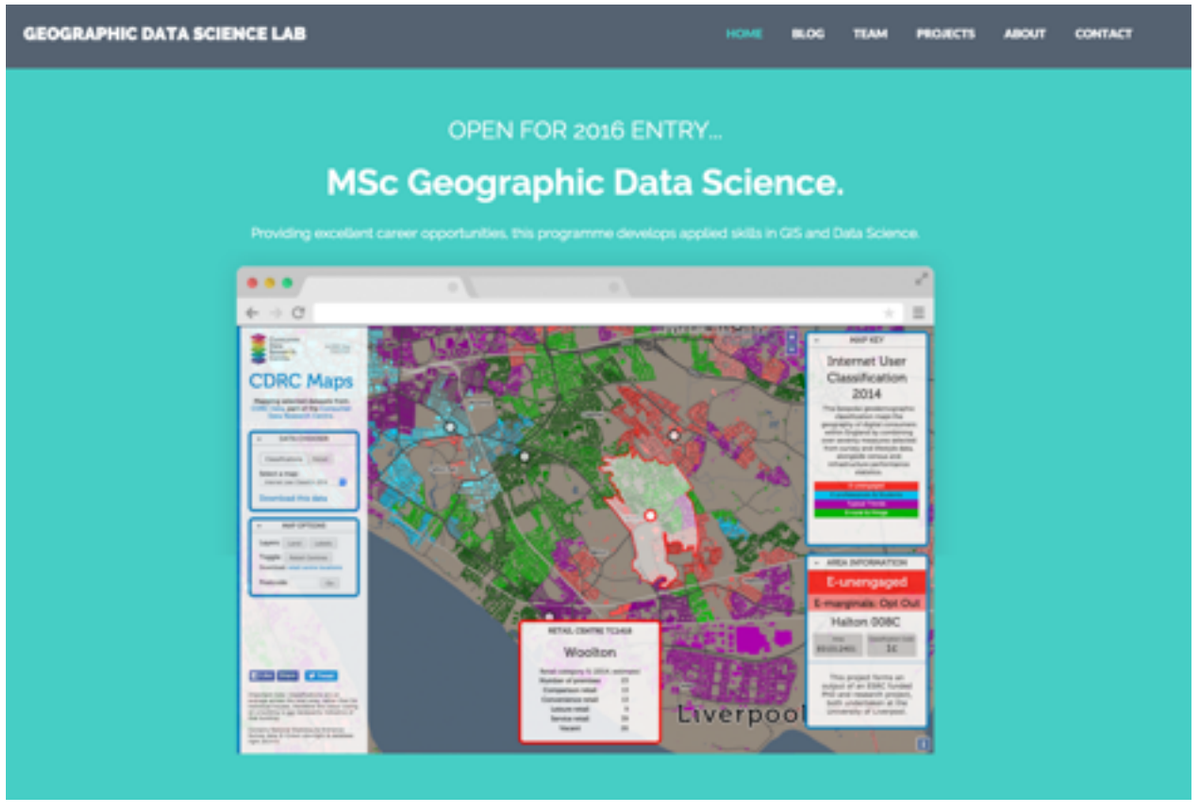
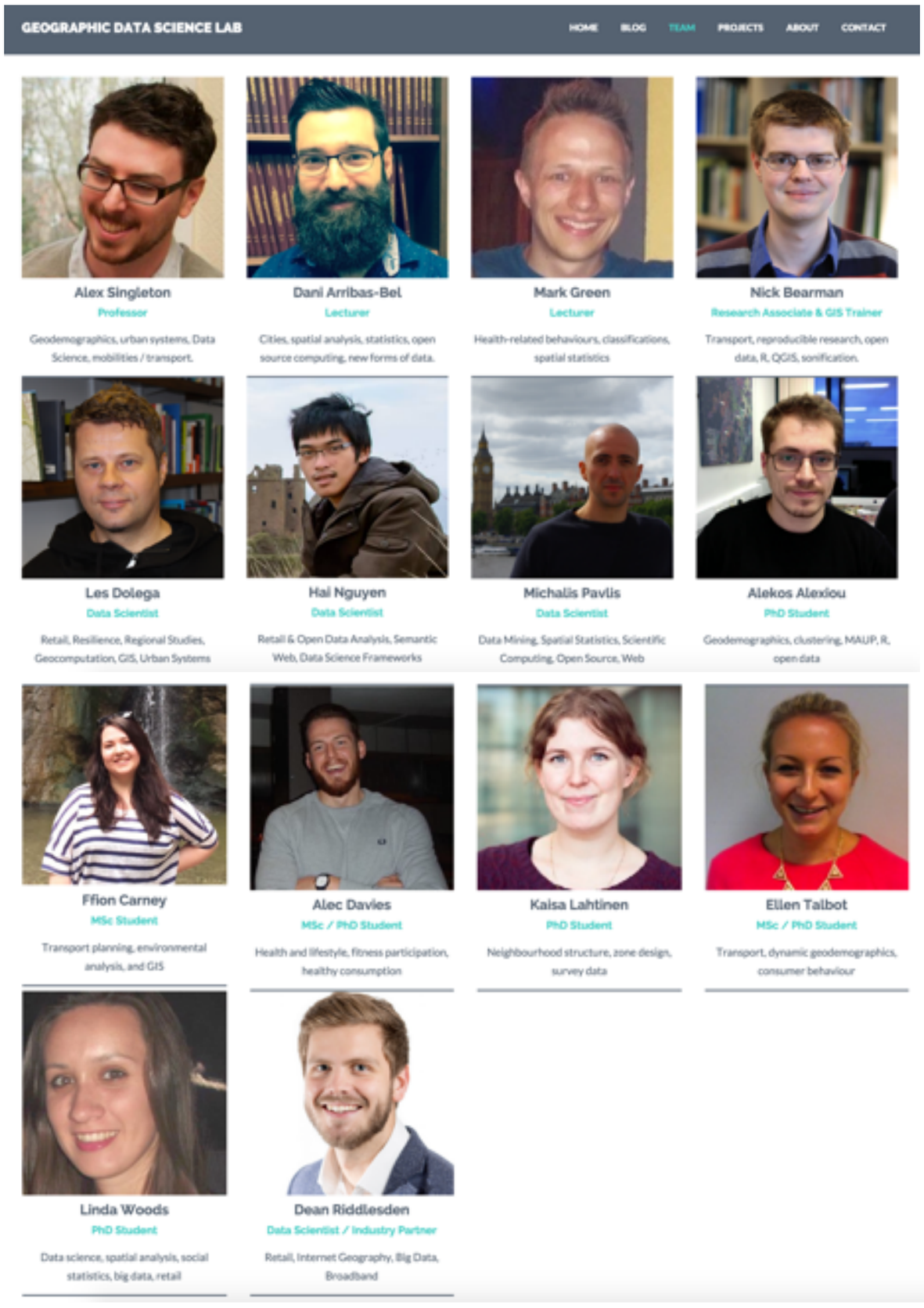
@alexsingleton


LIFE CHANGING | World Shaping




**geographicdatascience.com**

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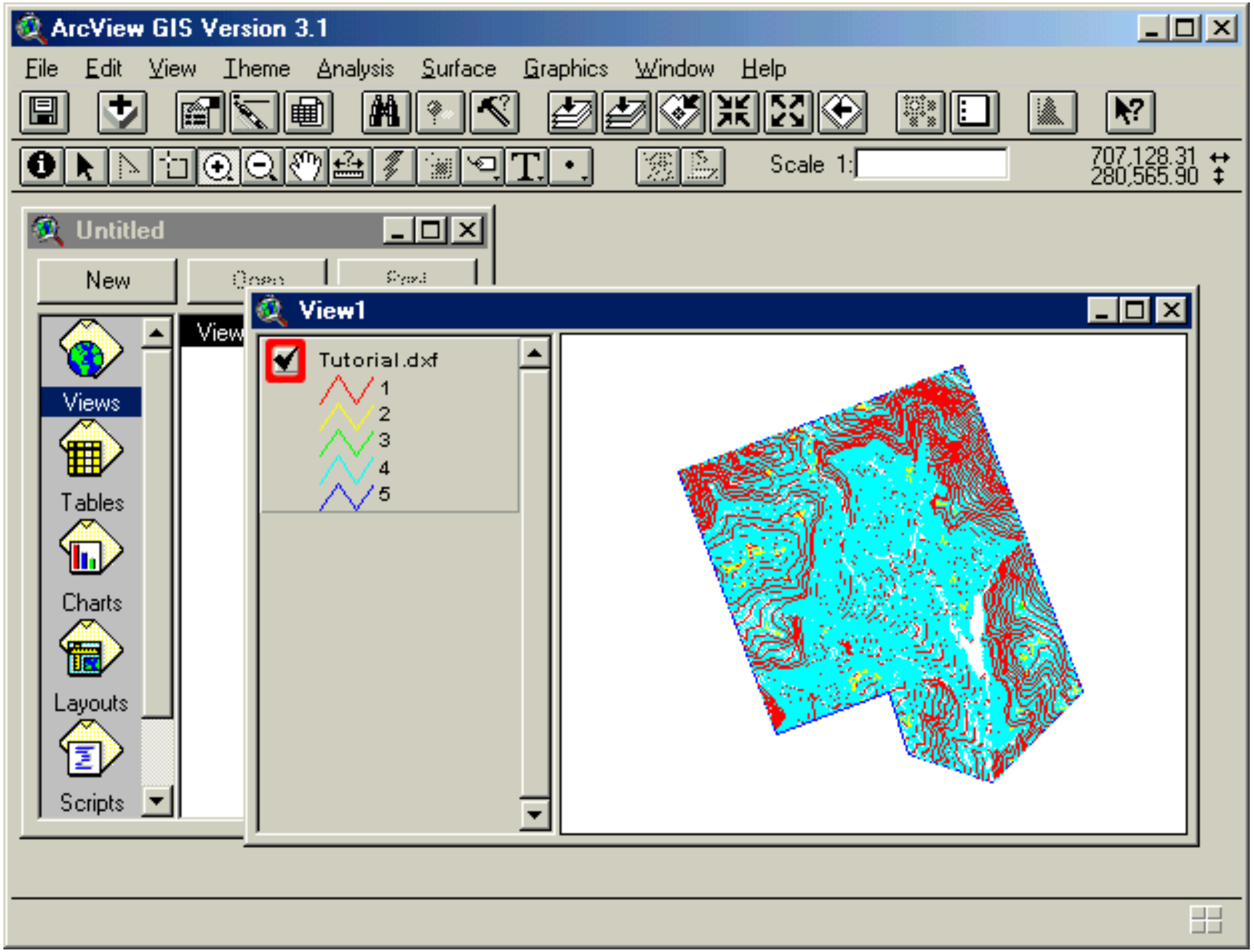


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coosbike - SPSS Data Editor

File Edit View Data Transform Statistics Graphs Utilities Window Help

1:q17a

| | q15a | q15b | | | | | | | | | | | | | q20d | q20e | q20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 97459 | | | | | | | | | | | | | | | |
| 2 | . | . | | | | | | | | | | | | | | | |
| 3 | 5 | 97459 | | | | | | | | | | | | | | | |
| 4 | . | . | | | | | | | | | | | | | | | |
| 5 | 5 | 97459 | | | | | | | | | | | | | | | |
| 6 | 4 | 97420 | | | | | | | | | | | | | | | |
| 7 | 4 | 97420 | | | | | | | | | | | | | | | |
| 8 | 4 | 97420 | | | | | | | | | | | | | | | |
| 9 | 3 | 97423 | | | | | | | | | | | | | | | |
| 10 | 5 | 97459 | 7 | 2 | 2 | 1 | 0 | 2 | 0 | 0 | 4 | . | . | . | . | . | |
| 11 | 3 | 97423 | 3 | 2 | 2 | 2 | 1 | 2 | 0 | 0 | 3 | 4 | . | . | . | . | |
| 12 | 4 | 97420 | 7 | 2 | 2 | 0 | 2 | 2 | 0 | 0 | 4 | 34 | . | . | . | . | |
| 13 | 4 | 97420 | 3 | 2 | 2 | 3 | 1 | 2 | 0 | 0 | 3 | 1 | . | . | . | . | |
| 14 | 4 | 97420 | 6 | 2 | 2 | 1 | 0 | 1 | 0 | 2 | 3 | | | | | | |
| 15 | 5 | 97459 | 7 | 2 | 1 | 0 | 0 | 1 | 1 | 1 | 5 | | | | | | |
| 16 | 4 | 97420 | 6 | 2 | 2 | 0 | 0 | 2 | 0 | 0 | 4 | | | | | | |
| 17 | 4 | 97420 | 7 | 3 | 1 | 0 | 2 | 2 | 0 | 0 | 4 | | | | | | |
| 18 | 4 | 97420 | 5 | 3 | 2 | 1 | 1 | 2 | 0 | 0 | 3 | | | | | | |

**Recode into Different Variables**

q14b
q14c
q14d
q15a
q15b
q16
q17b
q18a
q18b
q18c
q18d
q18e
q19
q2
q20a
q20b

Numeric Variable -> Output Variable:

q17a -> AGECAT

Output Variable

Name: AGECAT Change

Label: akdown Over/Under 50 Years

If...

Old and New Values...

OK Paste Reset Cancel Help

SPSS Processor is ready

Start | Norton System ... | Eudora Pro | Exploring - Proje... | coosbike - S...

www.spss.com

SPSS® 10.0 for Windows

Install SPSS
Install SmartViewer
Installation Instructions
Install Internet Explorer 5.0
Install Acrobat Reader 4.0
Install SPSS Data Access Pack
Evaluation Products
Browse the CD-ROM
Exit

SPSS Real Stats. Real Easy.™



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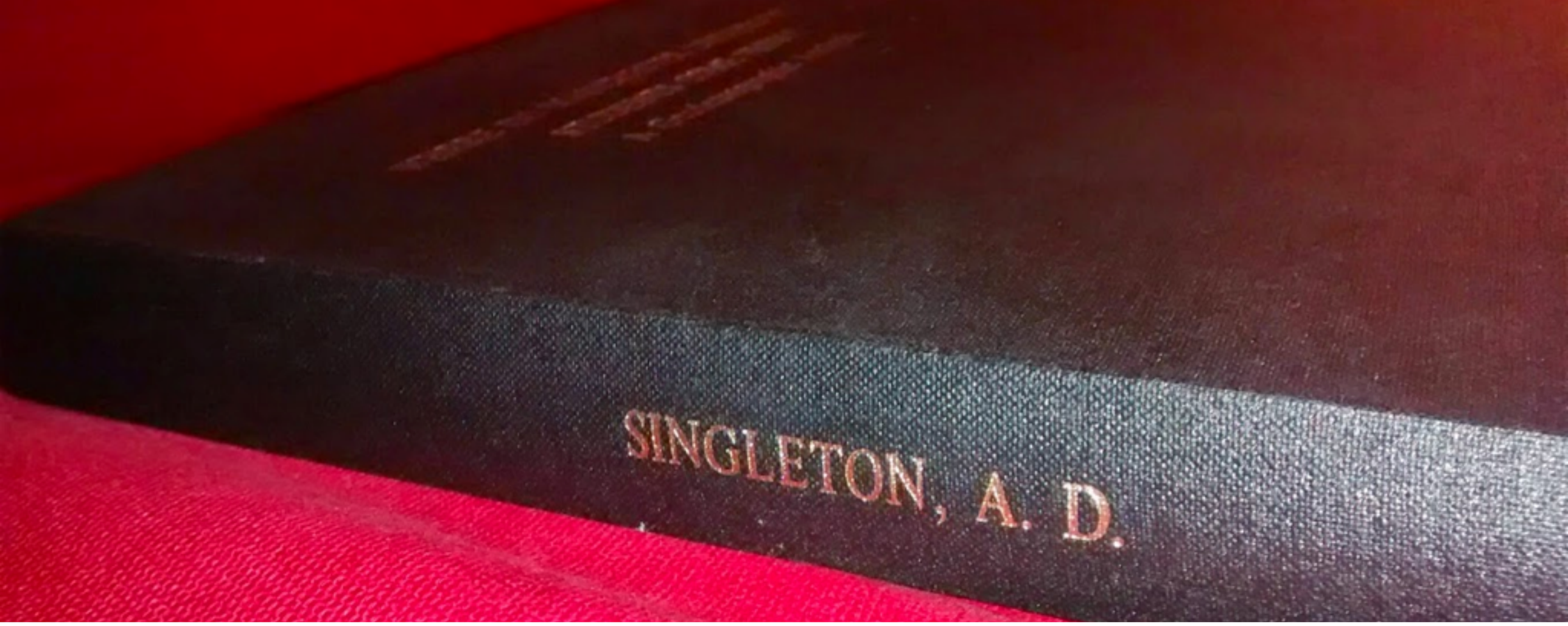


- Data handling: large administrative dataset
- Database joins
  - Geodemographics
- Geocoding postcodes

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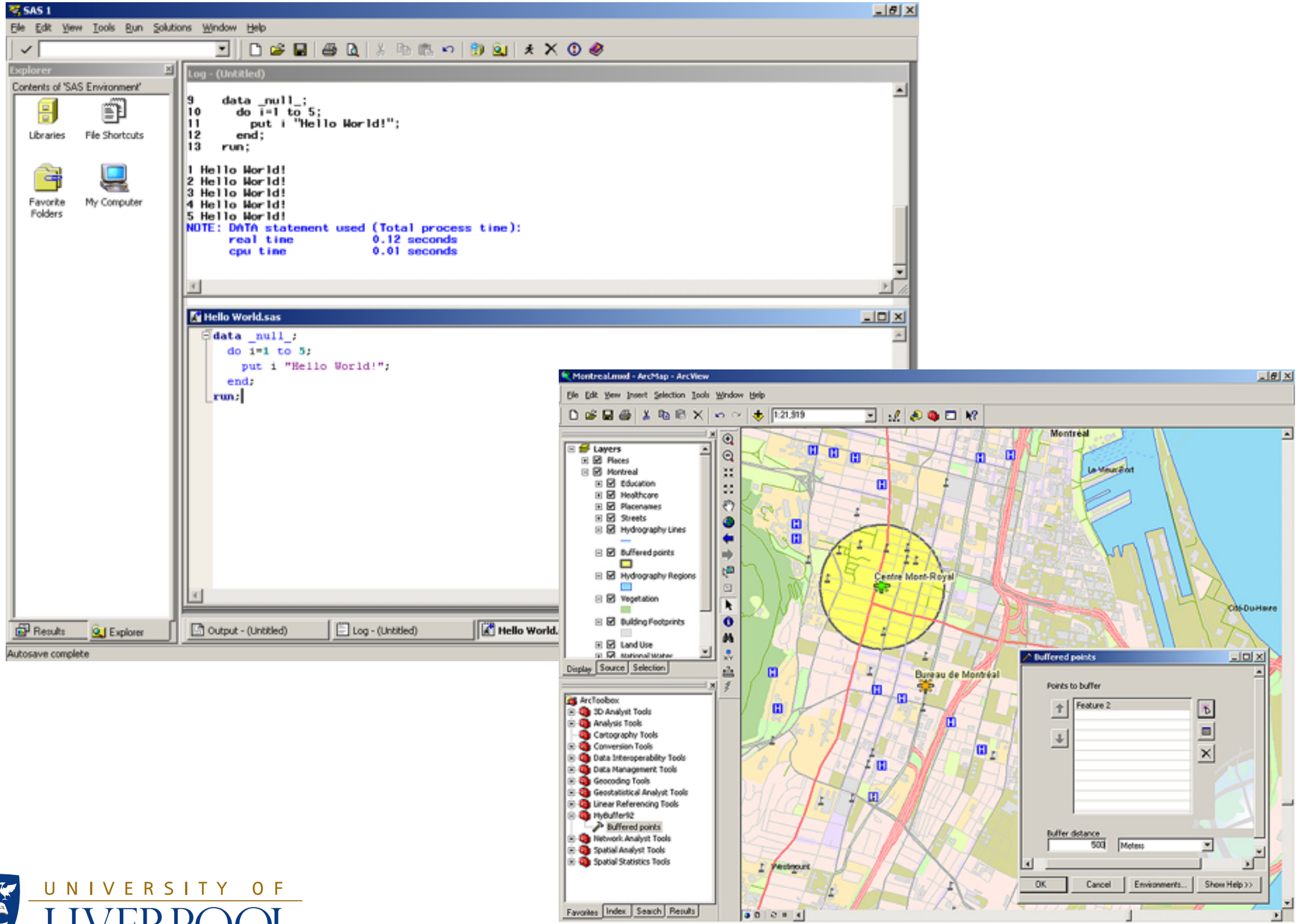


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# My Problem…

- Heavy on following instructions (button pushing)
  - Lack of process thinking
- Detached from the real world
  - Clean data? Old data?
- Not contemporary
  - Limited Tools
- Disjointed work flows

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Knowledge Media Institute

*~yr 2000; 24-25 year olds*

Untitled - Notepad

File Edit Format View Help

```
<!DOCTYPE html>
<html>
<body>

<h1>My First Heading</h1>

<p>My first paragraph.</p>

</body>
</html>
```

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**ESRC International Benchmarking Review** of UK Human Geography (2013) states that "in many sub-disciplines it [Human Geography] is world leading, setting the intellectual agenda ..." but identifies "**a relative weakness in quantitative methods and GIS**" due to "**the relative neglect of quantitative methods in undergraduate and postgraduate training**".

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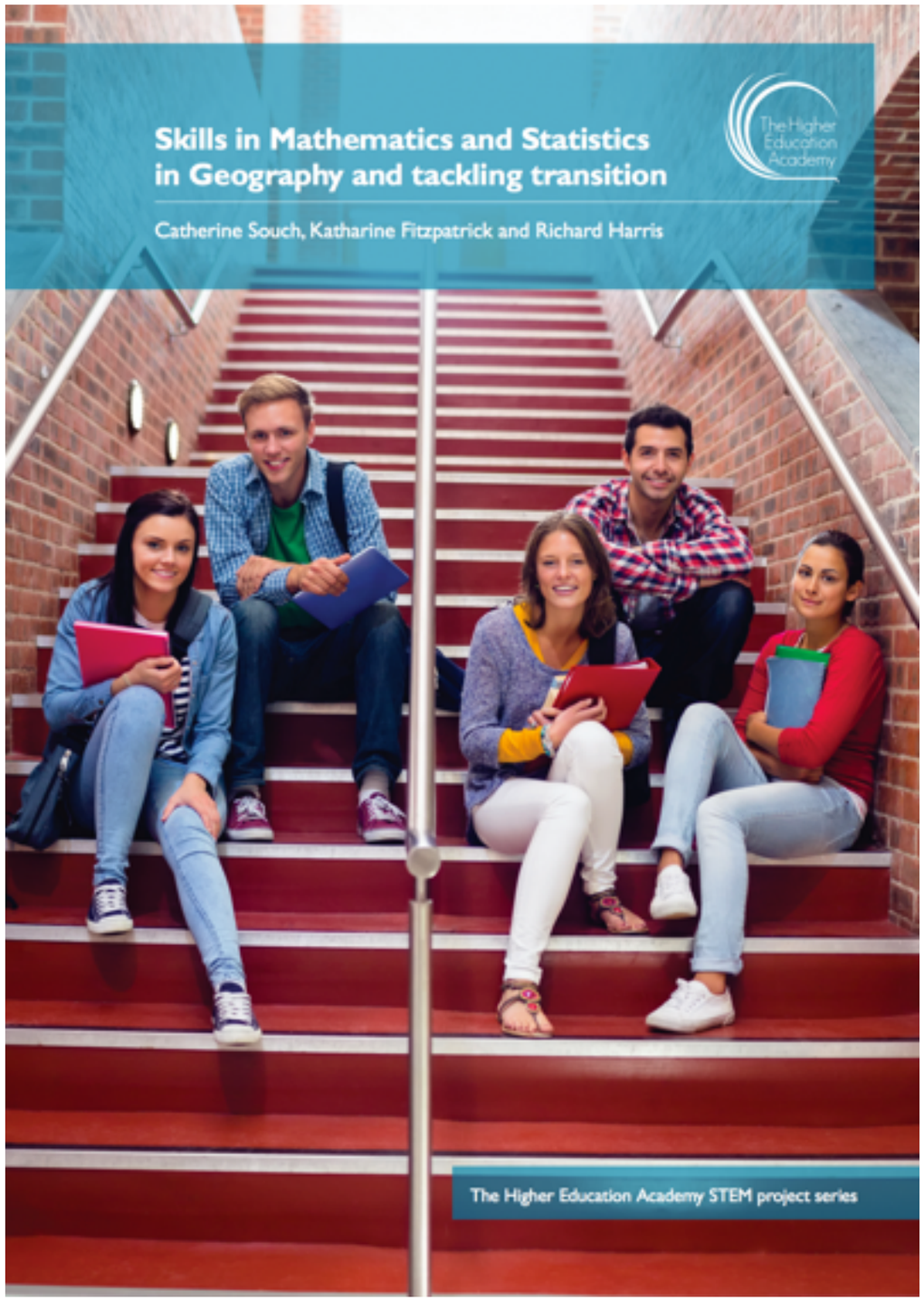
http://www.esrc.ac.uk/research/evaluation-impact/research-evaluation/international-benchmarking/




Dialogue between the pre-university and higher education sectors about the need for students to develop and apply mathematical and statistical skills

https://www.heacademy.ac.uk/resources/detail/detail/disciplines/Maths_Stats_OR/Skills-in-Mathematics-and-Statistics-in-geography

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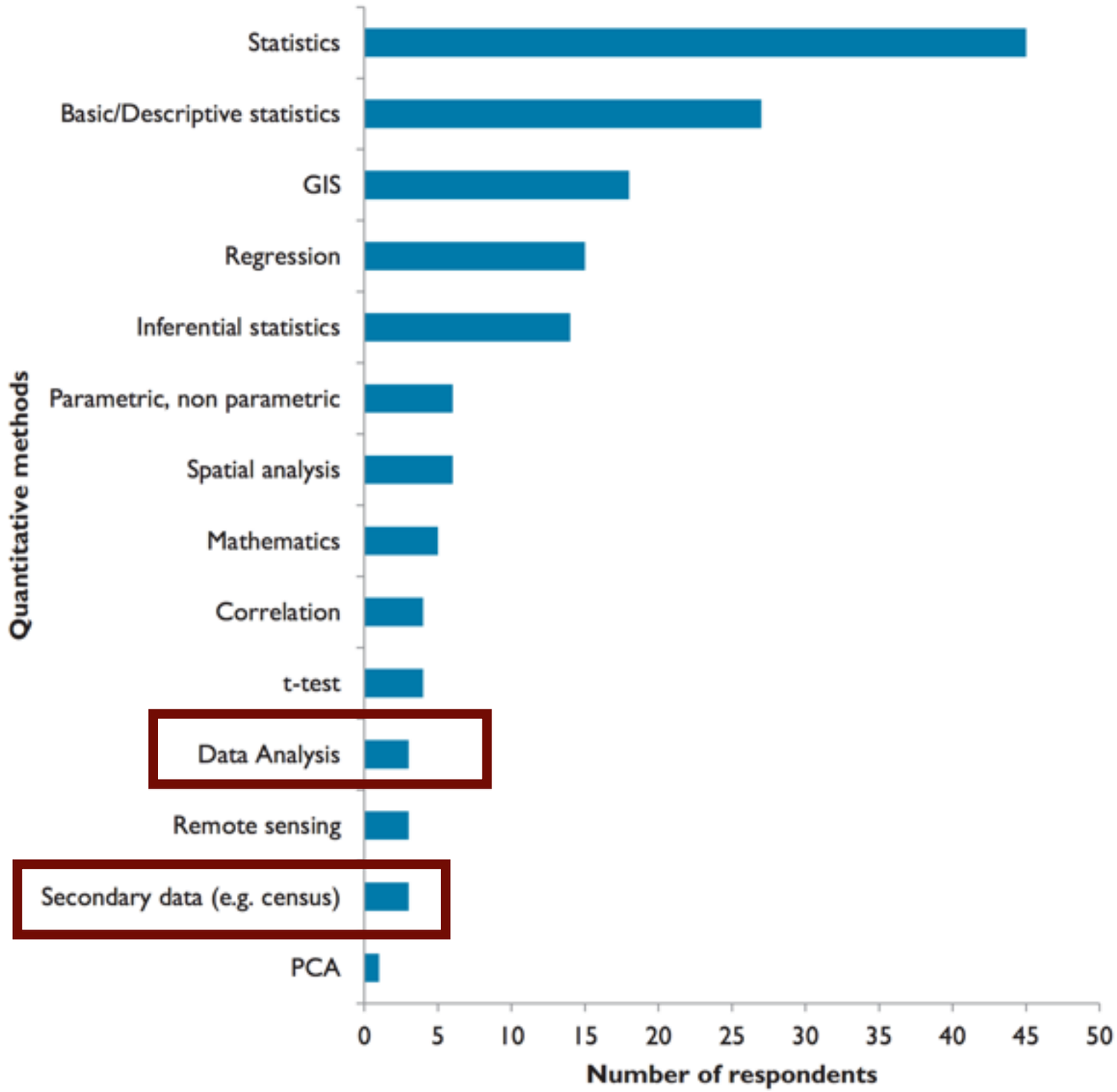
# What methods are taught in the standalone modules?

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# Software used for quantitative methods

| Descriptive Statistics | Number of responses |
|---|---|
| Use MS Excel only | 16 (29%) |
| Use SPSS (may also use MS Excel) | 28 (50%) |
| Use others, including Minitab, R, ArcGIS | 12 (21%) |
| **Inferential Statistics** | |
| Use MS Excel only | 6 (11%) |
| Use SPSS (may also use MS Excel) | 33 (59%) |
| Use others, including Minitab, R, ArcGIS, CAP | 13 (23%) |
| No response | 4 (7%) |

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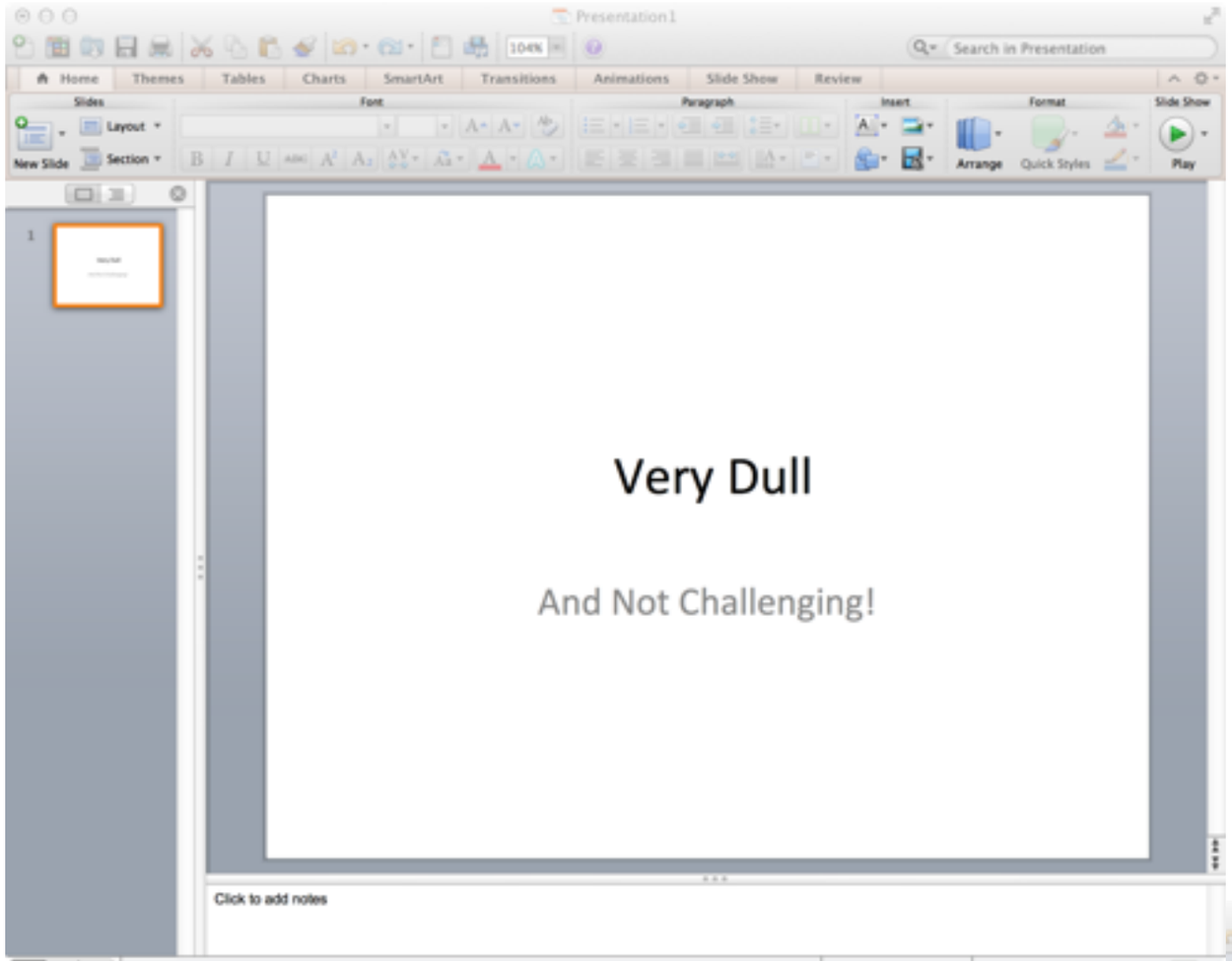


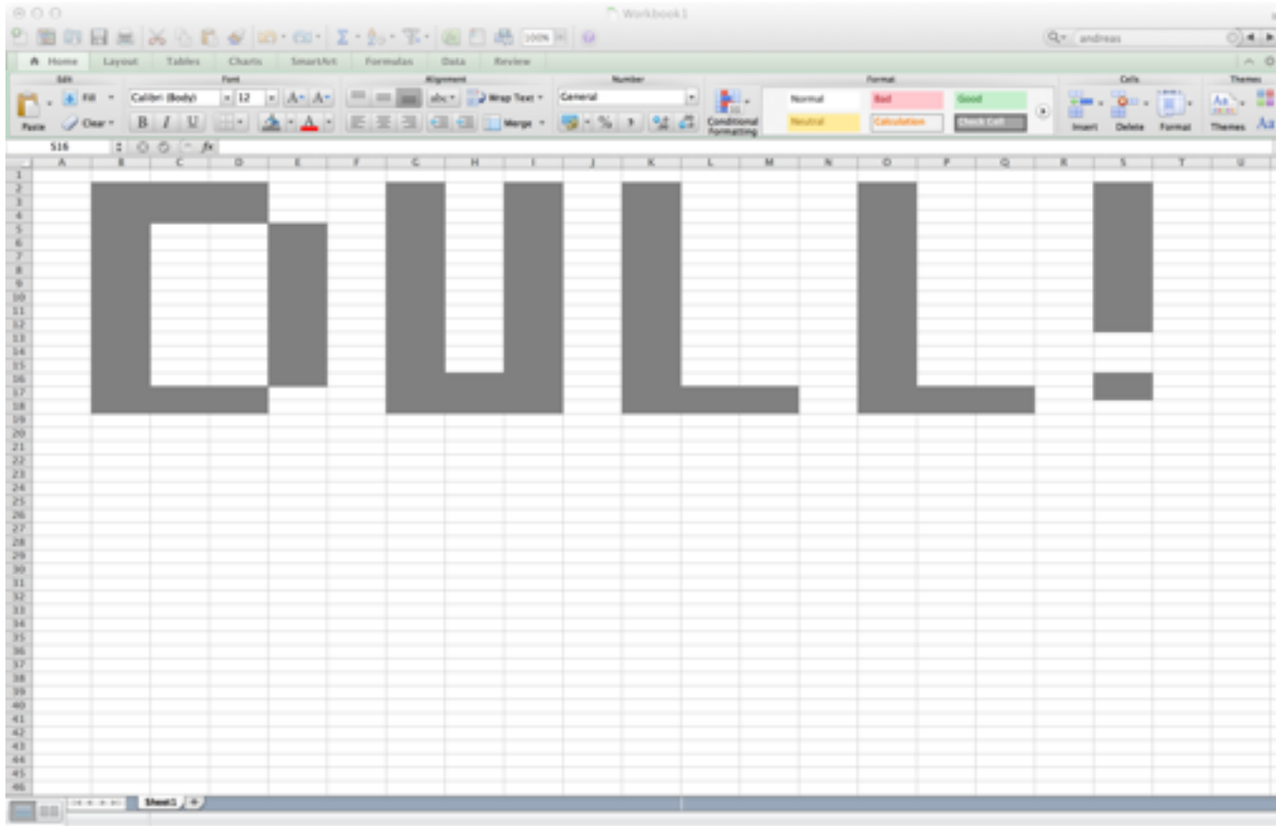


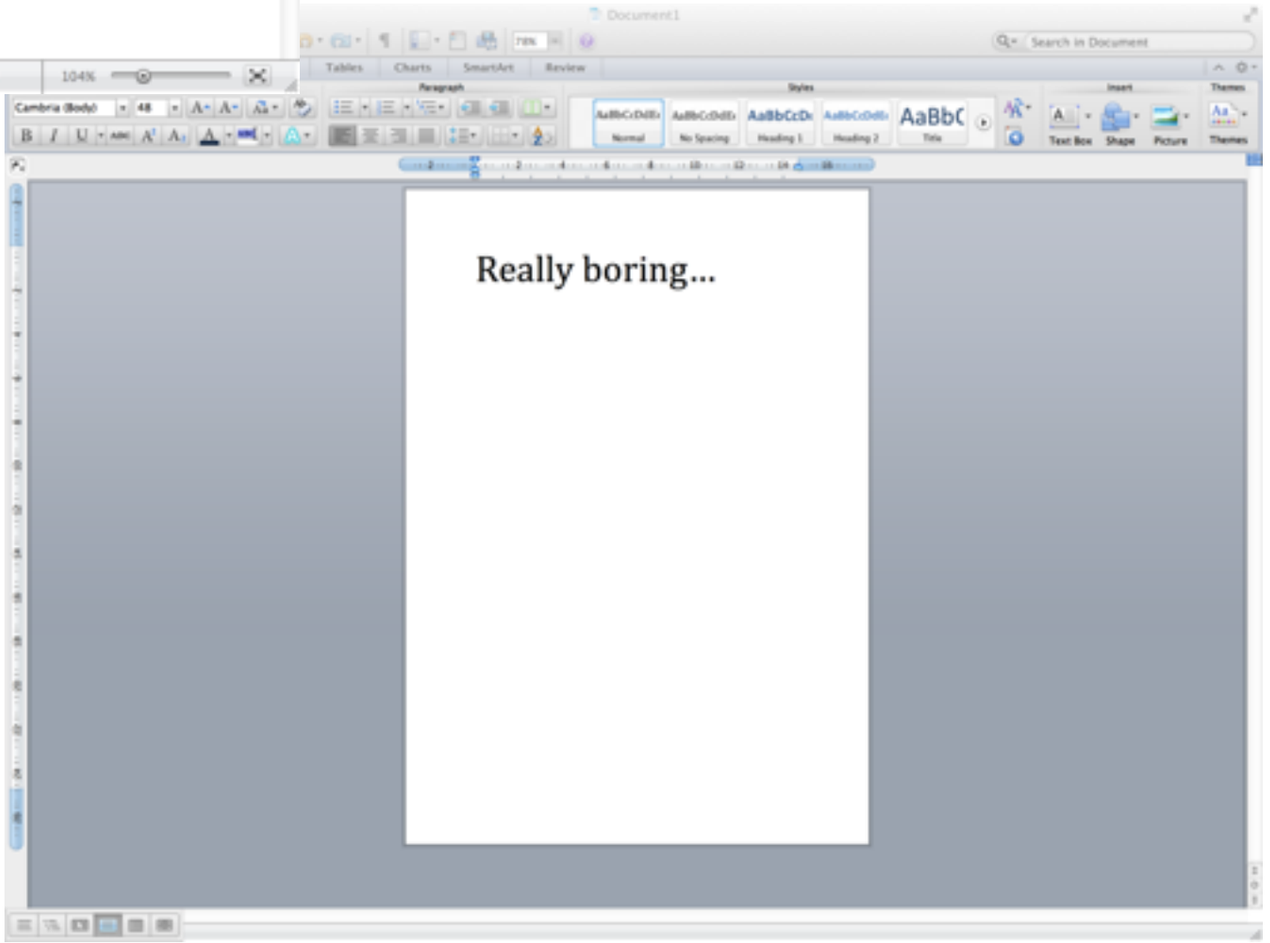


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https://www.gov.uk/government/news/harmful-ict-curriculum-set-to-be-dropped-to-make-way-for-rigorous-computer-science

Press release

# ‘Harmful’ ICT curriculum set to be dropped to make way for rigorous computer science

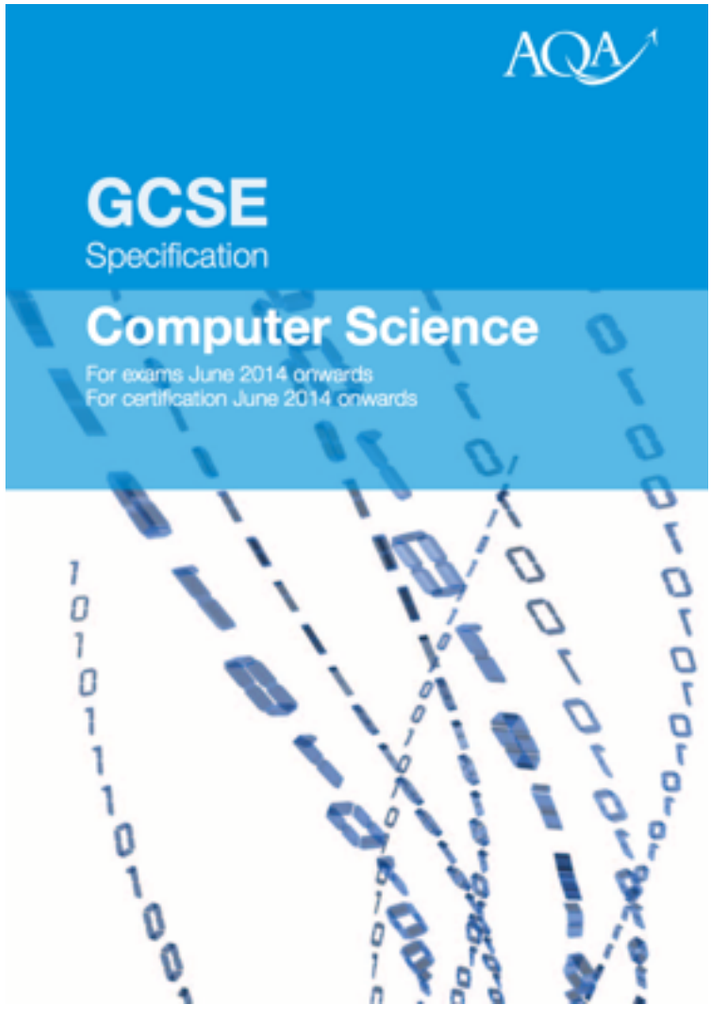
From: Department for Education and The Rt Hon Michael Gove MP
First published: 11 January 2012
Part of: Reforming qualifications and the curriculum to better prepare pupils for life after school and Schools

Gove announces the scrapping the existing ICT curriculum to introduce new courses of study in computer science.

Education Secretary Michael Gove today announced he was scrapping the existing ICT curriculum. In its place, he will introduce new courses of study in Computer Science.

The move, which is being supported by industry experts including Ian Livingstone - co-founder of Games Workshop, would give schools the freedom to create their own ICT and Computer Science curricula that equip pupils with the skills employers want.

Other experts, including the British Computer Society and ICT professional association Naace, confirm the current National Curriculum Programme of Study is dull and unsatisfactory. Some respondents to a 2008 e-Skills study said that GCSE ICT was “so harmful, boring and/or irrelevant it should simply be scrapped”.

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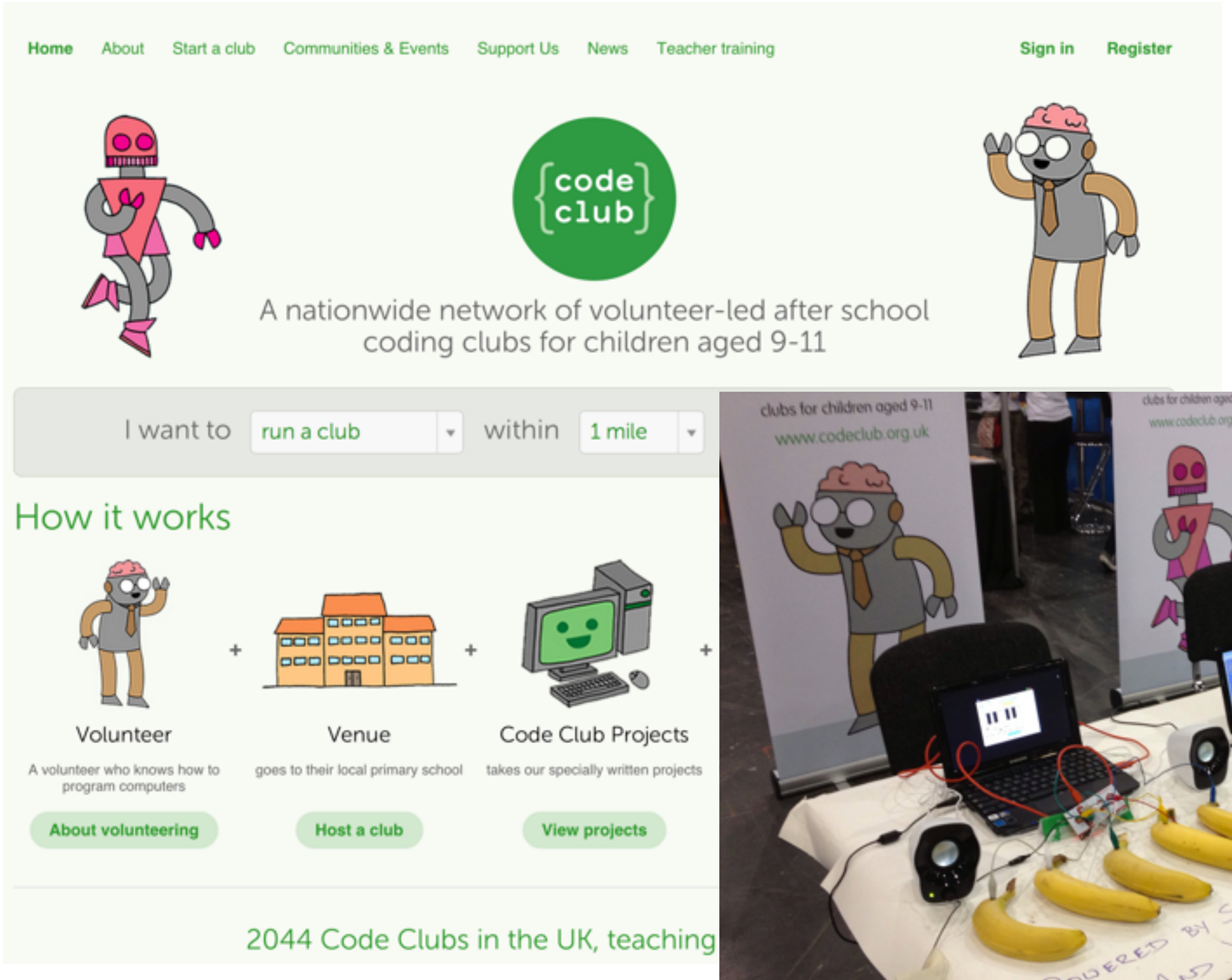
# https://www.codeclub.org.uk/





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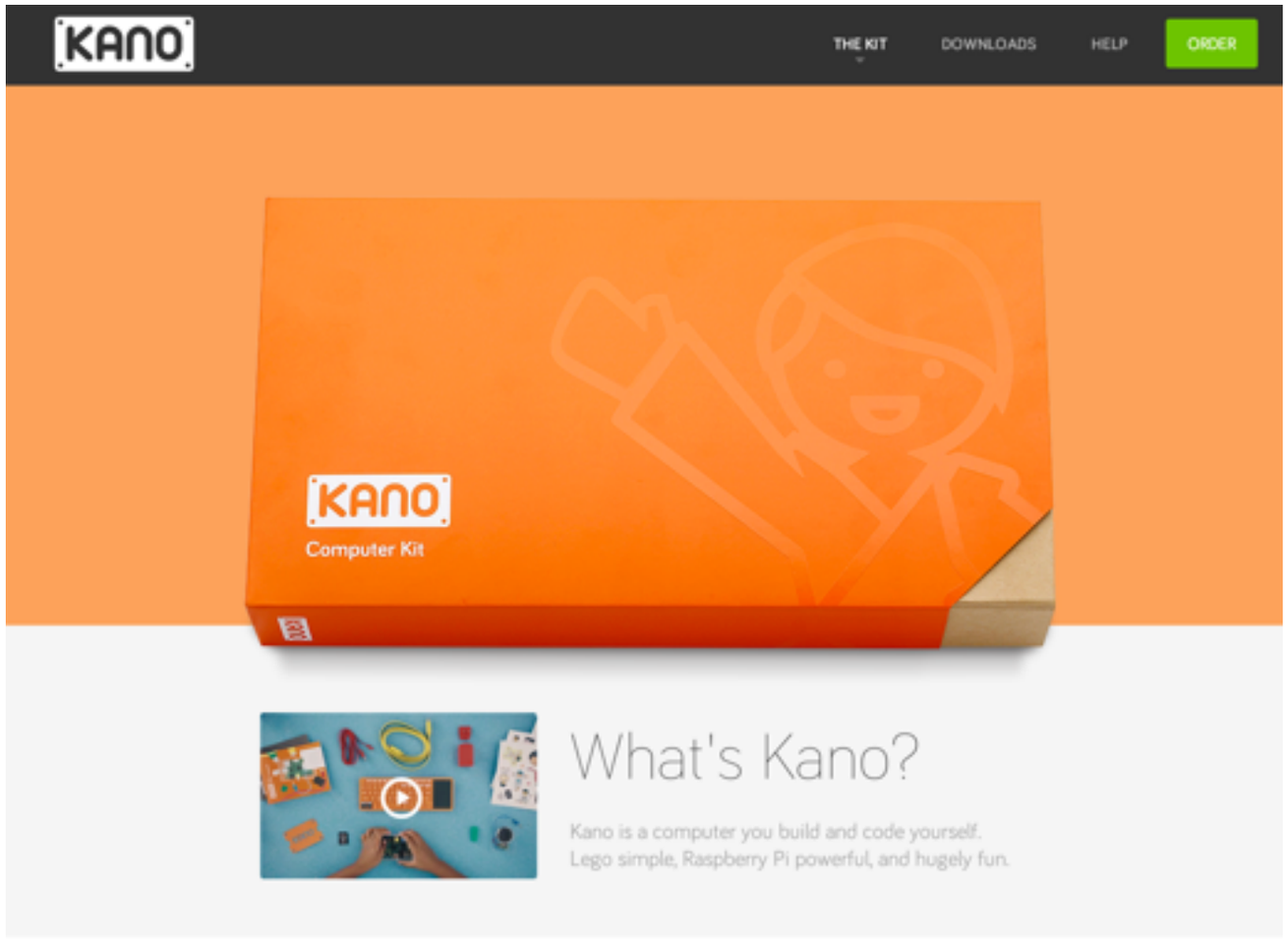
# http://kano.me/







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# Q-Step

**Q-Step is a £19.5 million programme designed to promote a step-change in quantitative social science training in the UK.**

Funded by the Nuffield Foundation, ESRC and HEFCE, Q-Step was developed as a strategic response to the shortage of quantitatively-skilled social science graduates.

Q-Step is funding fifteen universities across the UK to establish Q-Step Centres that will support the development and delivery of specialist undergraduate programmes, including new courses, work placements and pathways to postgraduate study.

The resulting expertise and resources will be shared across the higher education sector through an accompanying support programme which will also forge links with schools and employers.

## Further information:




### Highlights

Read all about the launch of the Level 3 Pilot Scheme in Social Analytics delivered by Mr Rhys Jones, the schemes project lead and Lecturer in Quantitative Methods FE at Cardiff Q-Step Centre.

Sarah Lock, Q-Step Programme Head, has written an article about Q-Step for the Social Research Association's *Research Matters* magazine on page 12.

The Nuffield Foundation, ESRC and HEFCE are delighted to announce that the University of Leeds is to join the Q-Step Programme. For further details, please read our press release.

Q-Step

**A step-change in quantitative social science skills**

Funded by the Nuffield Foundation, ESRC and HEFCE

Contact us:

QMenquiries@nuffieldfoundation.org

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# Sleepy Curriculums?


Get students excited and engaged

Demonstrate a brevity of tools / approaches

Less button clicking

Be critical / creative

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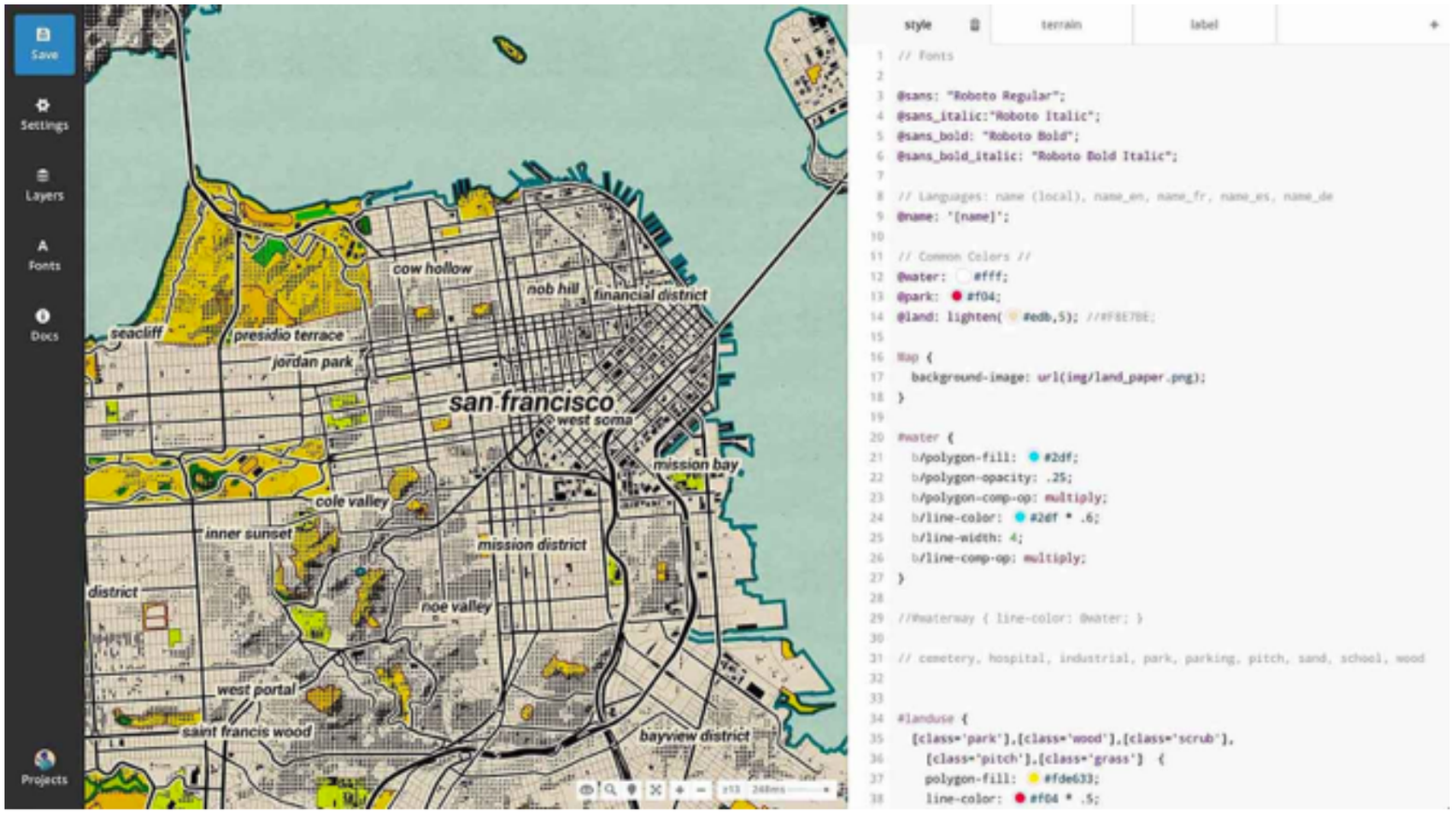
# Sleepy Curriculums?




Vector V Raster; Cartography; CartoCSS

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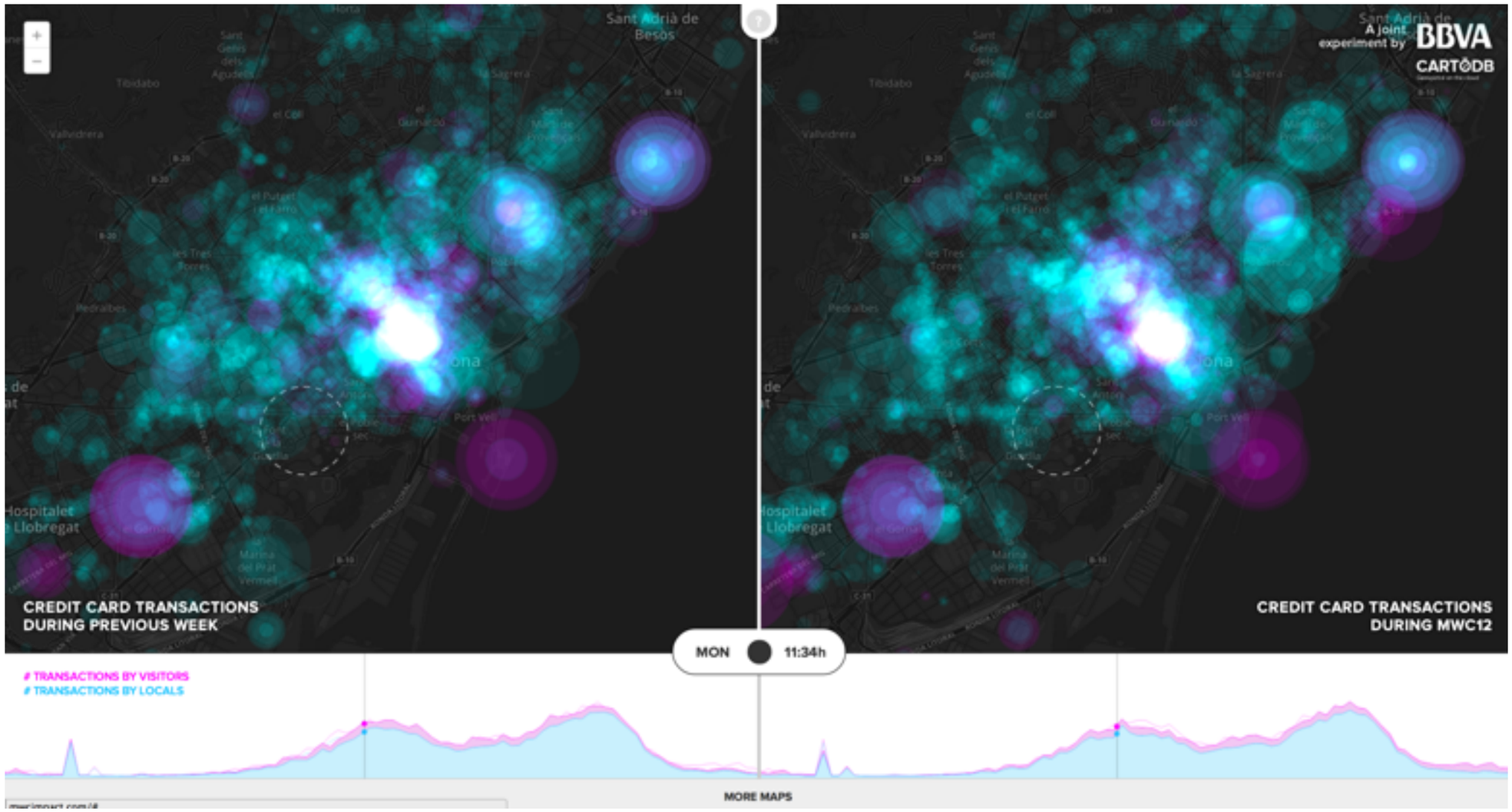
https://www.mapbox.com

# Sleepy Curriculums?




Hotspots; time and GIS

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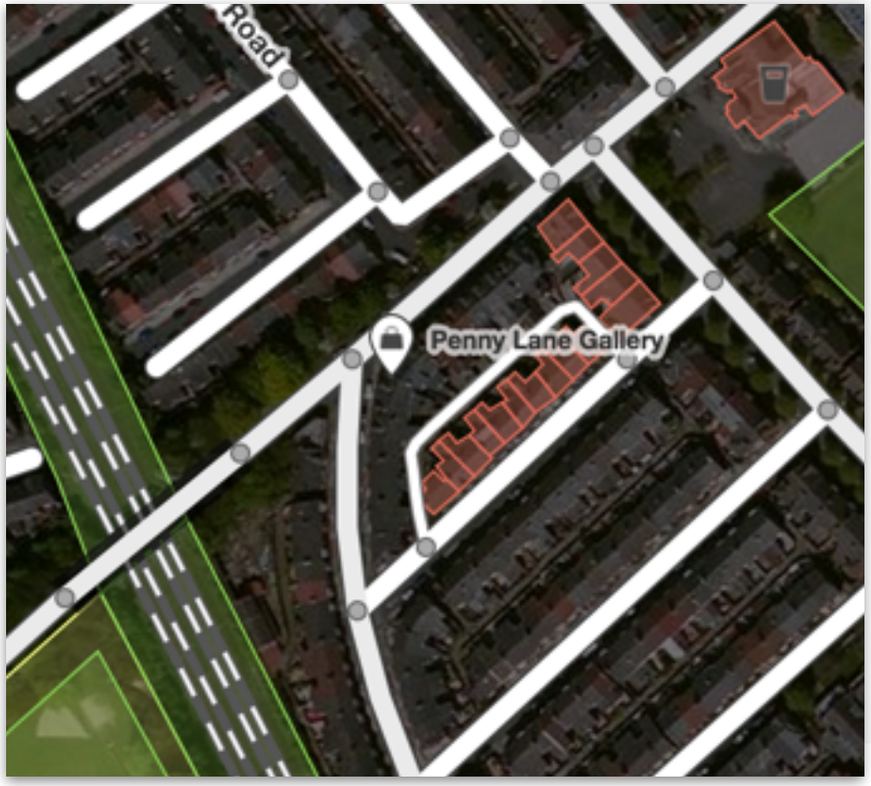
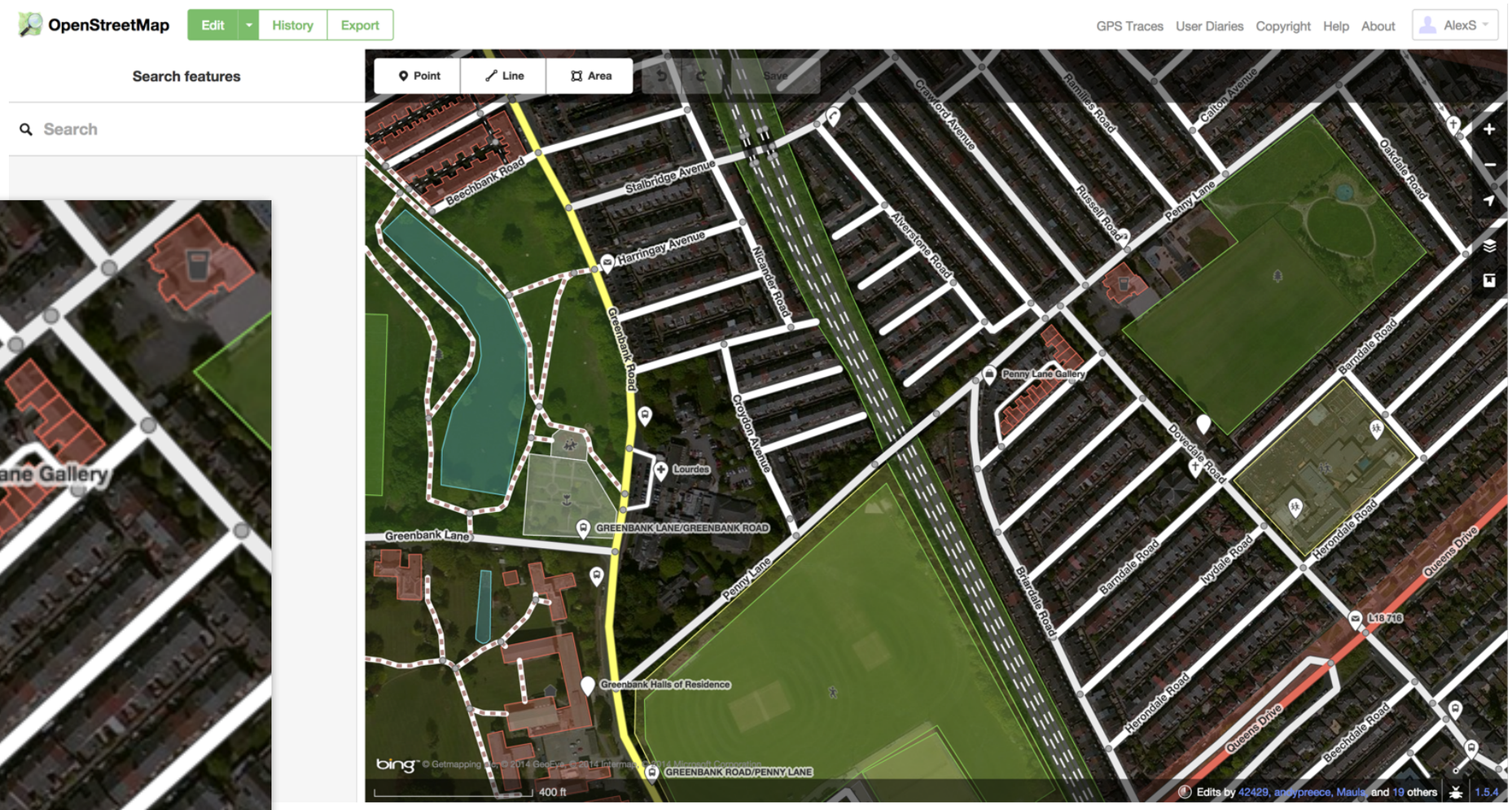
http://cartodb.com/

# Sleepy Curriculums?




## Crowdsourcing; Digitising

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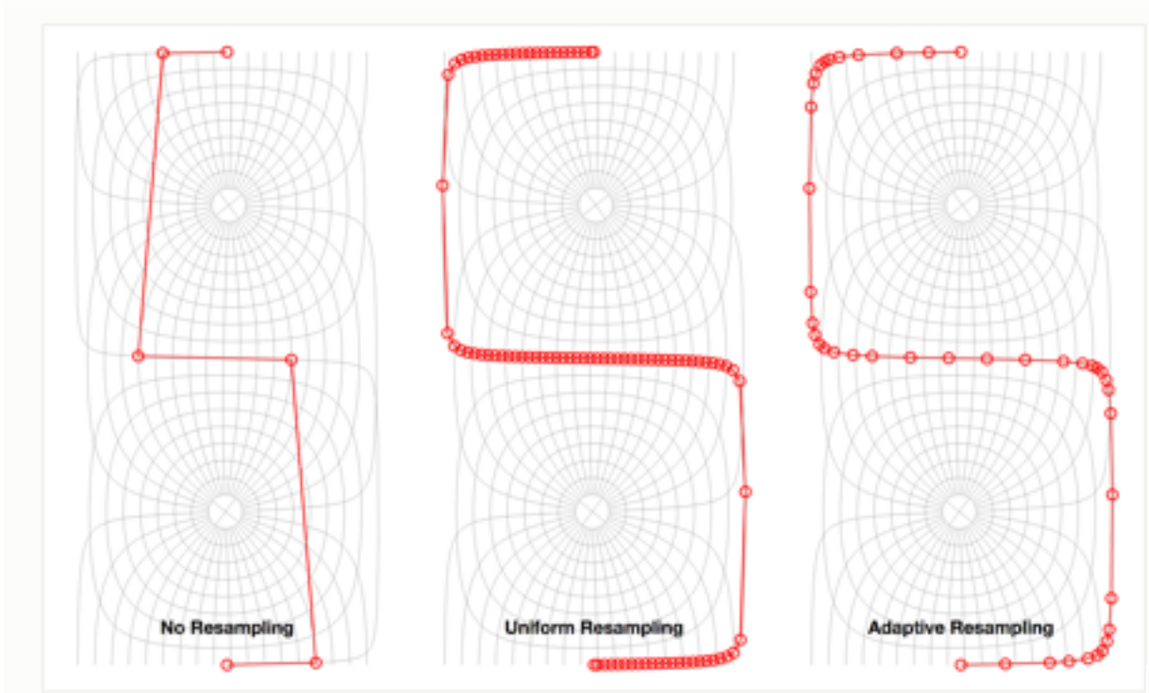
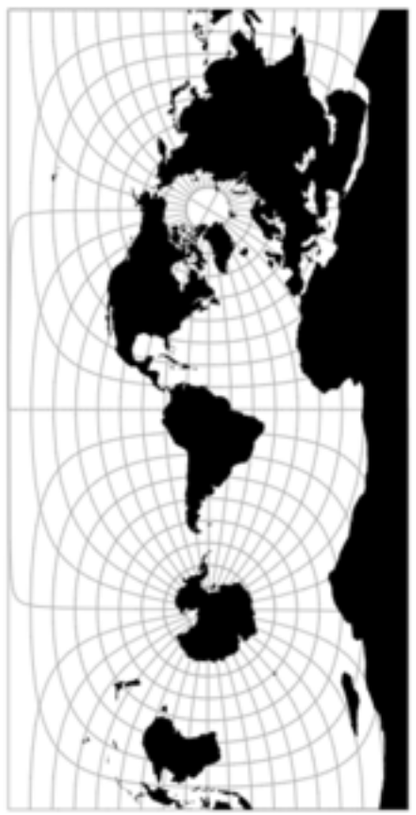
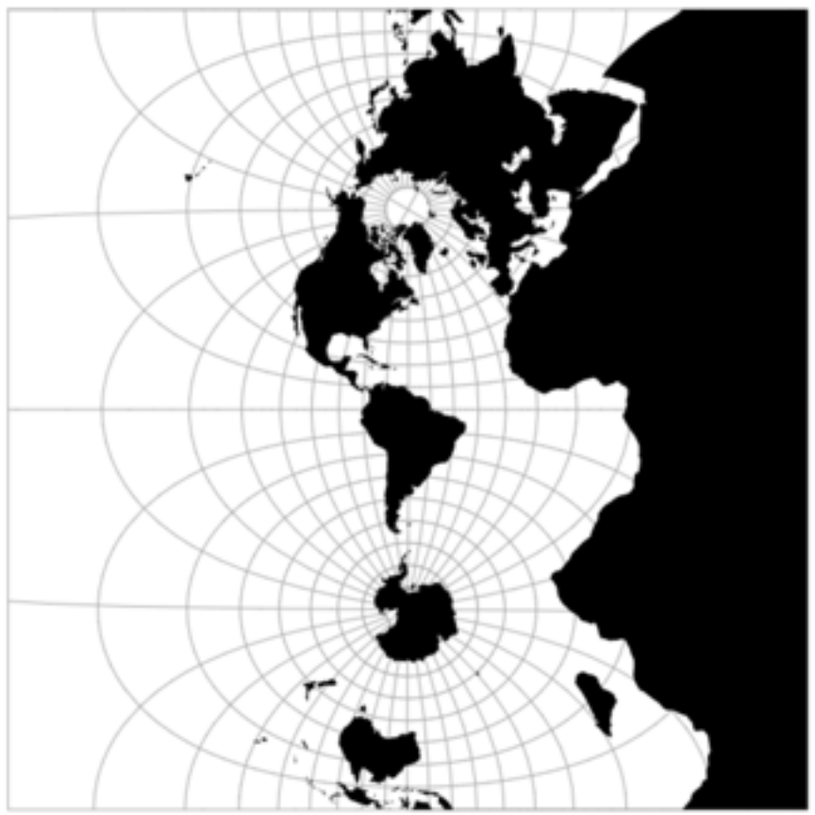
https://www.openstreetmap.org/edit?editor=id#map=17/53.38613/-2.92084

# Sleepy Curriculums?




http://bost.ocks.org/mike/example/





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# Sleepy Curriculums?


3D Mapping

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qgis2threejs - https://plugins.qgis.org/plugins/Qgis2threejs/

# Sleepy Curriculums?


Uncertainty, bias

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http://ny.spatial.ly/

# Code != Scary

- Useful for careers
- Be creative
  - Useful conceptual framework
  - Think about problems not process

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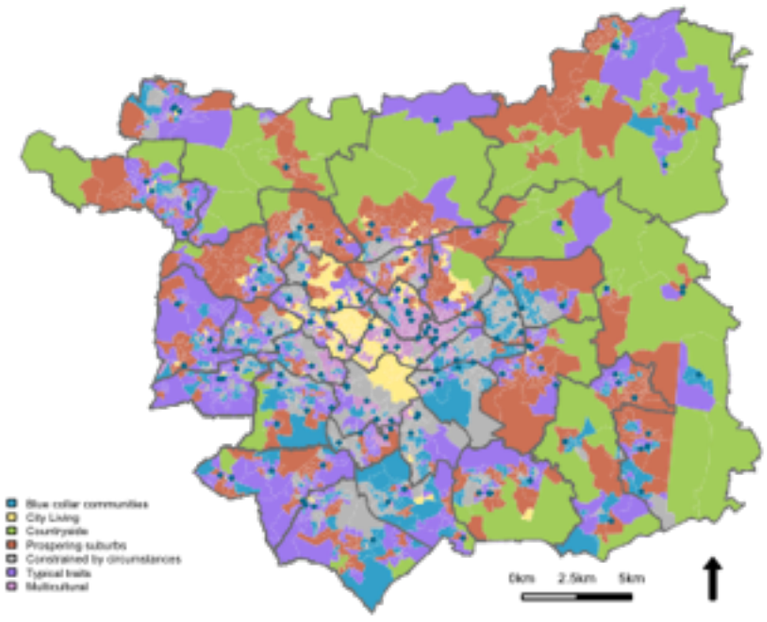
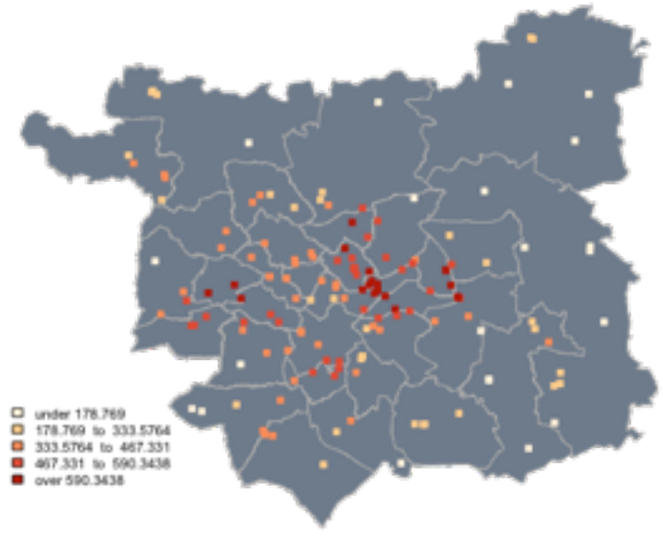
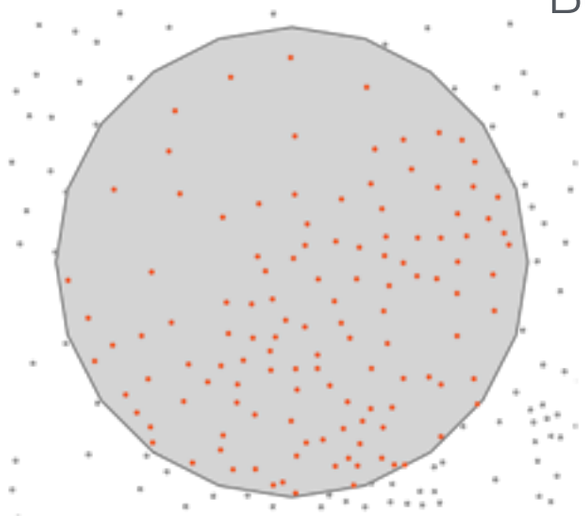
# R as a GIS



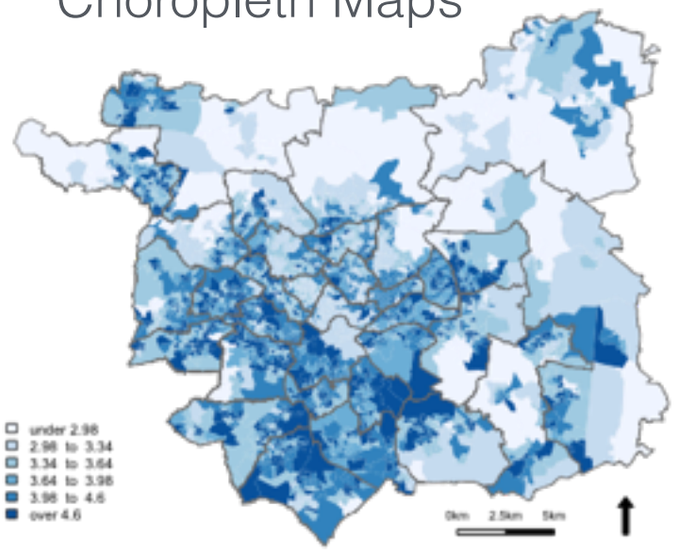

Buffers

PIP



Clipping

Choropleth Maps

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# R as a GIS

**breaks** <- classIntervals(**variable_to_map**, n = 6, style = “fisher”)

```
  [1] 6 5 4 3 3 3 5 4 3 3 3 3 3 4 3 3 3 4 3 3 3 3 3 3 3 3 5 3 3 3 3 2 3 3 3
 [36] 3 3 3 4 4 4 4 4 3 3 4 3 2 1 3 1 3 3 3 3 3 3 4 3 3 3 3 3 3 3 3 4 4 3 3
 [71] 3 3 4 3 3 4 4 3 3 3 3 3 3 3 3 3 3 2 2 3 2 1 3 3 3 3 4 3 3 3 3 3 3 3 3
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[176] 3 4 3 3 3 3 3 3 4 4 4 3 3 3 3 3 3 3 2 3 3 3 4 3 3 3 3 3 3 3 4 3 3 3 5
[211] 4 3 3 2 3 4 2 3 4 3 3 3 4 3 3 3 3 3 3 3 2 3 3 5 3 4 3 6 3 1 2 6 2 3 3 3
[246] 4 3 3 2 4 3 4 3 3 3 3 4 3 3 2 3 3 3 3 3 4 2 3 3 3 4 3 3 3 4 4 3 4 3 3
[281] 3 3 4 3 3 3 3 3 4 2 3
```

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# R as a GIS

**my_colours** <- c(“#FFFFB2”,”#FED976”,”#FEB24C”,
”#FD8D3C”,”#F03B20","#BD0026")

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# as a GIS

**my_colours**[findInterval(**variable_to_map**, **breaks**)]

```
  [1] "#BD0026" "#F03B20" "#FD8D3C" "#FEB24C" "#FEB24C" "#FEB24C" "#F03B20"
  [8] "#FD8D3C" "#FEB24C" "#FEB24C" "#FEB24C" "#FEB24C" "#FEB24C" "#FD8D3C"
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[288] "#FEB24C" "#FD8D3C" "#FED976" "#FEB24C"
```

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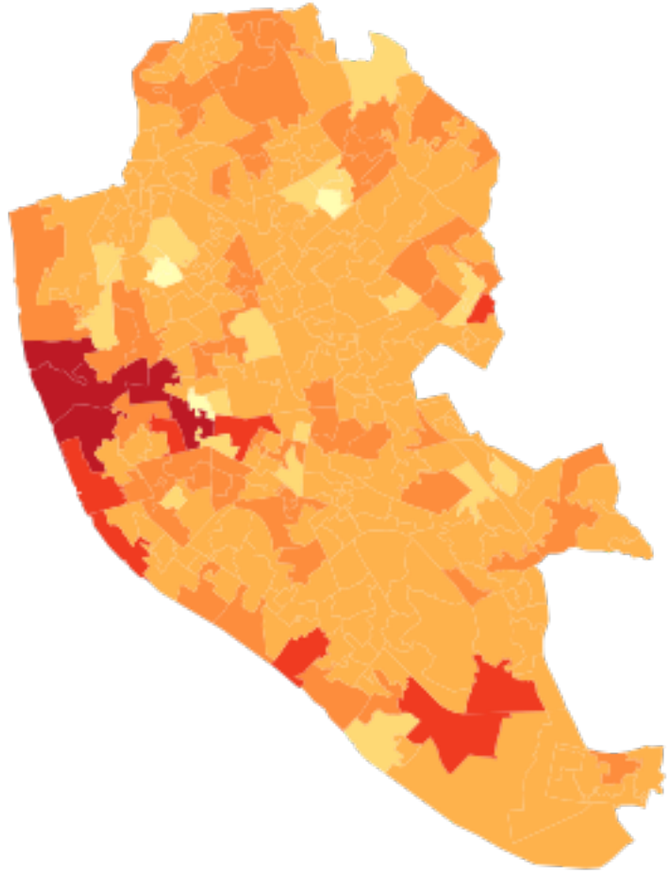
# as a GIS

```
plot(LSOA, col = my_colours[findInterval(variable_to_map,
breaks)], axes = FALSE, border = NA)
```



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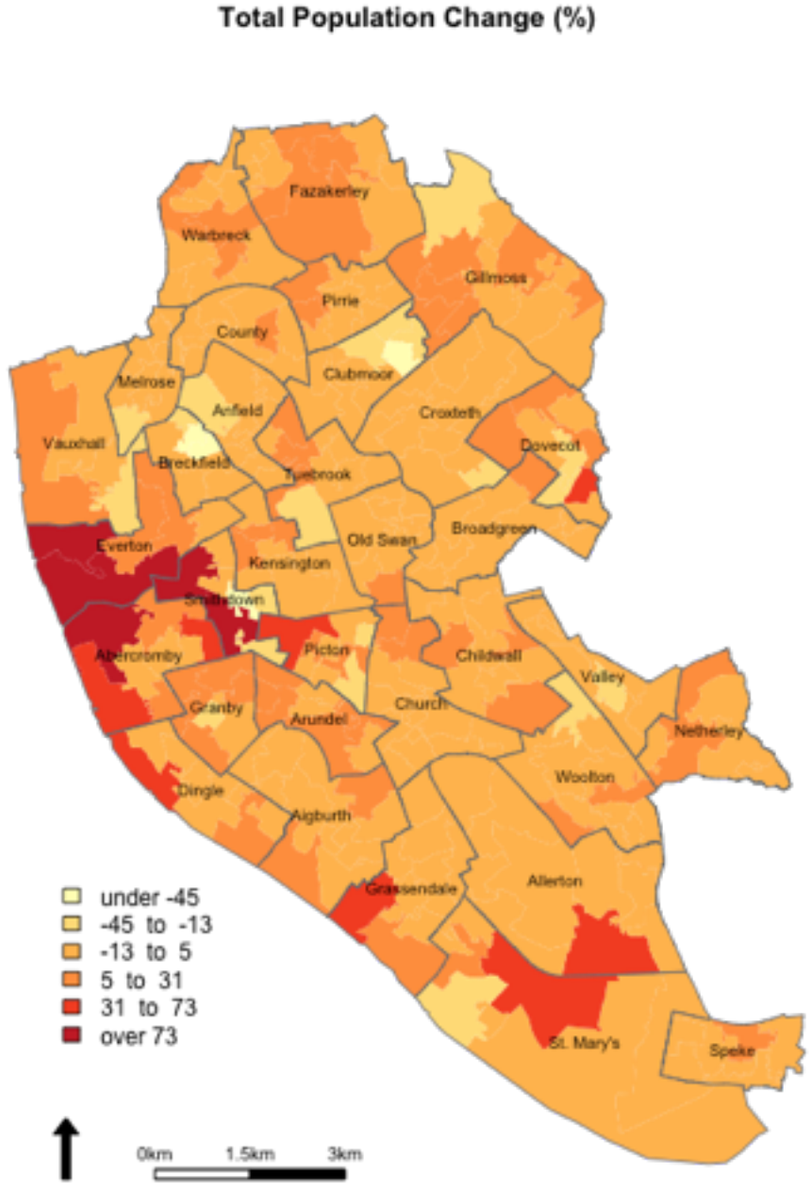
# R as a GIS

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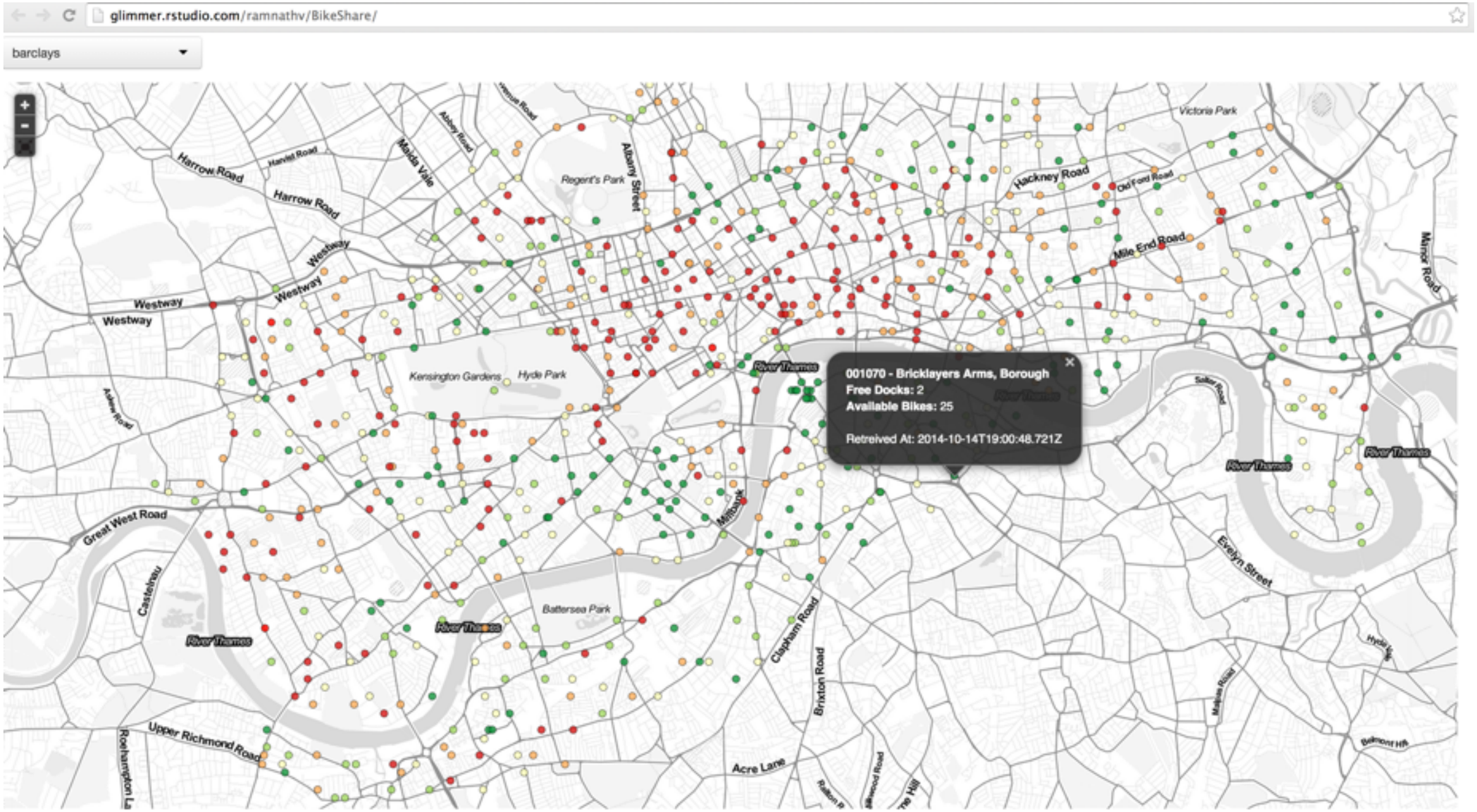
# R as a GIS

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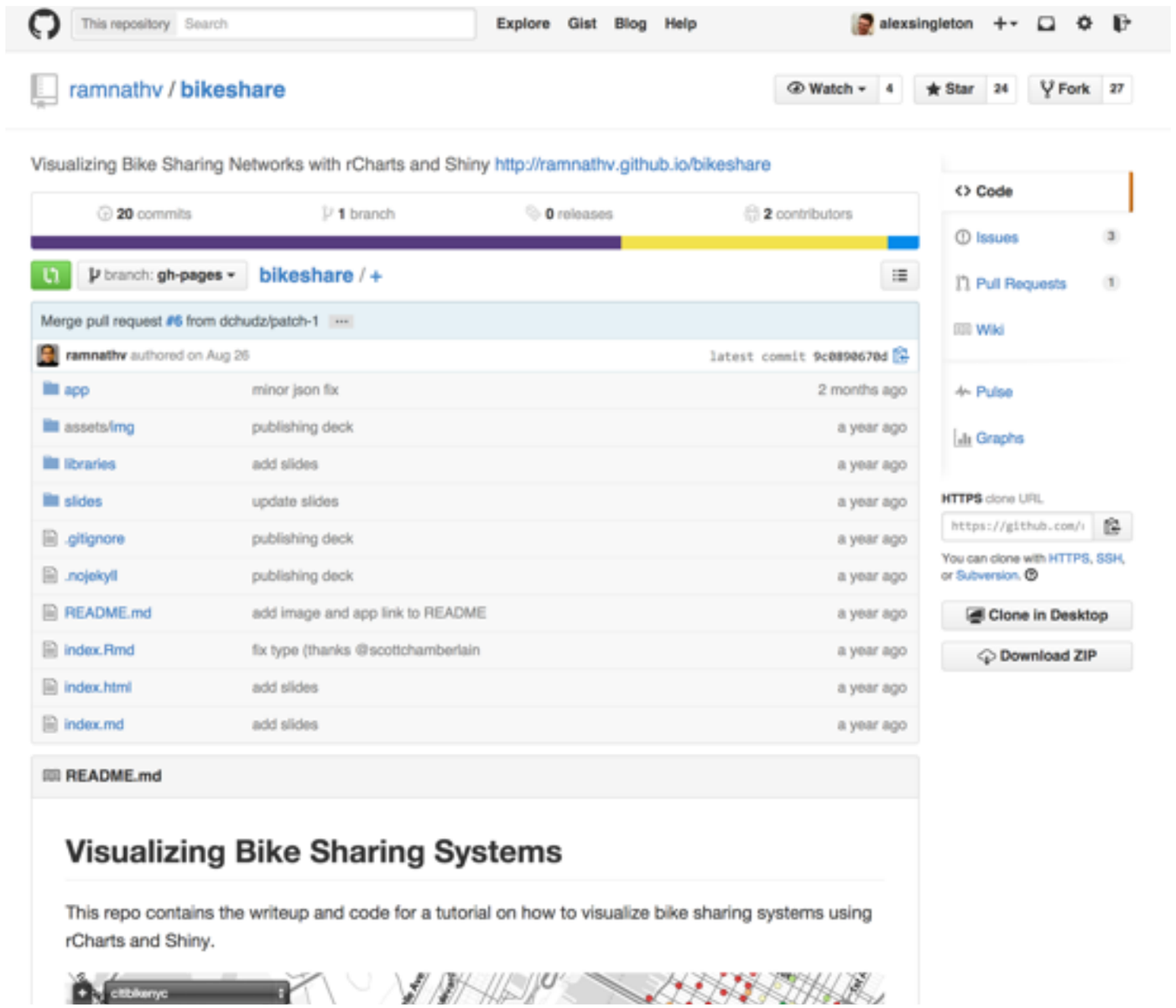
http://glimmer.rstudio.com/ramnathv/BikeShare/

# as a GIS

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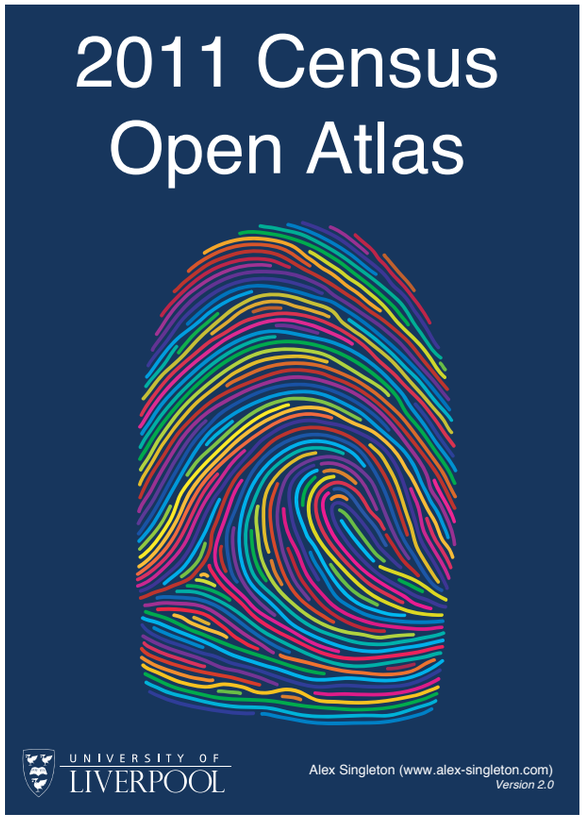
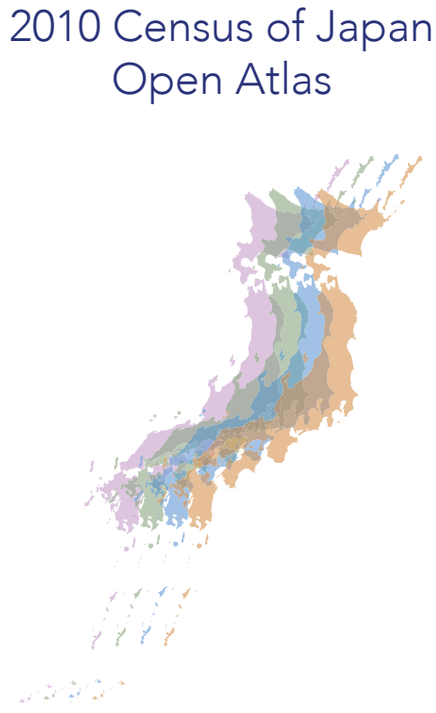
https://github.com/ramnathv/bikeshare


2011 Census
Open Atlas
UNIVERSITY OF
LIVERPOOL
Alex Singleton (www.alex-singleton.com)
Version 2.0


2010 Census of Japan
Open Atlas
Alex Singleton [www.alex-singleton.com]
Chris Brunsdon, Tomoki Nakaya, Keiji Yano
Version 1.0
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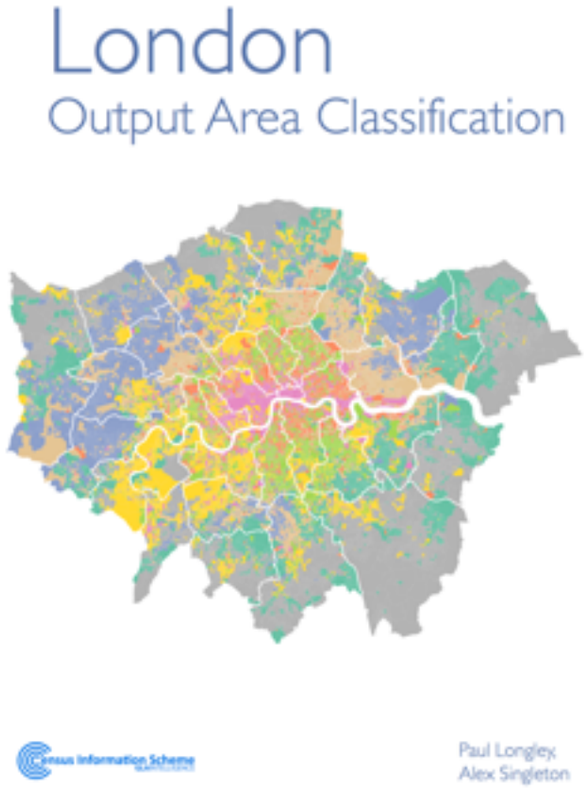
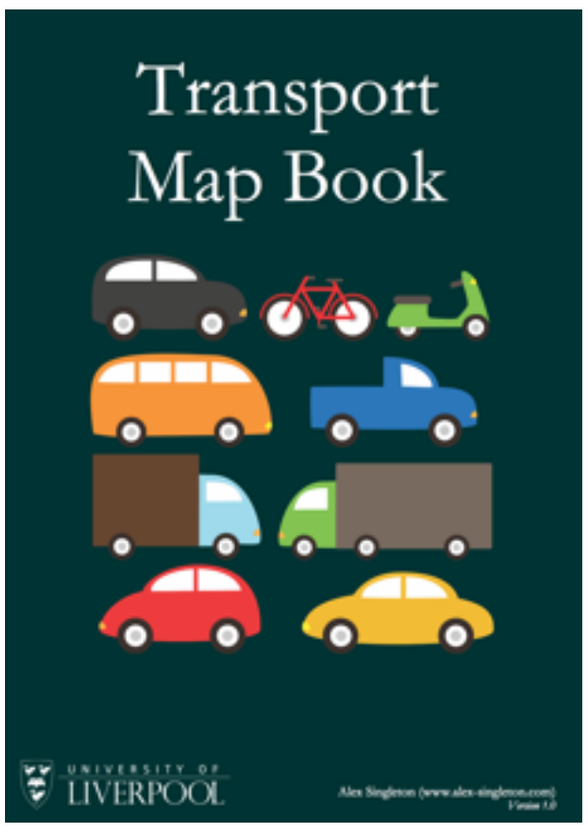
RITSUMEIKAN


London
Output Area Classification
Census Information Scheme
Paul Longley
Alex Singleton


Transport
Map Book
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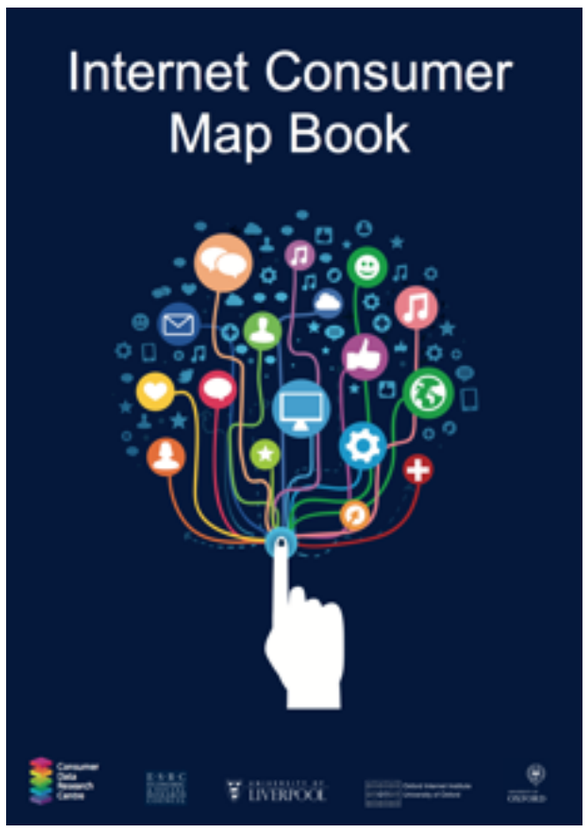
Alex Singleton (www.alex-singleton.com)


Internet Consumer
Map Book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News
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Mapping the census: how one man produced a library for all
Alex Singleton downloaded every single census dataset for every local authority in England - and then produced a free library of downloadable PDFs. Find out what he did
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Simon Rogers
Friday 8 February 2013
07.30 GMT
theguardian.com
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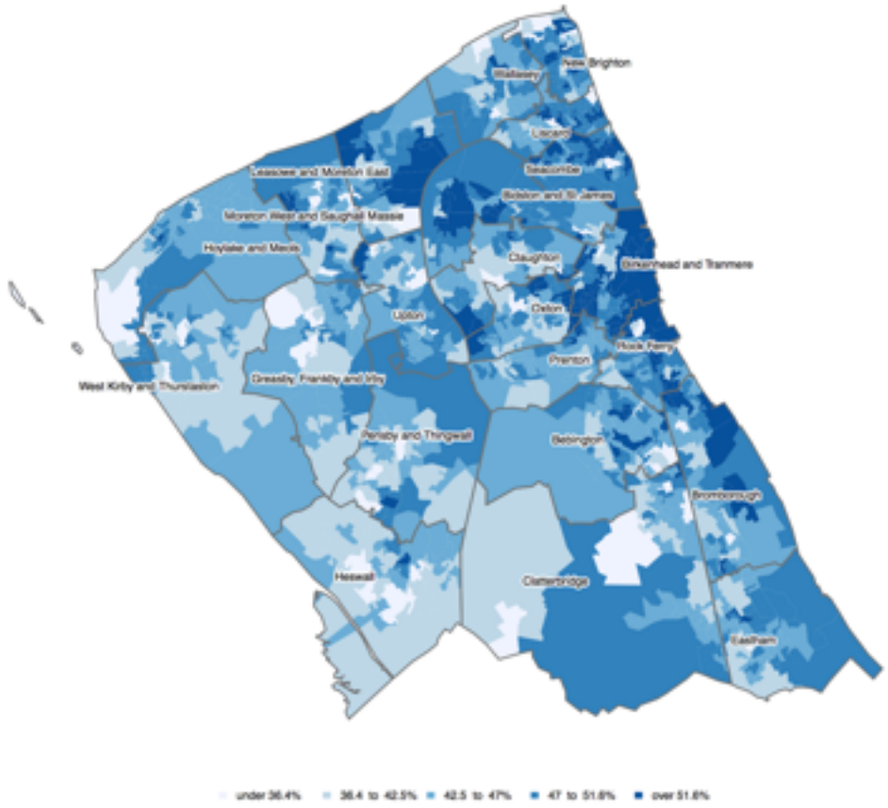



Figure 12: Persons who use the Internet while travelling through a mobile/dongle

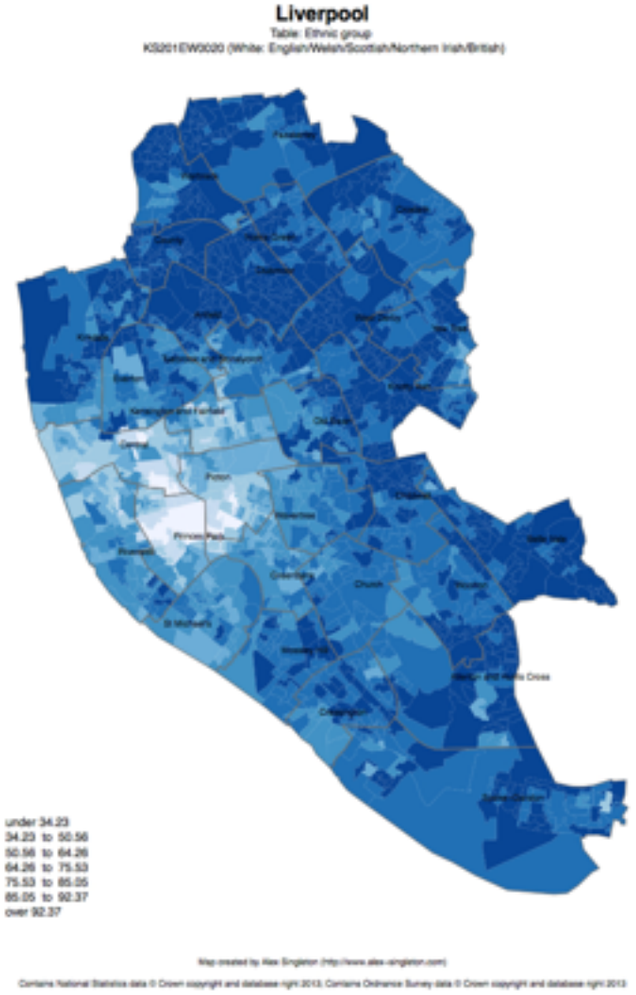




Figure 2: Travel to Work: Bicycle Flows (MSOA)

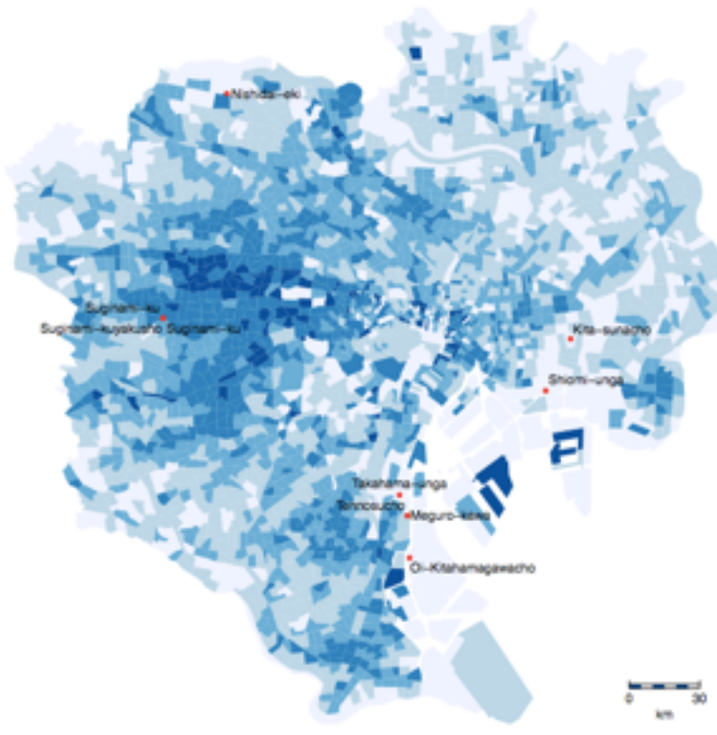
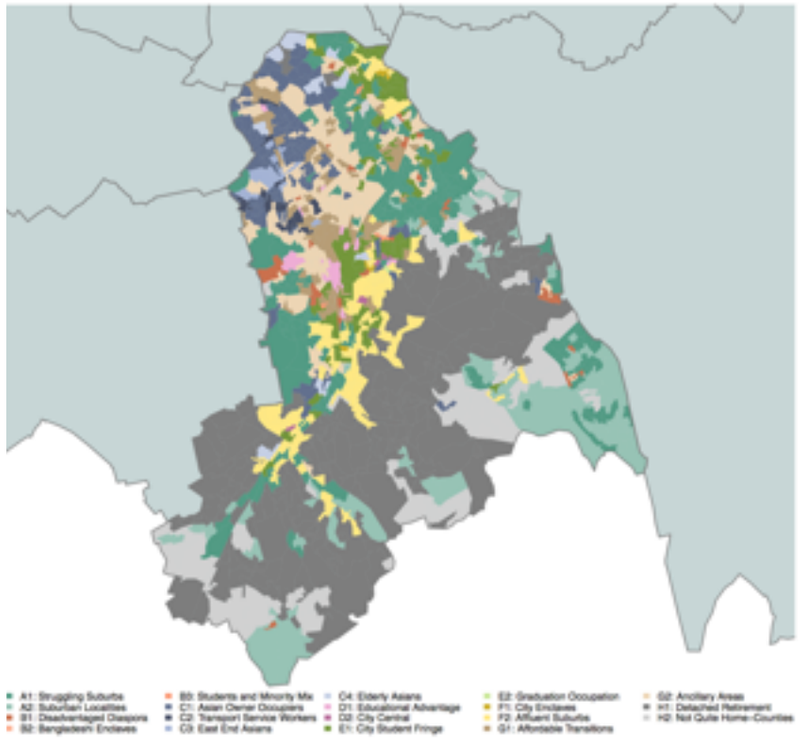



Figure 8: Croydon

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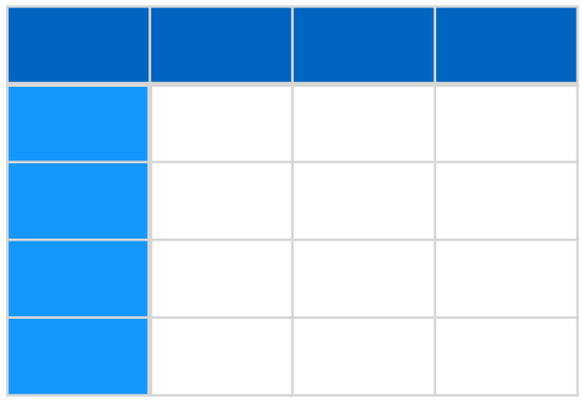
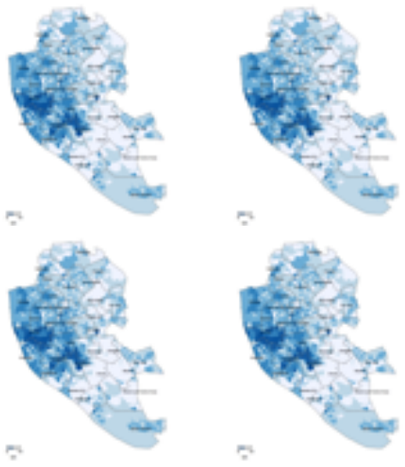


1) Download and process all data

Office for National Statistics

2) Download OA and Ward boundaries



4) Write a latex file

LATEX

PDFTK

pdfcrop

3) Render maps and legends for LAD

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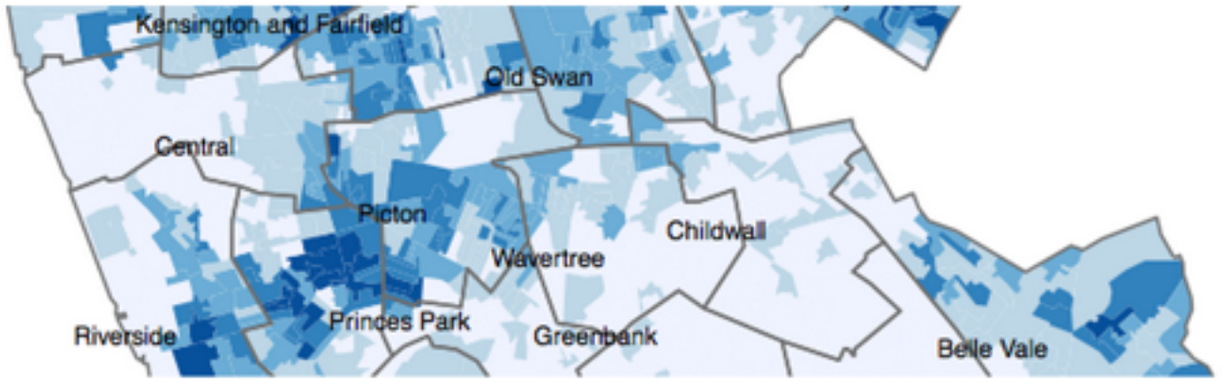
# 2011 Census Open Atlas - England and Wales

Output Area level census atlases by local authority district

View the Project on GitHub
alexsingleton/Open-Atlas

Download ZIP File | Download TAR Ball | View On GitHub




For further details about the open atlas project see the blog post; or for the R code, click the link on the left.

## Atlas Downloads

- E07000223 : Adur
- E07000026 : Allerdale
- E07000032 : Amber Valley
- E07000224 : Arun
- E07000170 : Ashfield
- E07000105 : Ashford
- E07000004 : Aylesbury Vale
- E07000200 : Babergh
- E09000002 : Barking and Dagenham
- E09000003 : Barnet
- E08000016 : Barnsley
- E07000027 : Barrow-in-Furness
- E07000066 : Basildon
- E07000084 : Basingstoke and Deane
- E07000171 : Bassetlaw
- E06000022 : Bath and North East Somerset
- E06000055 : Bedford
- E09000004 : Bexley
- E08000025 : Birmingham

This repository | Search or type a command | Explore | Gist | Blog | Help | alexsingleton

PUBLIC alexsingleton / **Open-Atlas**

Unwatch 1 | Star 0 | Fork 0

**Description**

Short description of this repository

**Website**

Website for this repository (optional)

Save or cancel

**3** commits | **2** branches | **0** releases | **1** contributor

branch: **master** **Open-Atlas** /

minor change

**alexsingleton** authored 3 days ago — latest commit `b78e3d93bb`

| | | |
|---|---|---|
| Code | Minor changes | 3 days ago |
| atlas | Initial Commit | 3 days ago |
| README.md | minor change | 3 days ago |

README.md

# 2011 Census Open Atlas

## Aim

The code contained in this repository was used to create version two of the England and Wales 2011 Open

Code
Issues 0
Pull Requests 0
Wiki
Pulse
Graphs
Network
Settings

**HTTPS** clone URL

https://github.com

You can clone with HTTPS, SSH, or Subversion.

Clone in Desktop

Download ZIP

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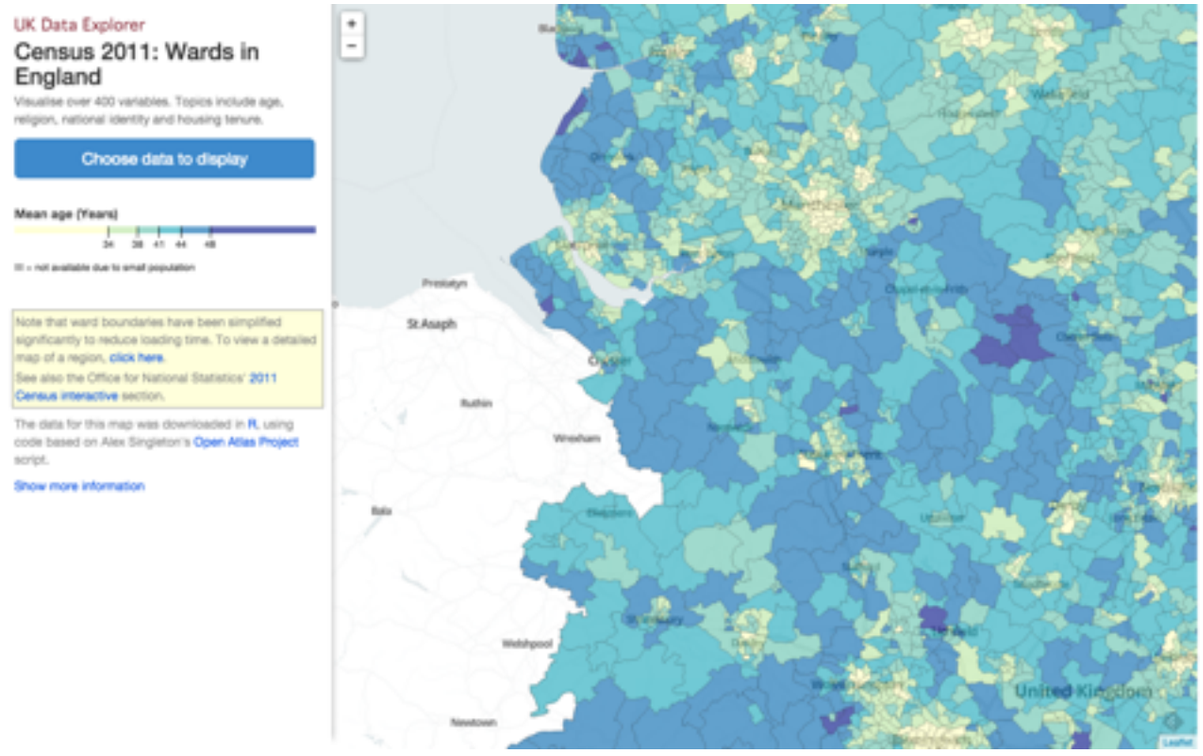
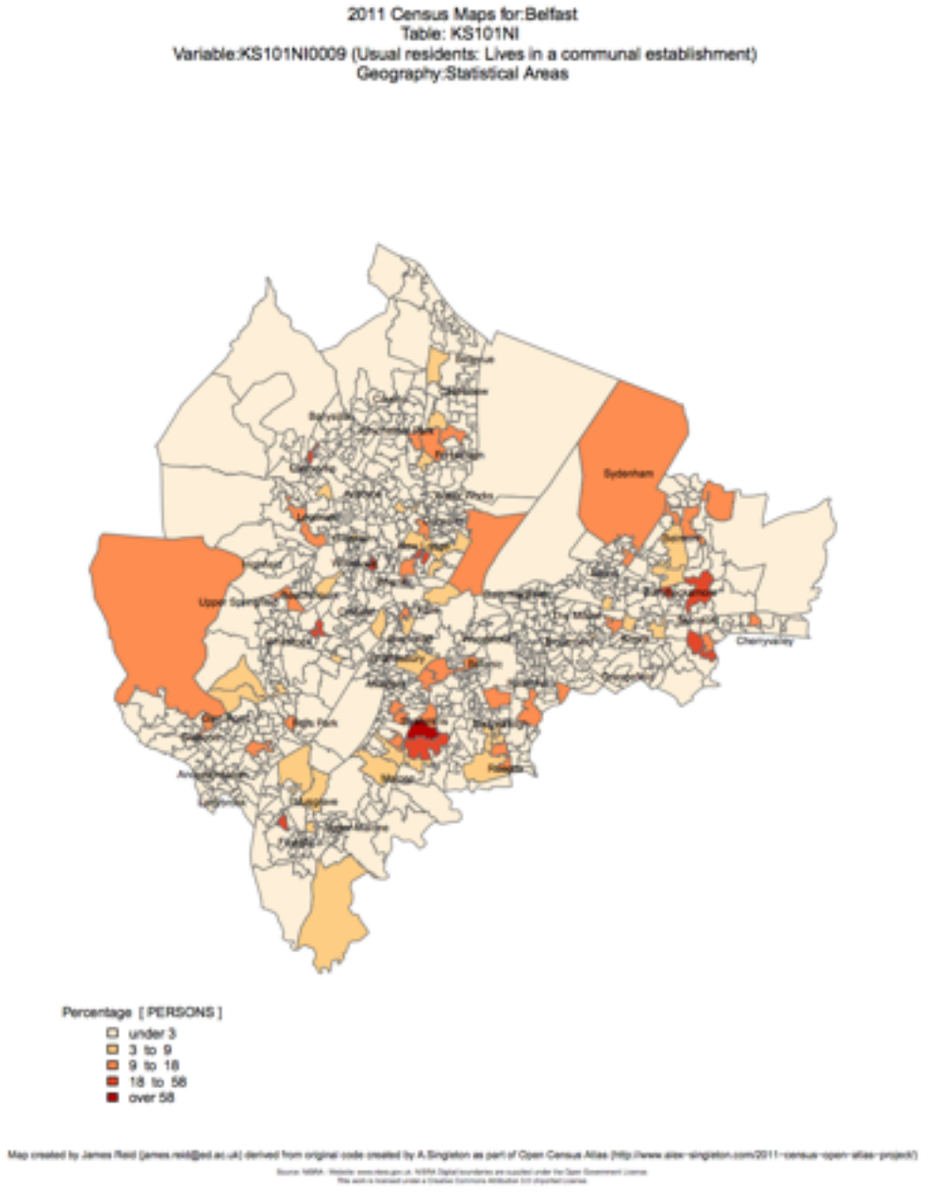
# Others Can Benefit

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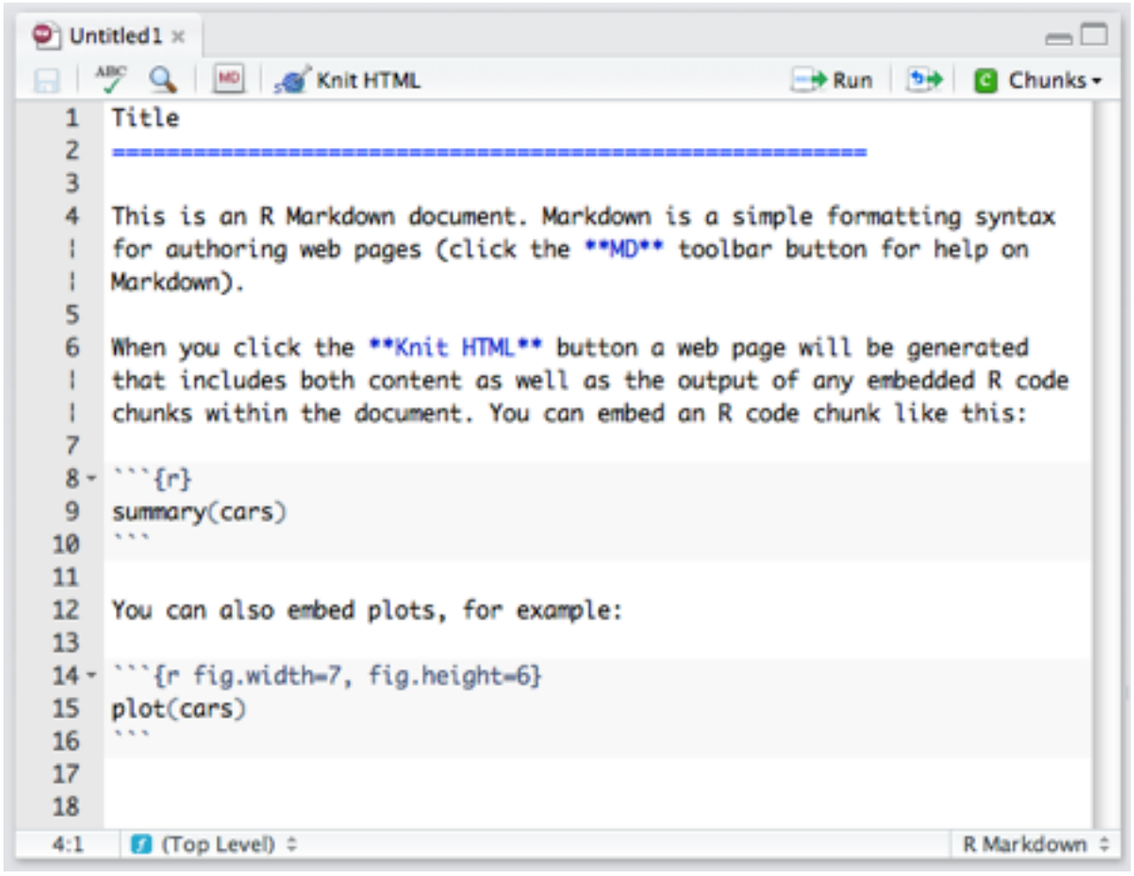
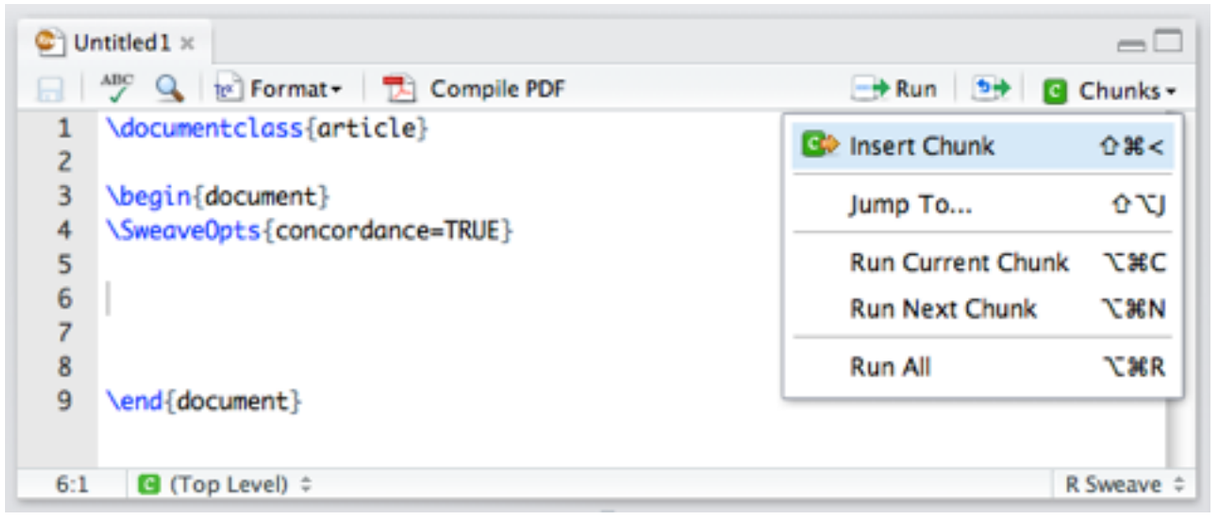
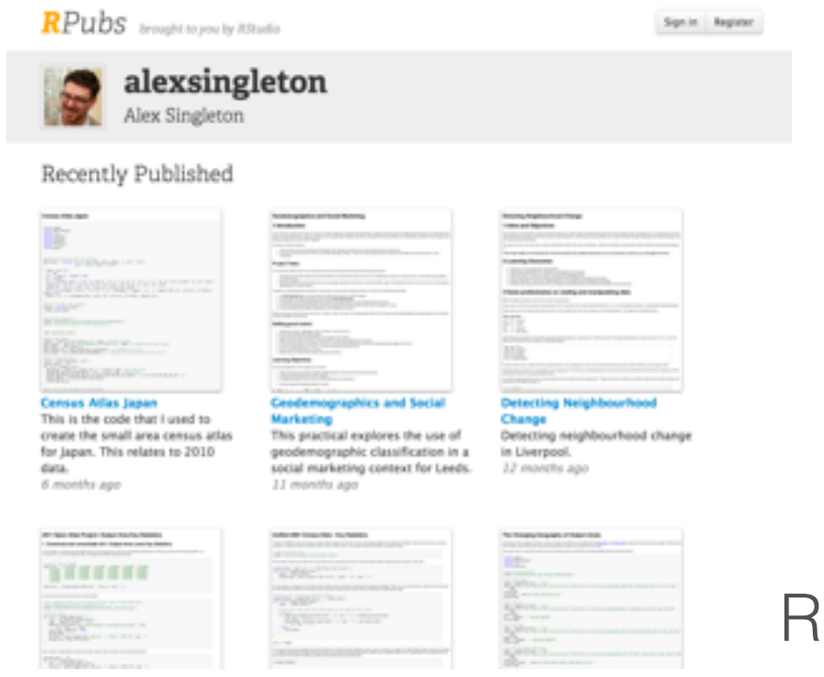
James Reid - Northern Ireland Atlas (http://ukbdev.edina.ac.uk/Census2011/)
James Trimble (http://ukdataexplorer.com/census/england/)

# Reproducibility




Sweave (.Rnw)




Rpubs

Markdown (.Rmd)

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RStudio

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## Geographic Data Science Careers

Dec 9, 2015. | By: Alex Singleton

Geographic Data Scientists have varied career trajectories and work within a variety of industry sectors. In this post we assemble a number of career profiles for people who have some connection to the University of Liverpool and are now working within Geographic Data Science. We asked each of them the following questions:

1. What does your company do?
2. What is your role?
3. Describe a typical mapping or spatial analysis task conducted in your role?
4. What career path did you follow into your current job?
5. What advice would you give a student wishing to start a Geographic Data Science career in your industry?
6. Where do you see the Geographic Data Science industry going in the next 10 years?


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http://geographicdatascience.com/blog/careers/GDS-career-profiles/


- “physical GIS applications are often more exciting …– human GIS…have more money sloshing around”

- “I also can't recommend enough to learn Python”

- “ having skills in at least one coding language”

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# My Challenges

- Greater brevity of tools - not just desktop
    - Teaching needs to be critical & creative not software
- Exposure to new and varied forms of data
    - GIS is exciting!
- Back to basics - less point and click
- More data handling skills (plus GIS / Stats)

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