Using open UK Data Service Census Support datasets in open source GIS software

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Welcome

- Look at the range of open geospatial data that is available for download through UK Data Service Census Support
- Other sources of open geospatial data that can be combined with UK Data Service Census Support data will also be looked at
- Introduction to open source GIS software
- Specific use of PostGIS spatial database
- Specific use of QGIS desktop GIS application
- Use of PostGIS / QGIS based around visualising census data using Choropleth maps, Cartograms and Flow maps.

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- Access to, and user support for, data from the last five UK population censuses (1971 – 2011)
- Majority of data provided by UKDS-CS is available as open data
- Various other non-census datasets which support the use of census data also available

https://census.ukdataservice.ac.uk/

What is open data?

- Open data is data that anyone can access, use and share
- Open data becomes useable when made available in a common, machine-readable format
- Open data must be licensed. Its licence must permit people to use the data in any way they want, including transforming, combining and sharing it with others, even commercially

Source: European Data Portal

(UK) Open Government Licence

- Copyright licence for Crown Copyright works published by the UK government
- Compatible with the Creative Commons Attributions (CC-BY) licence
- Permits anyone to copy, publish, distribute, transmit and adapt the licensed work, and to exploit it both commercially and non-commercially
- In return, the re-user of the licensed work has to acknowledge the source of the work and (if possible) provide a link to the OGL

Open UK Data Service Census Support Census data

Aggregate census area statistics data

- tables

Census interaction data

- flows between places

Census microdata

- detailed tables

Supporting boundary data & geographical lookup tables

- census places

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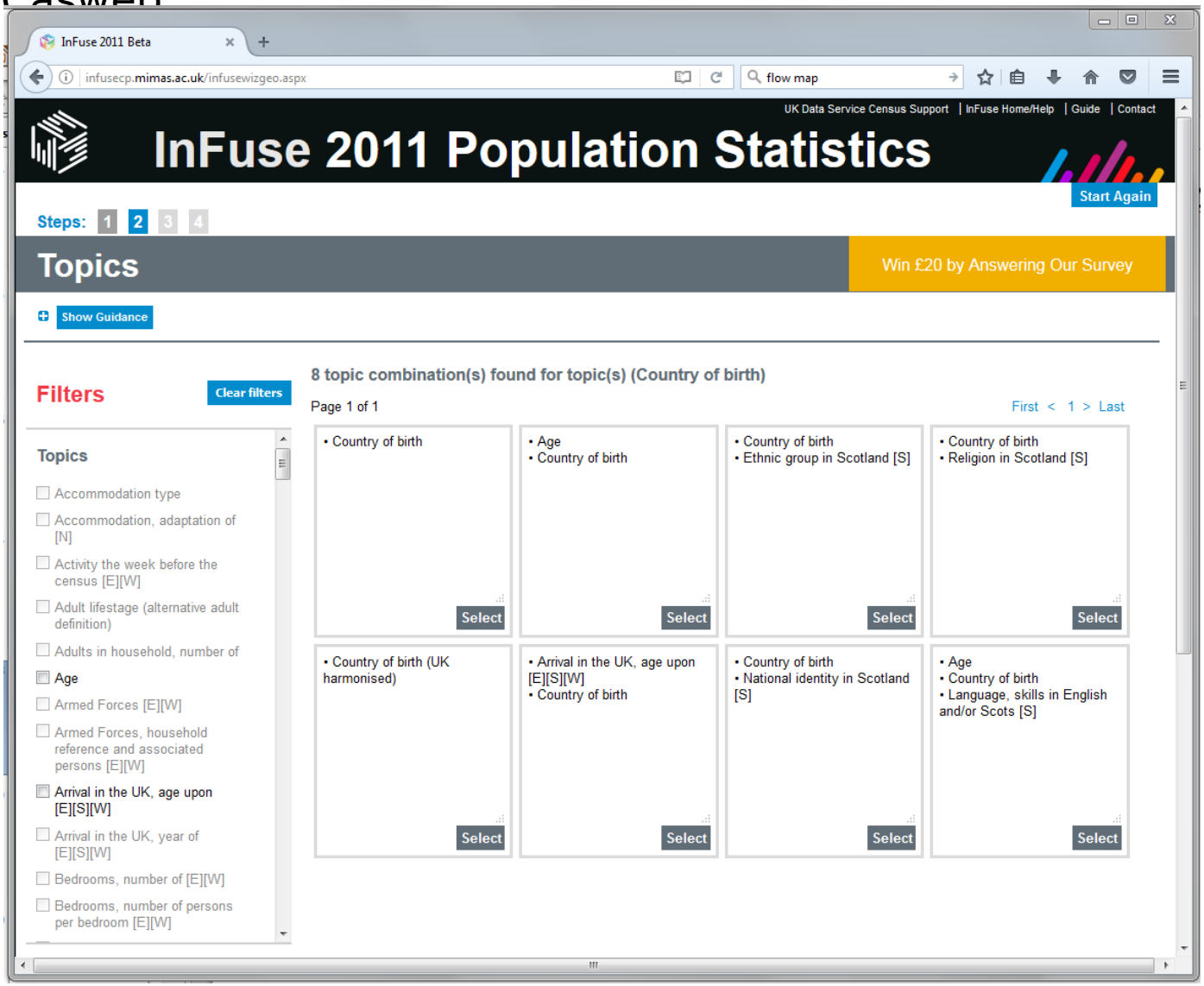
Aggregate census area statistics data – download using InFuse / Casweb



1971 – 2011 aggregate census area statistics data available as open OGL data.

InFuse gives access to 2001/2011 data.

Earlier data available in Casweb

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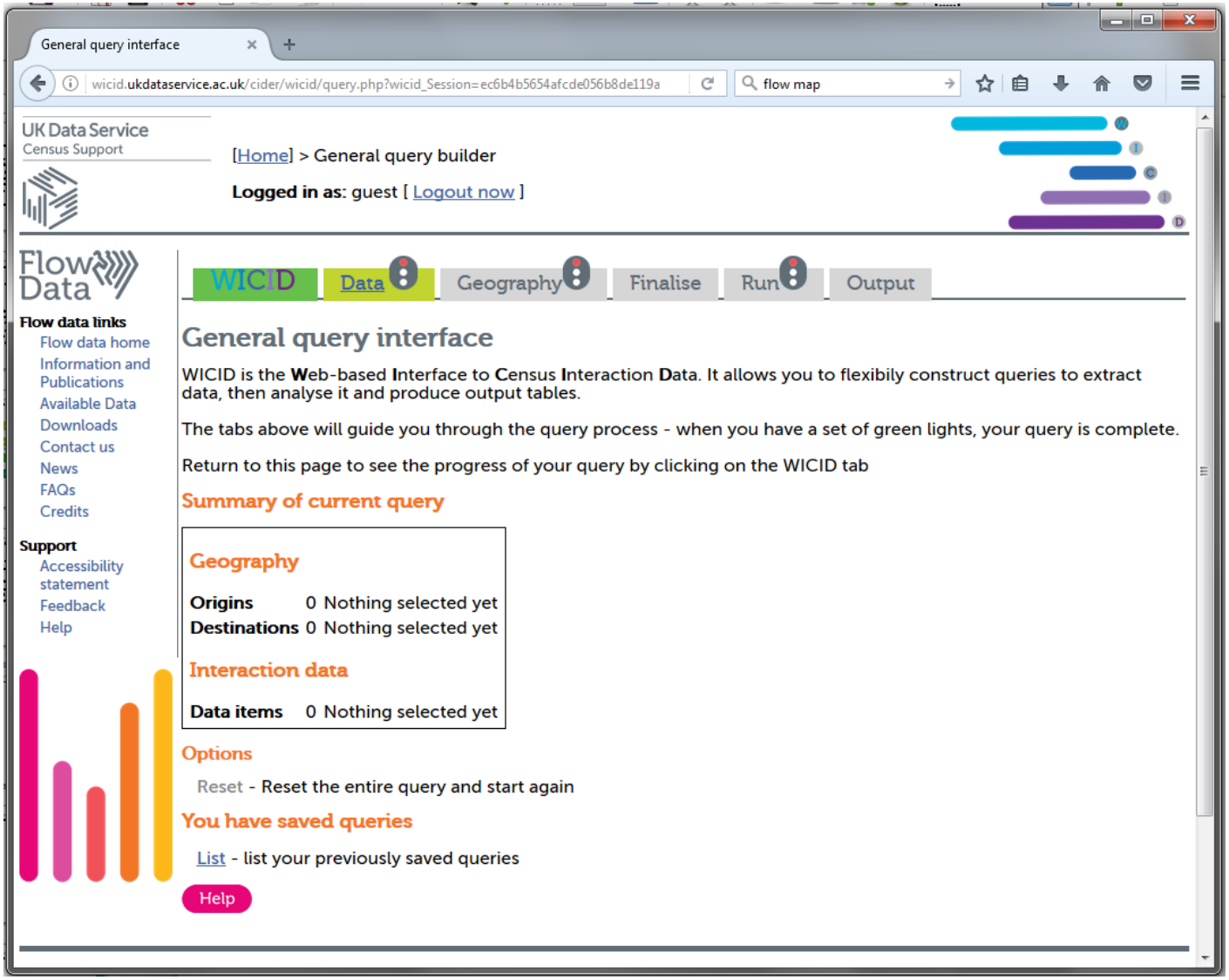
Census interaction data – download using WICID



1981 – 2011 interaction data available.

Public datasets available as open OGL data.

Access to safeguarded datasets more restrictive.

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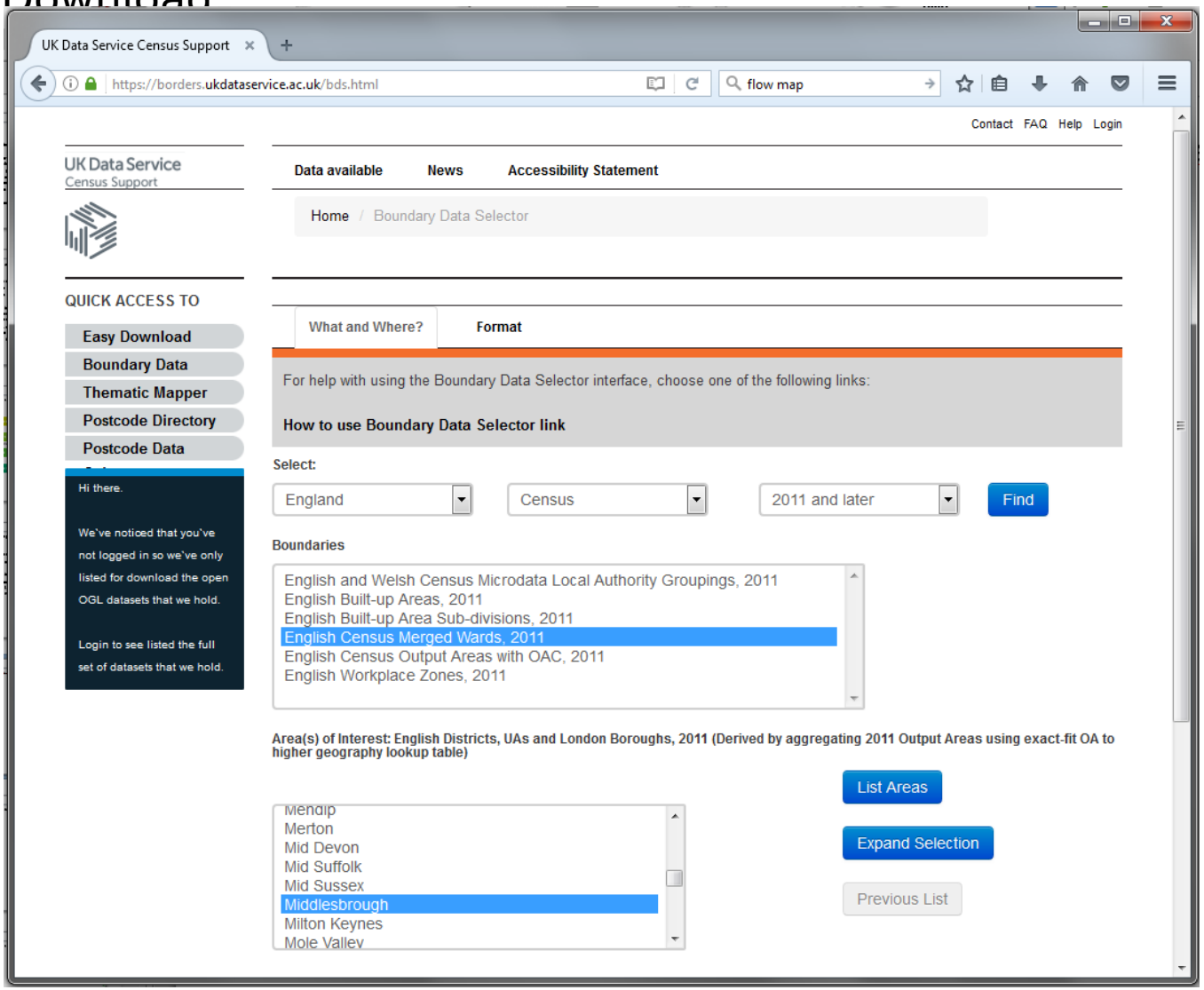
Boundaries – download using Boundary Data Selector / Easy Download



Boundaries describing core 1971 - 2011 census geographies available as open OGL data.

Various other non-core boundaries also available.

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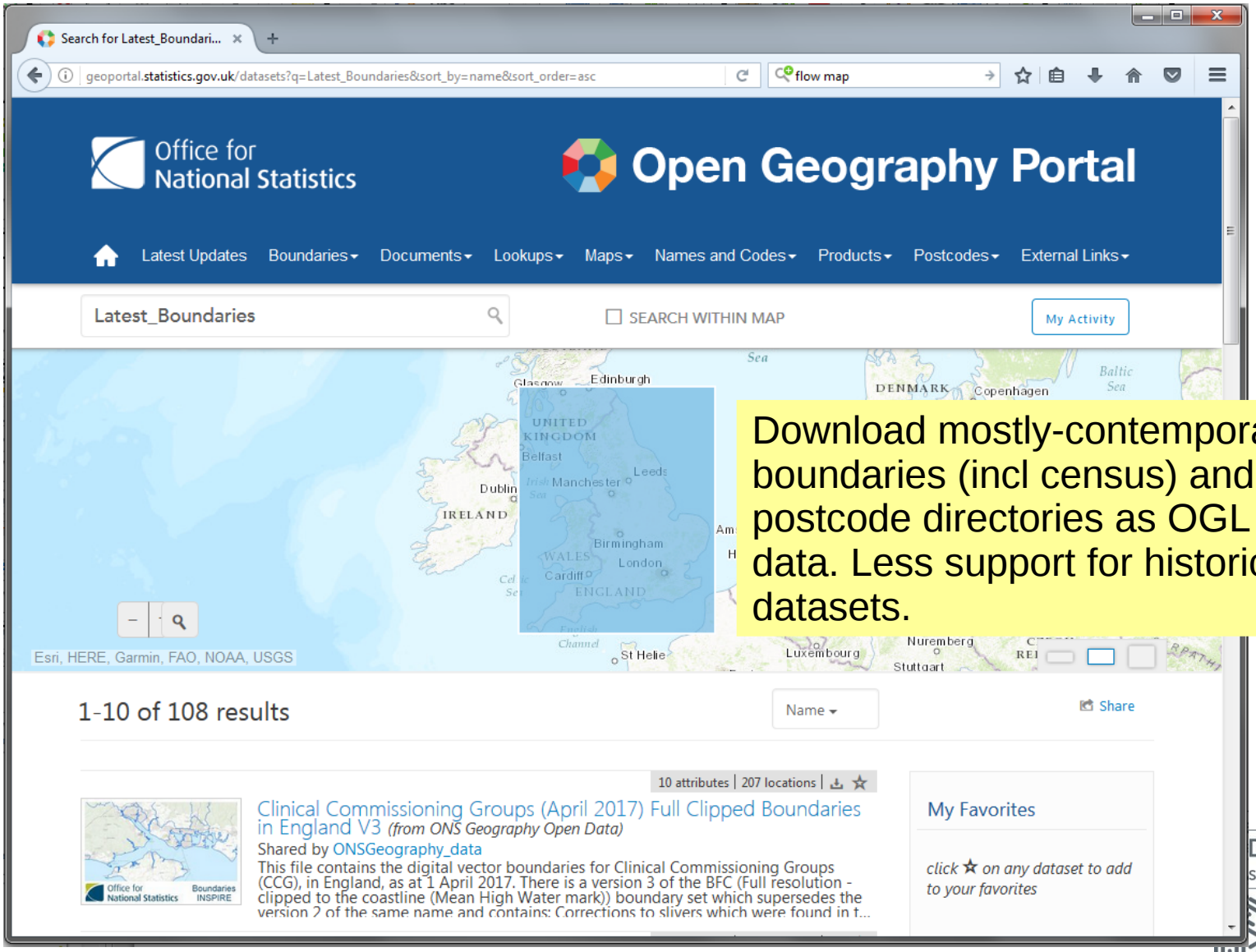
Office for National Statistics Open Geography Portal



Download mostly-contemporary boundaries (incl census) and postcode directories as OGL data. Less support for historical datasets.

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Ordnance Survey Open Data

OS OpenData Supply - Do...

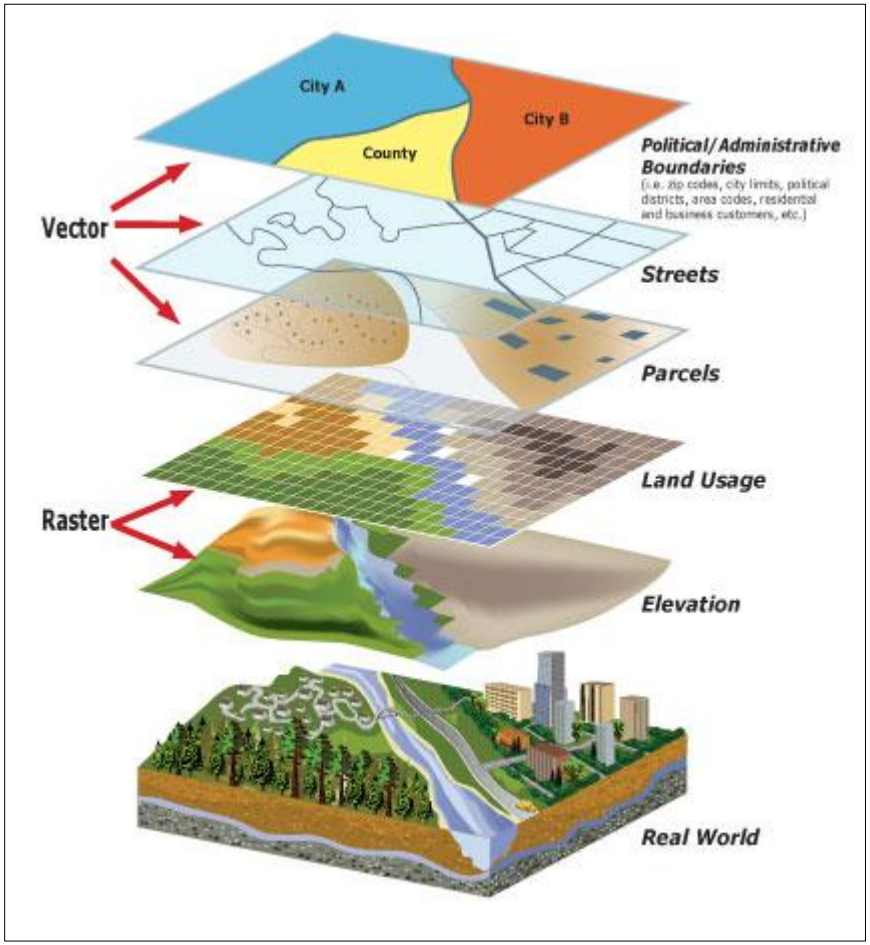
Ordnance Survey Limited (GB) https://www.ordnancesurvey.co.uk/opendatadownload/products.html

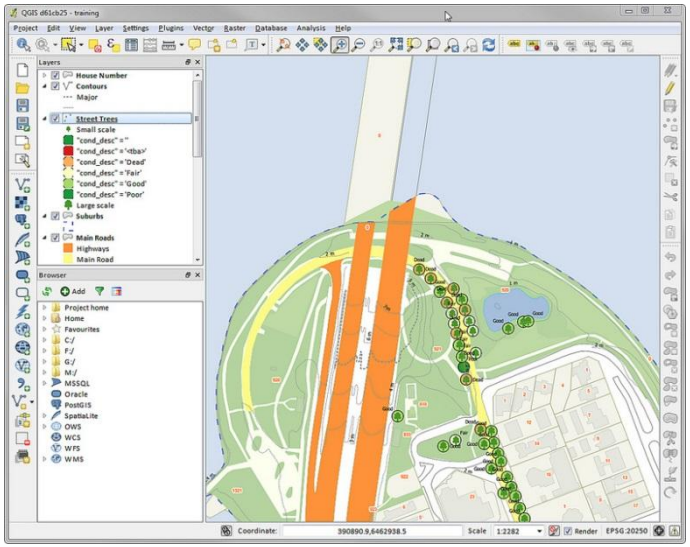
flow map

Product	Coverage	DVD	Download
Code-Point® Open *Data type:* **Point Data** *Supply format:* **CSV** *Version:* **02/2017** Code-Point Open provides a precise geographic location for each postcode unit in Great Britain. The product is a CSV file containing postcodes, grid references, NHS® health and regional health authority codes, administrative ward, district, county and country area codes.	Great Britain [20 Mb]		
Strategi® *Data type:* **Vector** *Supply format:* ESRI ® Shape *Version:* **01/2016**	Great Britain [ESRI ® Shape: 52 Mb] [DXF: 52 Mb] [MapInfo® TAB: 48.2 Mb]		

Free map datasets – many of which are open versions of non-free OS datasets. Includes background mapping data; Postcodes; boundaries; gazetteers etc.

GIS – Geospatial data; Geospatial technology; Processes around its use and management etc.





Different views of the world.

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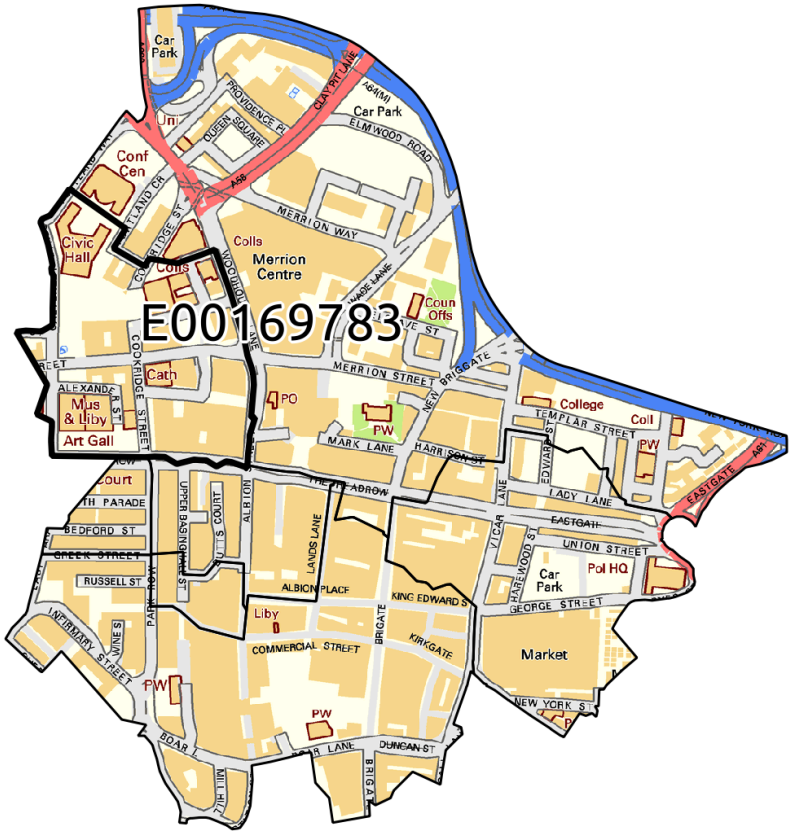
Census data in GIS

Census Statistics

GEOID	totpop	male	female
E00169777	387	200	187
E00169778	391	196	195
E00169780	214	123	91
E00169782	126	71	55
E00169783	242	137	105
E00169785	1799	810	989
E00169786	197	109	88
E00169788	421	290	131
E00169789	214	132	82

Digital boundaries overlain on OS basemap



Small area regional geography

GEOGRAPHIC **ID**ENTIFIERS

Location brings context

Shapefiles and CSV`s

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What is open source (GIS) software?

- Open source software is computer software made available with a license in which the copyright holder provides the rights to study, change and distribute the software to anyone and for any purpose.

- Open source software is often developed in a public, collaborative manner.
- Open source GIS software is open software used within the geospatial data application domain

OSGeo

- The Open Source Geospatial Foundation
- A not-for-profit organisation whose mission is to support the collaborative development of open source geospatial software and promote its widespread use
- Projects should manage themselves, striving for consensus and encouraging participation from all contributors, from beginners through to advanced users
- OSGeo website a good place to start

www.osgeo.org

Different types of open source GIS software aimed at different types of user or application

- Geospatial Libraries
- Desktop Applications
- Web Mapping
- Content Management Systems
- Metadata Catalogs

Today you will see use of UK Data Service Census Support census data in two specfic open source GIS software applications

During today`s webinar we will use the QGIS desktop GIS application to create maps and other geographic visualisations of UK census data downloaded from UK Data Service Census Support.

As part of this the use of a PostGIS spatial database as a datastore will be demonstrated.

Getting started with PostGIS

- PostGIS adds GIS functionality / datatypes to PostgreSQL
- Store GIS data in PostgreSQL databases
- Do GIS data processing/analysis using spatial SQL
- Access our GIS data from anything that can talk to PostgreSQL

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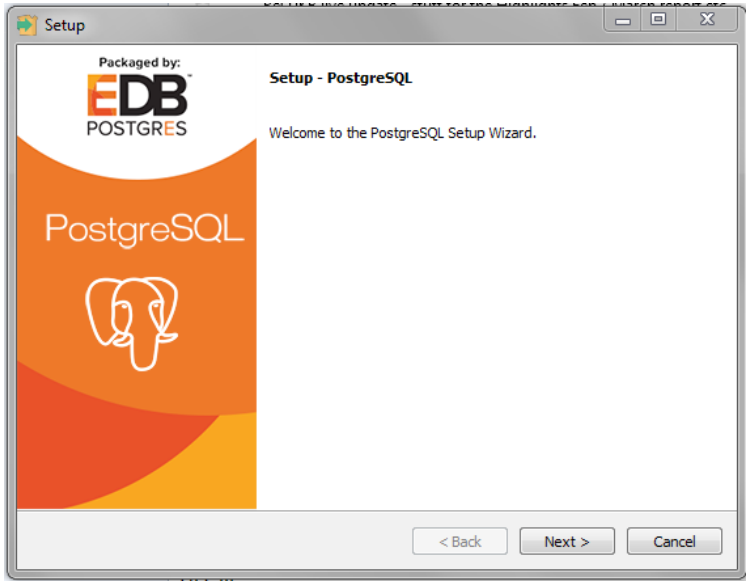
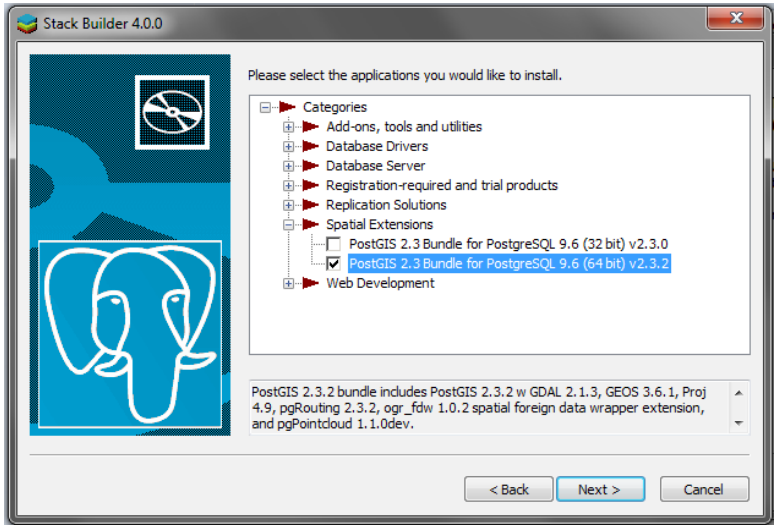
Obtaining / Installing PostGIS

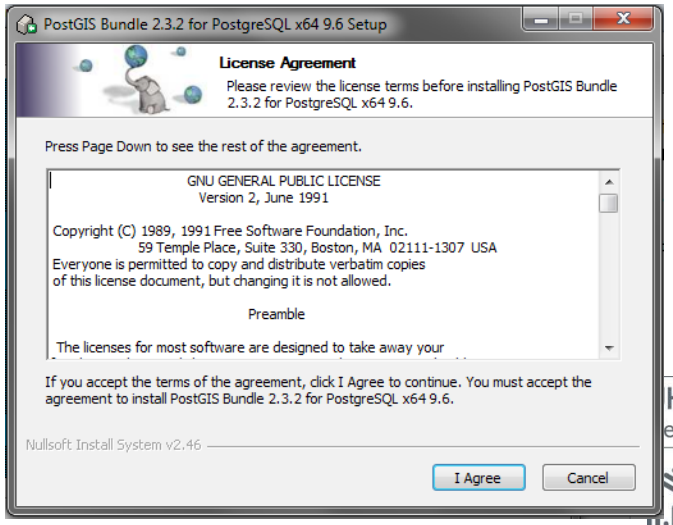


A **working installation of PostgreSQL is a prerequisite to installing PostGIS**

Installing PostgreSQL/PostGIS on windows through binaries is **trouble-free** and **painless**.

Install PostgreSQL then run **Stack Builder** to install additional features e.g. PostGIS on top of the base PostgreSQL installation.





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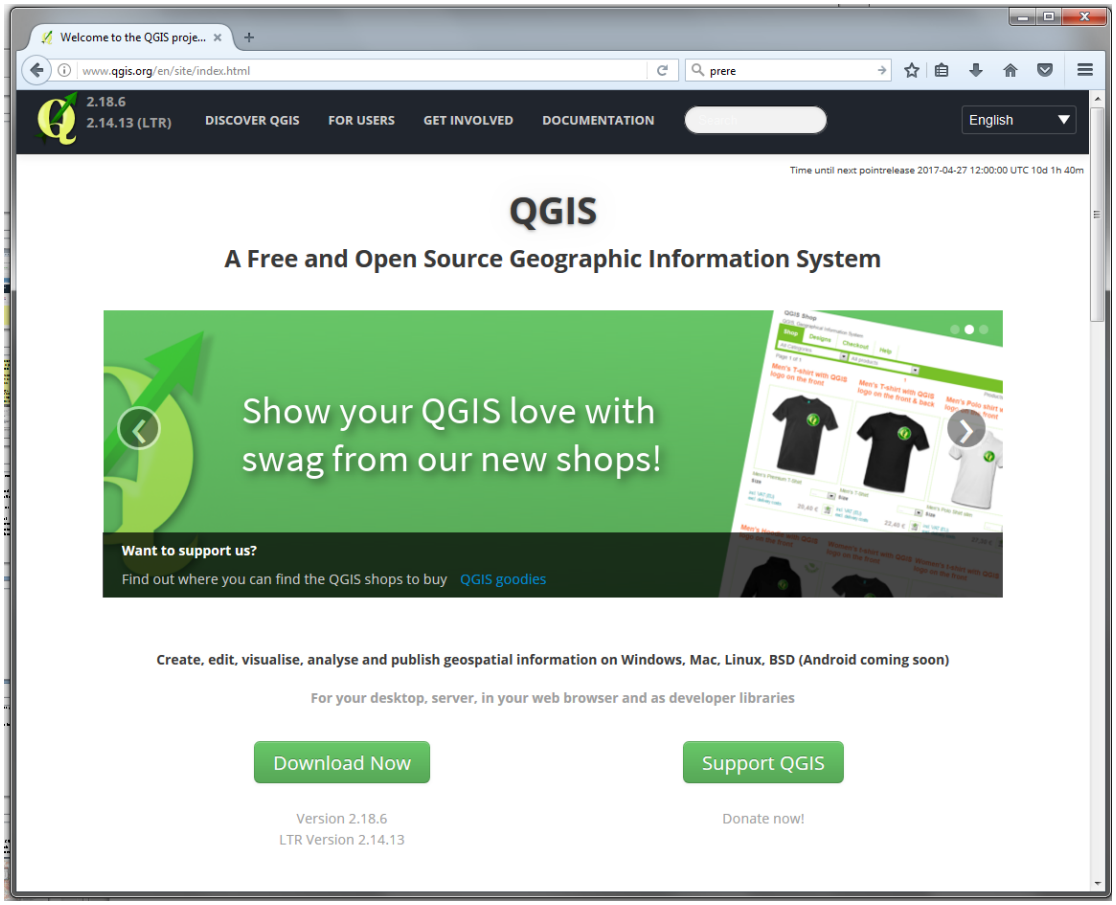
Demo 1: Load a shapefile of UKDS-CS boundaries into PostGIS

- We have downloaded a shapefile boundary dataset (Scottish Council Areas) from UK Data Service Census Support
- We want to load the shapefile into a PostGIS spatial database that we have access to
- There are LOTS of different methods of accomplishing this. We`ll look at one method and having done so will look at how the data is then stored within our PostGIS spatial database.

Demo 2: Viewing PostGIS data in QGIS desktop GIS application



Download QGIS installer from the QGIS website for your platform of choice.

QGIS website has nicely written documentation describing how to use QGIS reflecting the very active QGIS community.

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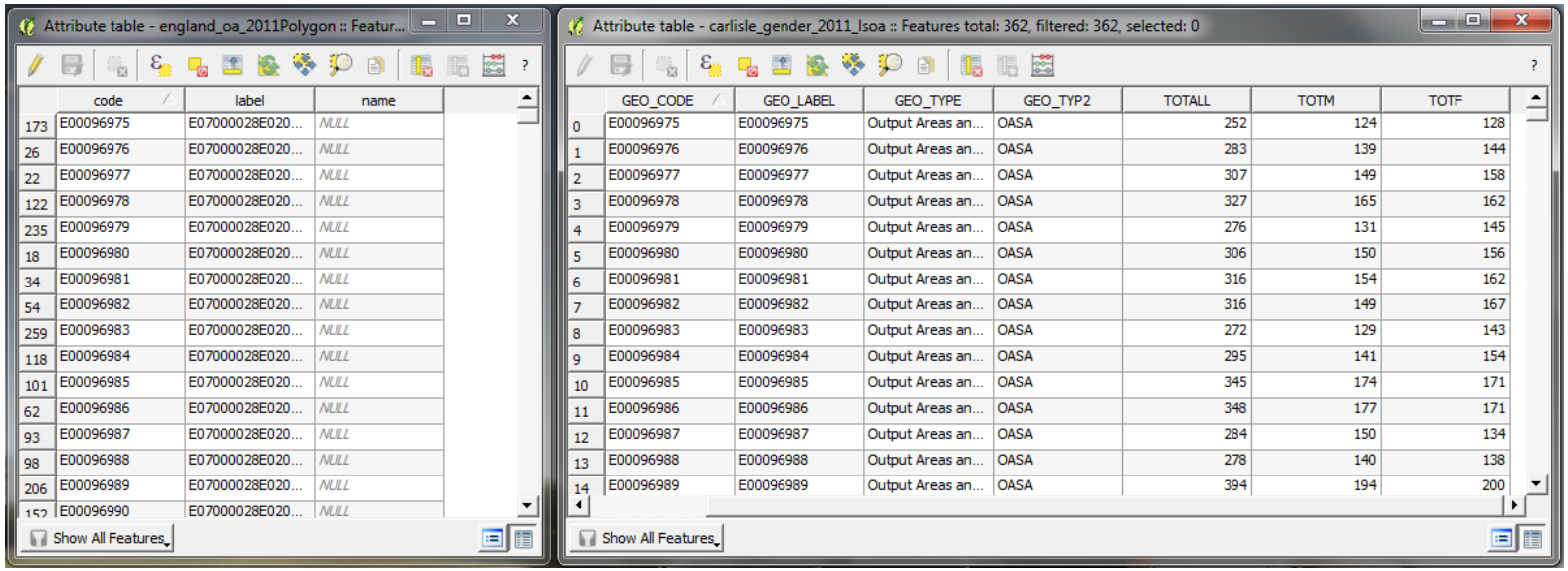
Demo 3: Joining CSV data to PostGIS data in QGIS

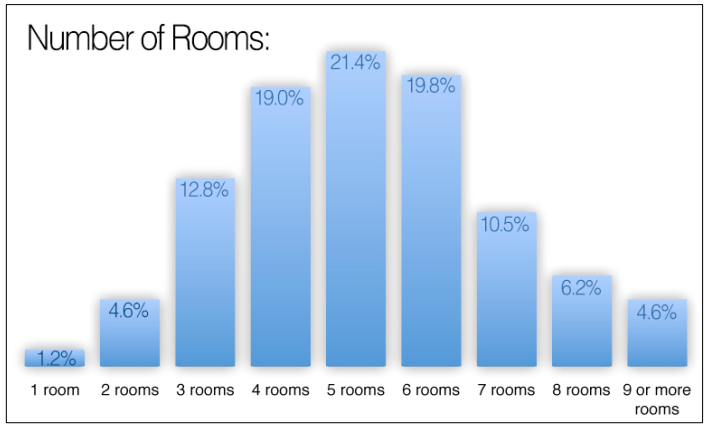
- A common task when using data downloaded from UKDS-CS is linking small area statistical data to boundaries. Will show how to do this in QGIS.

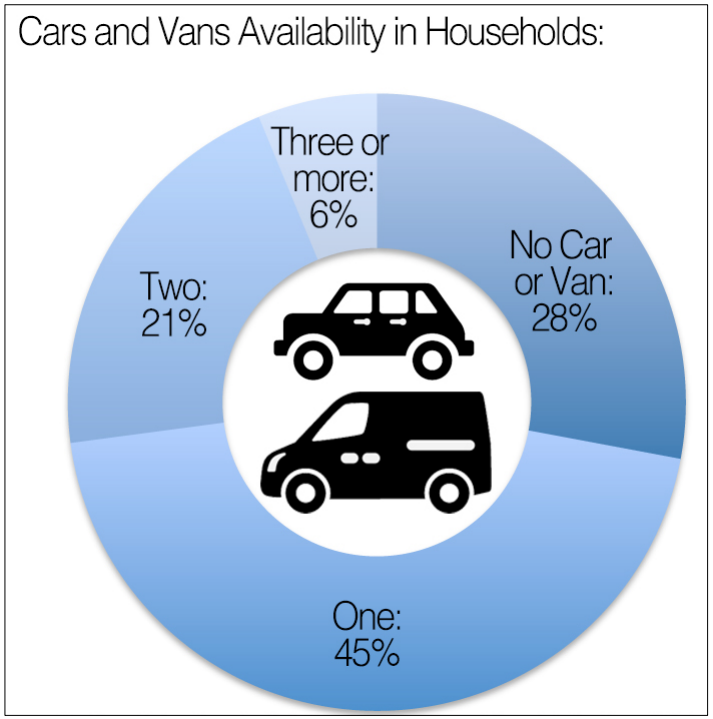


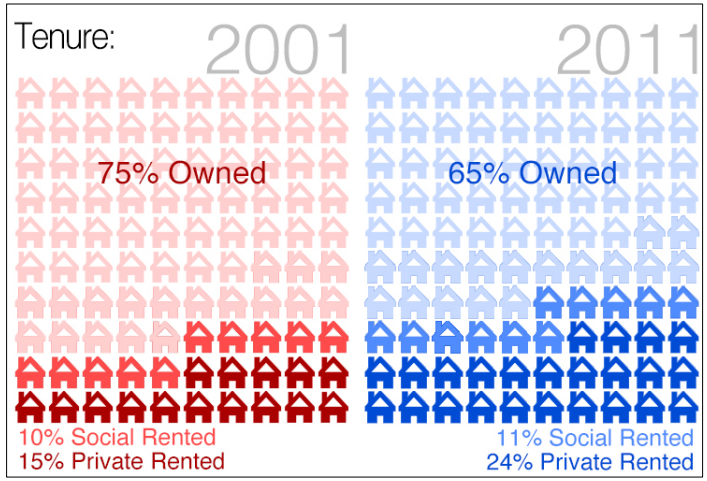
	code	label	name
173	E00096975	E07000028E020...	NULL
26	E00096976	E07000028E020...	NULL
22	E00096977	E07000028E020...	NULL
122	E00096978	E07000028E020...	NULL
235	E00096979	E07000028E020...	NULL
18	E00096980	E07000028E020...	NULL
34	E00096981	E07000028E020...	NULL
54	E00096982	E07000028E020...	NULL
259	E00096983	E07000028E020...	NULL
118	E00096984	E07000028E020...	NULL
101	E00096985	E07000028E020...	NULL
62	E00096986	E07000028E020...	NULL
93	E00096987	E07000028E020...	NULL
98	E00096988	E07000028E020...	NULL
206	E00096989	E07000028E020...	NULL
152	E00096990	E07000028E020...	NULL

	GEO_CODE	GEO_LABEL	GEO_TYPE	GEO_TYP2	TOTALL	TOTM	TOTF
0	E00096975	E00096975	Output Areas an...	OASA	252	124	128
1	E00096976	E00096976	Output Areas an...	OASA	283	139	144
2	E00096977	E00096977	Output Areas an...	OASA	307	149	158
3	E00096978	E00096978	Output Areas an...	OASA	327	165	162
4	E00096979	E00096979	Output Areas an...	OASA	276	131	145
5	E00096980	E00096980	Output Areas an...	OASA	306	150	156
6	E00096981	E00096981	Output Areas an...	OASA	316	154	162
7	E00096982	E00096982	Output Areas an...	OASA	316	149	167
8	E00096983	E00096983	Output Areas an...	OASA	272	129	143
9	E00096984	E00096984	Output Areas an...	OASA	295	141	154
10	E00096985	E00096985	Output Areas an...	OASA	345	174	171
11	E00096986	E00096986	Output Areas an...	OASA	348	177	171
12	E00096987	E00096987	Output Areas an...	OASA	284	150	134
13	E00096988	E00096988	Output Areas an...	OASA	278	140	138
14	E00096989	E00096989	Output Areas an...	OASA	394	194	200

Visualising census data – non (geo)graphically.







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Visualising census data – geographically as a (choropleth) map.

Example: % of people working more than 49 hours per week in London as recorded in the UK 2011 census.

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First – some mapping fundamentals

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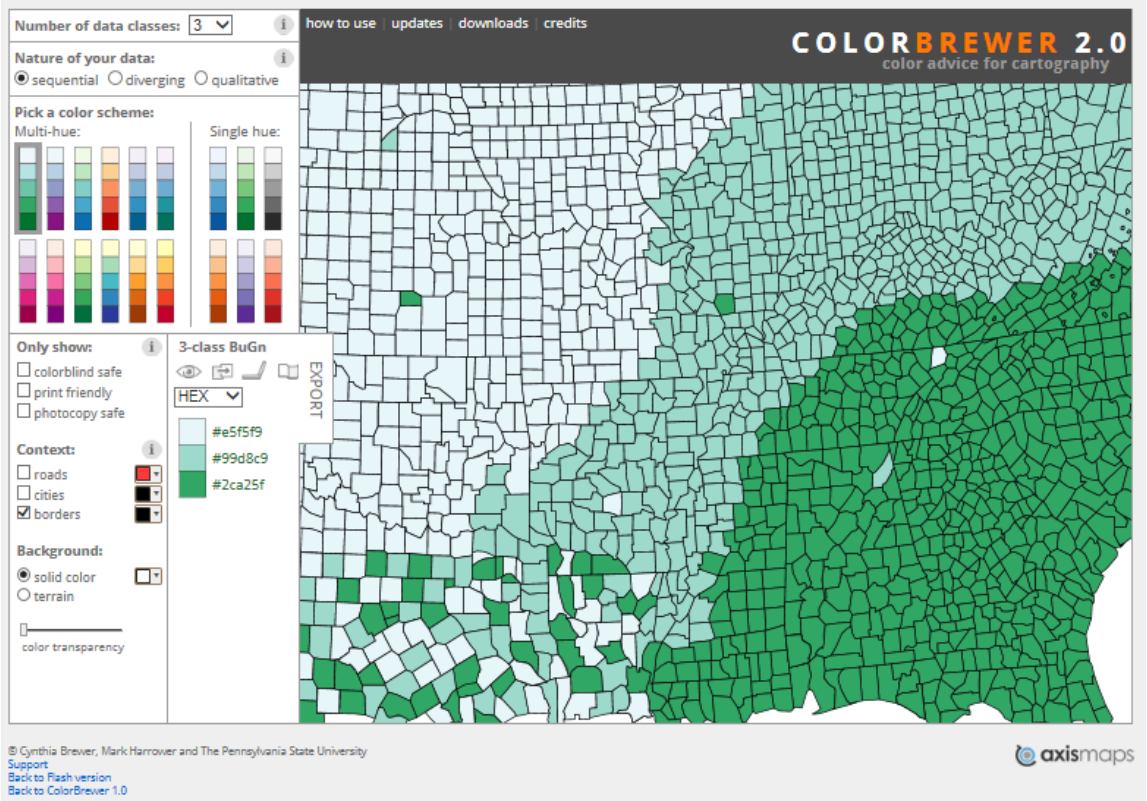
Mapping fundamentals I: Classifying Data

- Simplify numeric data into a set number of data classes (categories) in order to recognise patterns in that data.
- Various methods of classification provided by QGIS
- Choosing a different number of data classes and classification method will produce different results(?)

Data Value	Class
3	3 to 20
4	3 to 20
5	3 to 20
18	3 to 20
20	3 to 20
22	21 to 38
30	21 to 38
32	21 to 38
39	39 to 56
53	39 to 56
57	57 to 74
60	57 to 74
61	57 to 74
62	57 to 74
64	57 to 74
64	57 to 74
67	57 to 74
77	75 +
81	75 +
91	75 +
93	75 +

Map Fundamentals II: Styling Data

Data Value	Class
3	3 to 20
4	3 to 20
5	3 to 20
18	3 to 20
20	3 to 20
22	21 to 38
30	21 to 38
32	21 to 38
39	39 to 56
53	39 to 56
57	57 to 74
60	57 to 74
61	57 to 74
62	57 to 74
64	57 to 74
64	57 to 74
67	57 to 74
77	75 +
81	75 +
91	75 +
93	75 +



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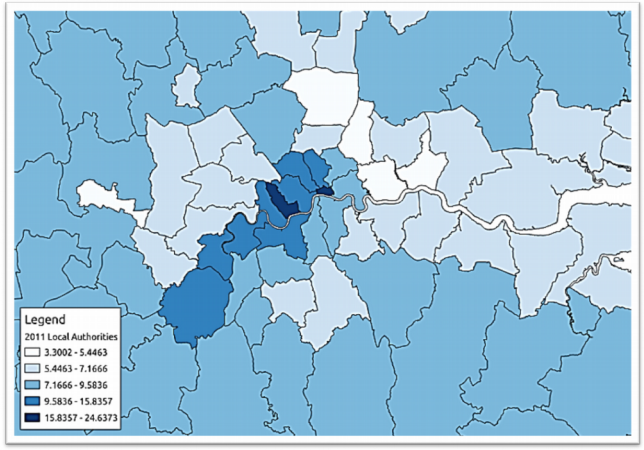
Demo 4: Use QGIS to create a choropleth map from the boundaries we loaded into PostGIS and the CSV file we added to QGIS

Choropleth maps:

- Shade areas to display statistical variables
- Colour scale assigned to data and the value of each region is used to colour the region



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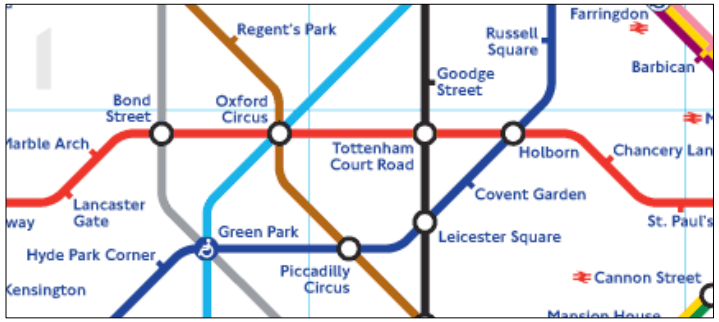
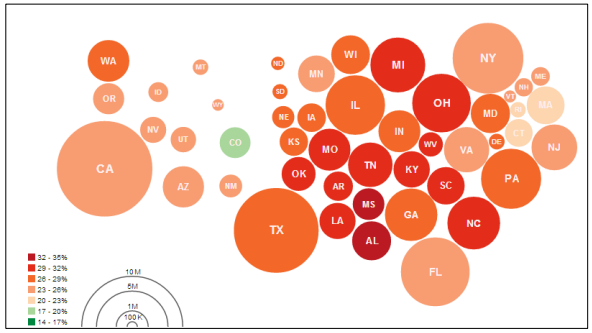
Cartograms

- Statistic being thematically mapped is substituted for areal extent or distance
- Geometry of the the map is distorted in order to convey the information of this alternate variable
- Distance or Area Cartograms



Distance Cartogram – relative distance within a network



Area Cartogram – alters physical area by another statistical variable

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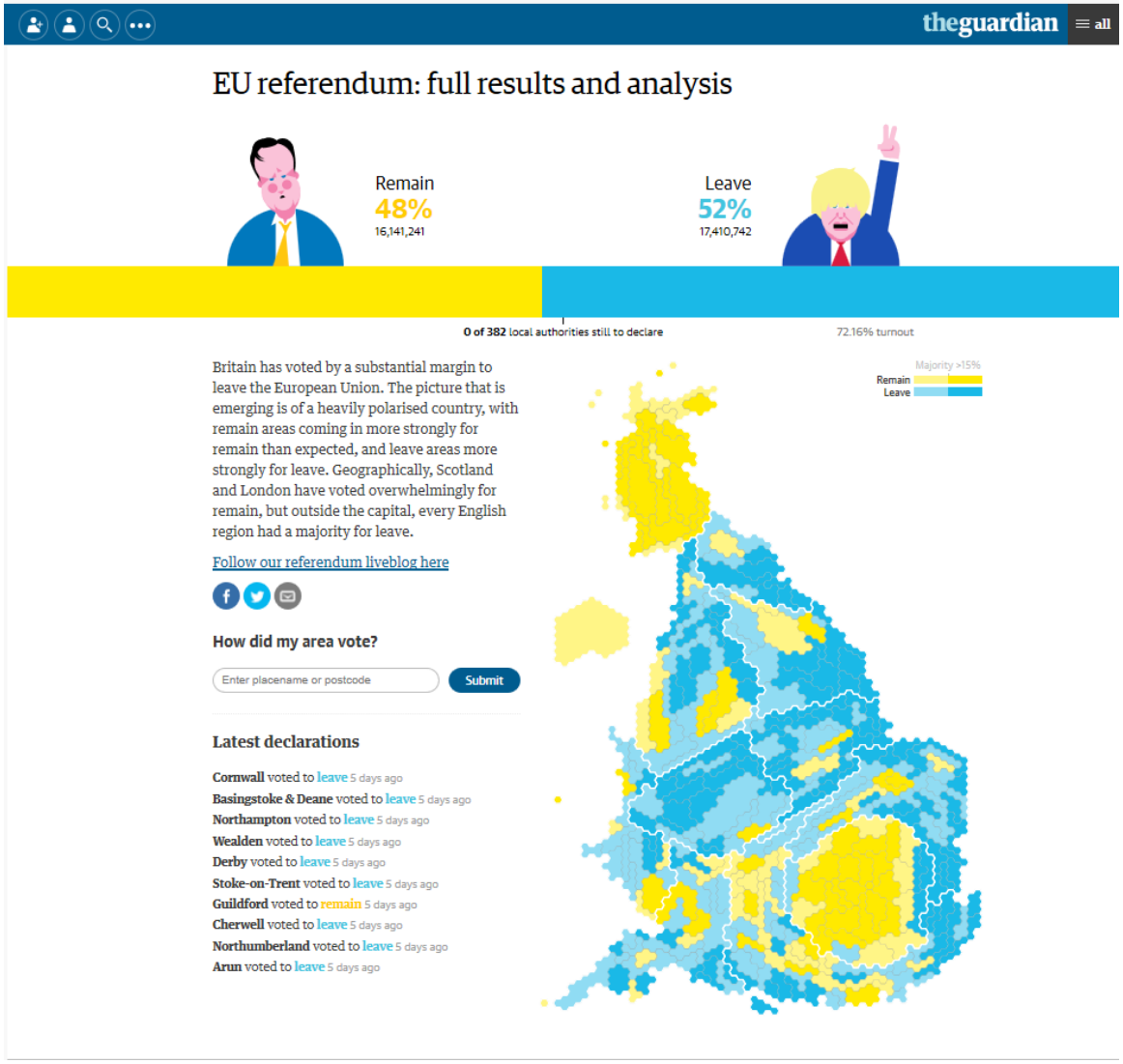
EU Referendum Cartograms



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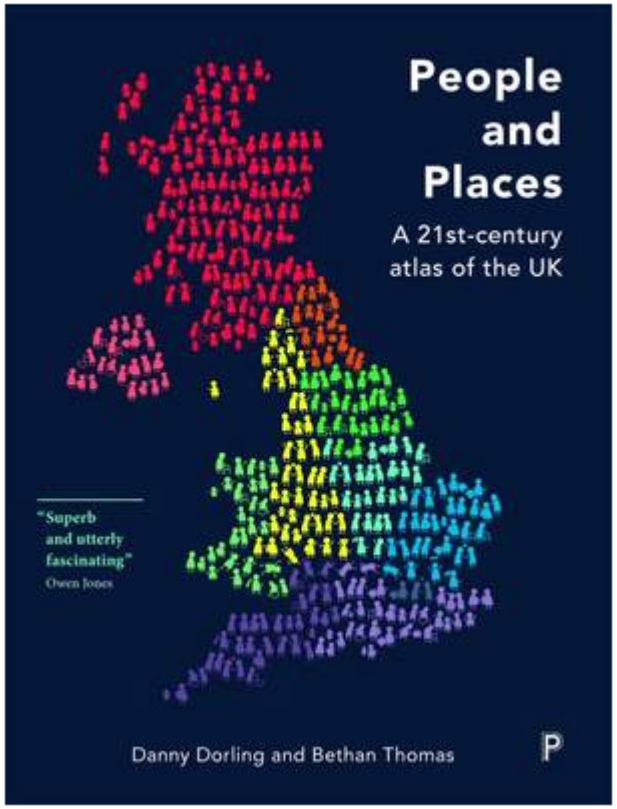
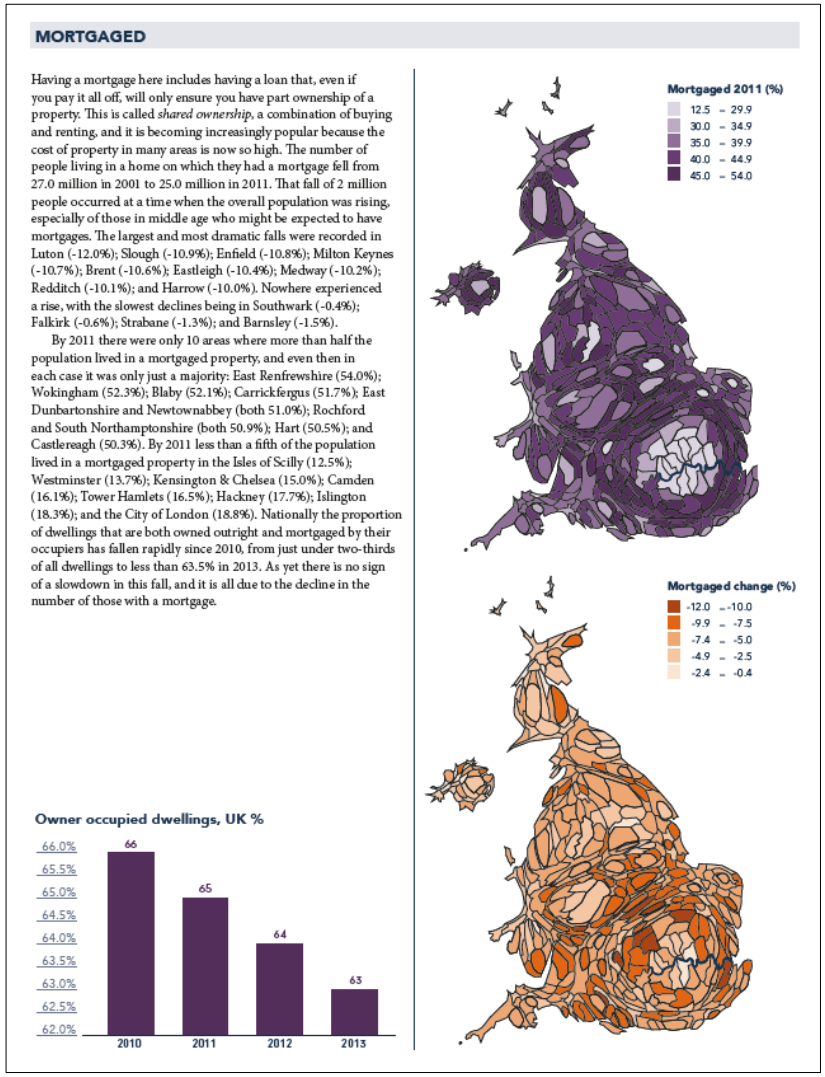
Census Cartograms





MORTGAGED

Having a mortgage here includes having a loan that, even if you pay it all off, will only ensure you have part ownership of a property. This is called *shared ownership*, a combination of buying and renting, and it is becoming increasingly popular because the cost of property in many areas is now so high. The number of people living in a home on which they had a mortgage fell from 27.0 million in 2001 to 25.0 million in 2011. That fall of 2 million people occurred at a time when the overall population was rising, especially of those in middle age who might be expected to have mortgages. The largest and most dramatic falls were recorded in Luton (-12.0%); Slough (-10.9%); Enfield (-10.8%); Milton Keynes (-10.7%); Brent (-10.6%); Eastleigh (-10.4%); Medway (-10.2%); Redditch (-10.1%); and Harrow (-10.0%). Nowhere experienced a rise, with the slowest declines being in Southwark (-0.4%); Falkirk (-0.6%); Strabane (-1.3%); and Barnsley (-1.5%).

By 2011 there were only 10 areas where more than half the population lived in a mortgaged property, and even then in each case it was only just a majority: East Renfrewshire (54.0%); Wokingham (52.3%); Blaby (52.1%); Carrickfergus (51.7%); East Dunbartonshire and Newtownabbey (both 51.0%); Rochford and South Northamptonshire (both 50.9%); Hart (50.5%); and Castlereagh (50.3%). By 2011 less than a fifth of the population lived in a mortgaged property in the Isles of Scilly (12.5%); Westminster (13.7%); Kensington & Chelsea (15.0%); Camden (16.1%); Tower Hamlets (16.5%); Hackney (17.7%); Islington (18.3%); and the City of London (18.8%). Nationally the proportion of dwellings that are both owned outright and mortgaged by their occupiers has fallen rapidly since 2010, from just under two-thirds of all dwellings to less than 63.5% in 2013. As yet there is no sign of a slowdown in this fall, and it is all due to the decline in the number of those with a mortgage.

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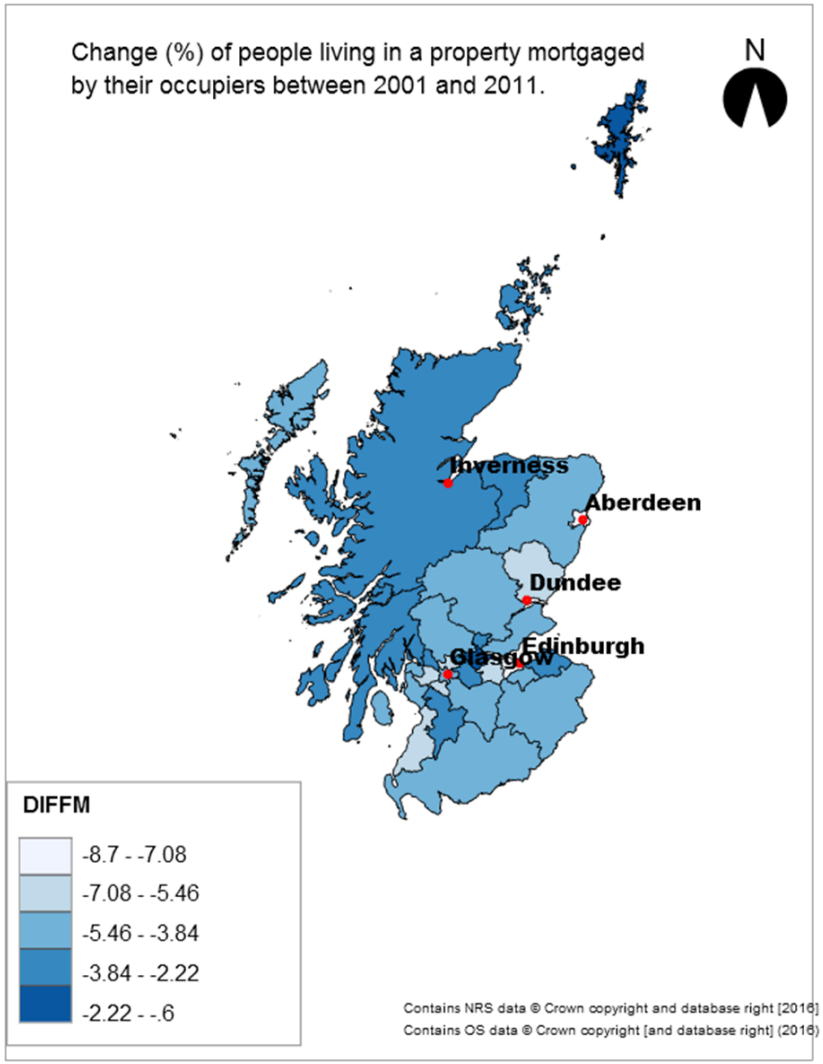
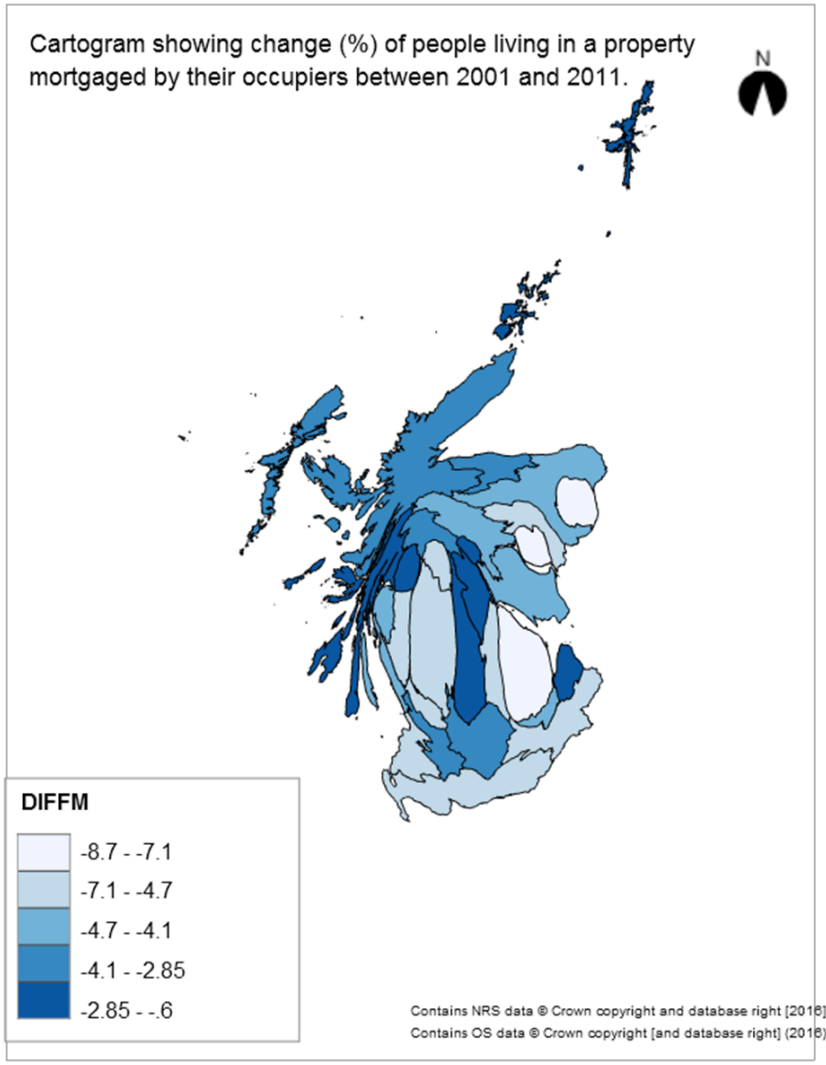
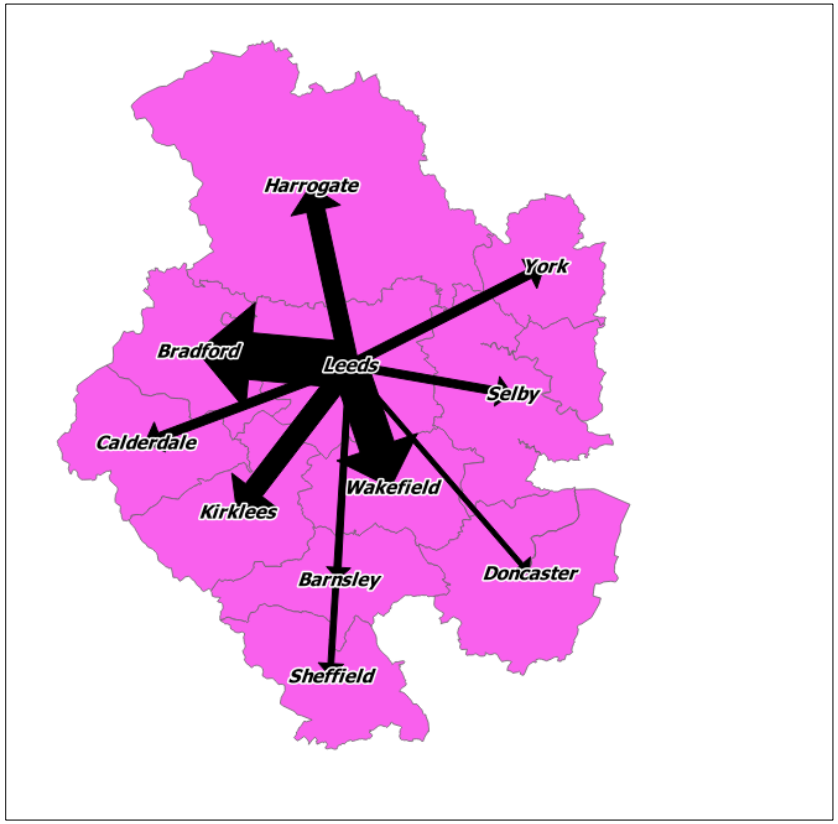
Demo 5: Use QGIS to create a cartogram from our census data and compare with the choropleth map





Demo 6: Use QGIS to create a flow map from UK Data Service Census Support flow data

- use 2011 census interaction (flow) data downloaded from UDKS-CS WICID application.



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