Open geographies and open software – using open UKDS-CS datasets in open source GIS software

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UK Data Service Census Support

EDINA

UK Data Service
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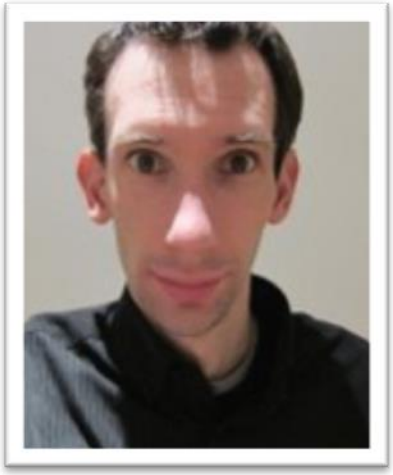
Hi

An introduction…



James Crone
UK Data Service
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University of Edinburgh

Welcome

During the webinar today we will look at open data that is available through UKDS-CS and the use of this data in open source GIS software

- Overview of what open data is and what open data is available through UKDS-CS
- Overview of what open source GIS software is and some of the different tools/applications which are available
- Detailed demonstrations of the use of UKDS-CS data in QGIS – *the user friendly* open source GIS application

INTRO TO UKDS / UKDS-CS

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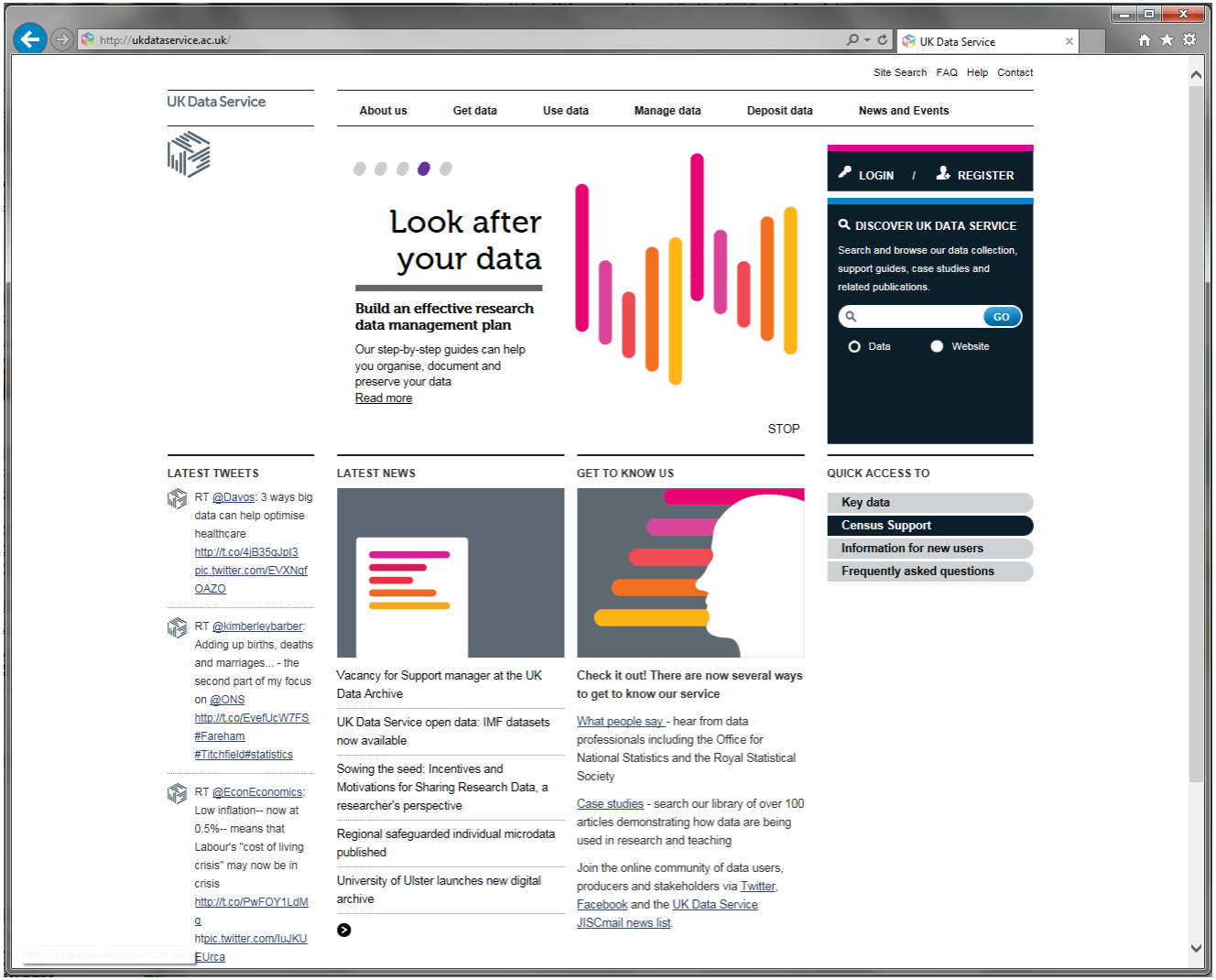
What is the UK Data Service?

- a comprehensive resource funded by the ESRC
- a single point of access to a wide range of secondary social science data
- support, training and guidance

Who is it for?

- academic researchers and students
- government analysts
- charities and foundations
- business consultants
- independent research centres
- think tanks

ukdataservice.ac.uk website



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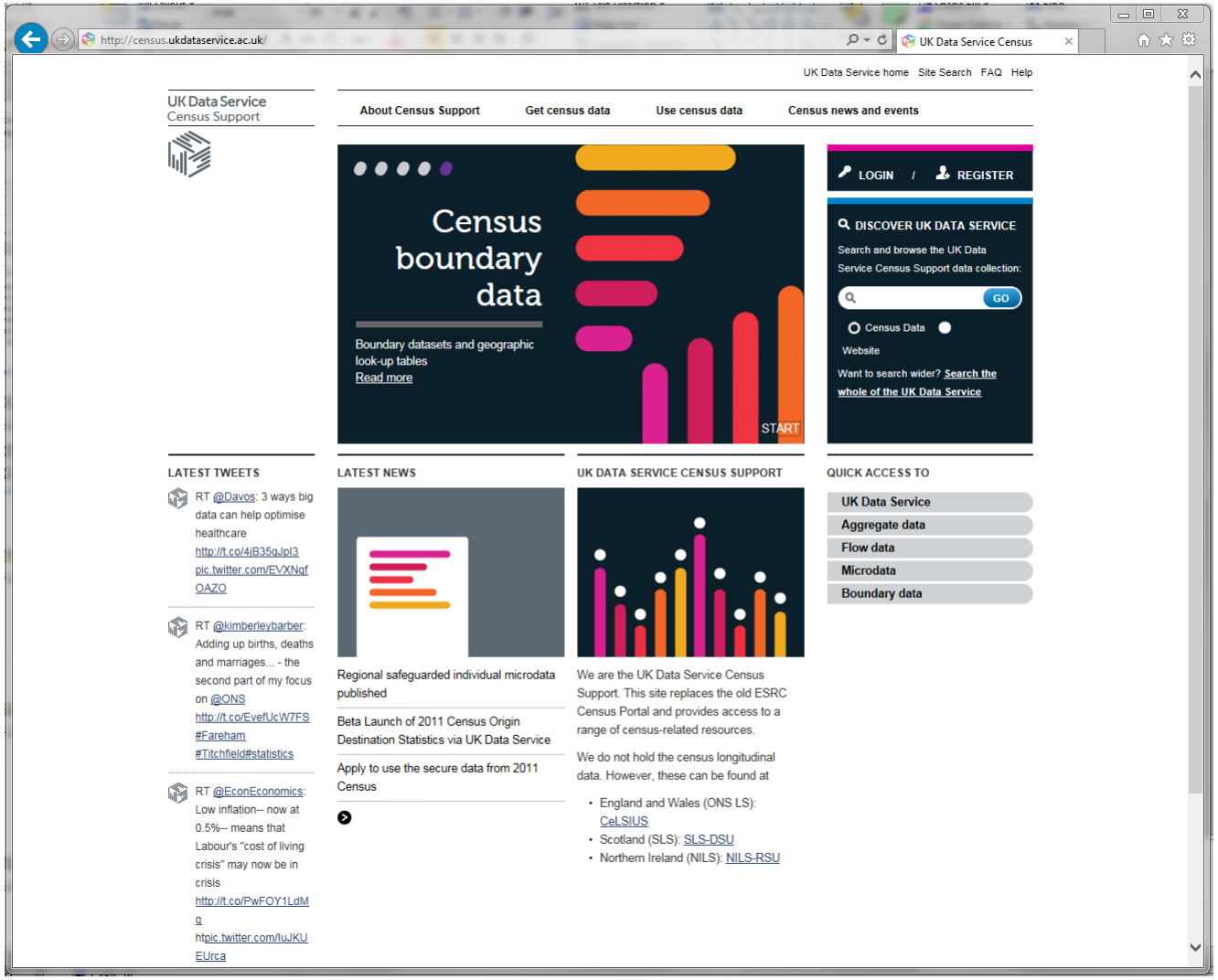
http://census.ukdataservice.ac.uk/



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What is Census Support?

- access to, and user support for, data from the last five UK population censuses (1971 – 2011)
- Majority of data provided by UKDS-CS is now available as open data

census.ukdataservice.ac.uk

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Types of UKDS-CS data

Aggregate census area statistics data

- tables

Census interaction data

- flows between places

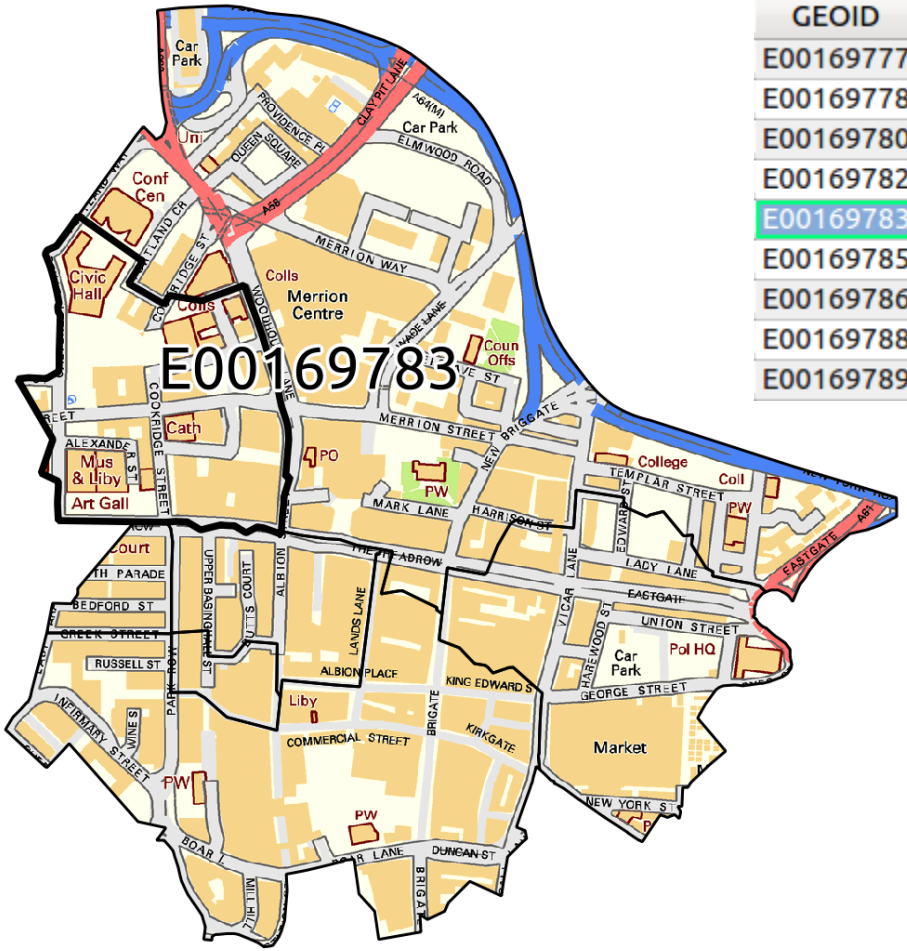
Census microdata

- detailed tables

Supporting boundary data & geographical lookup tables

- census places

Digital Boundaries / Aggregate Data



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

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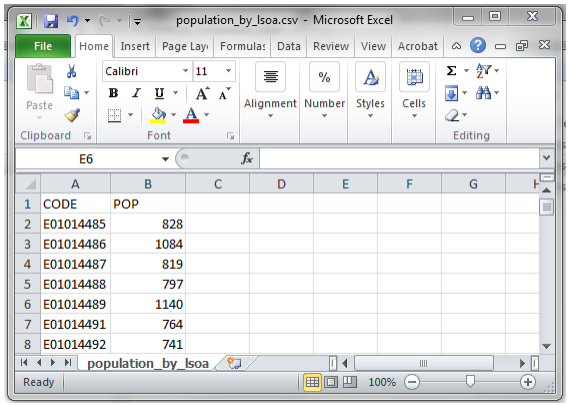
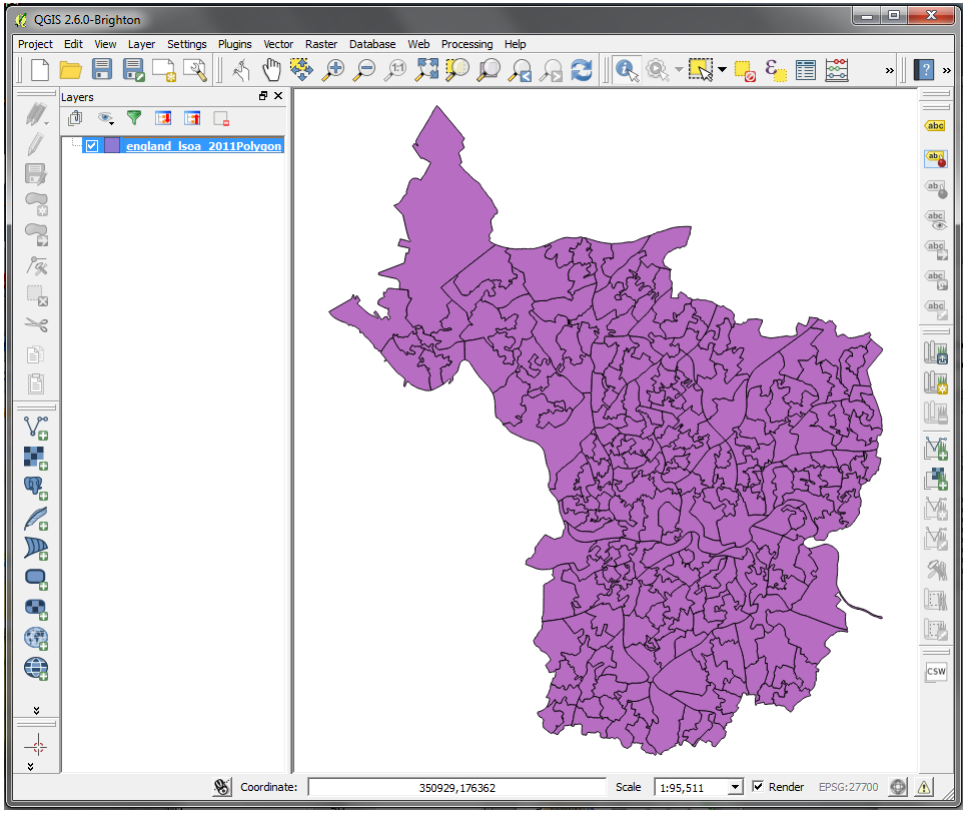
Aggregate data (CSV) in excel. Shapefile in QGIS





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Open Data

What is open data?

Open data is data that is made available by organisations, businesses and individuals for anyone to access, use and share.

Source: open data institute

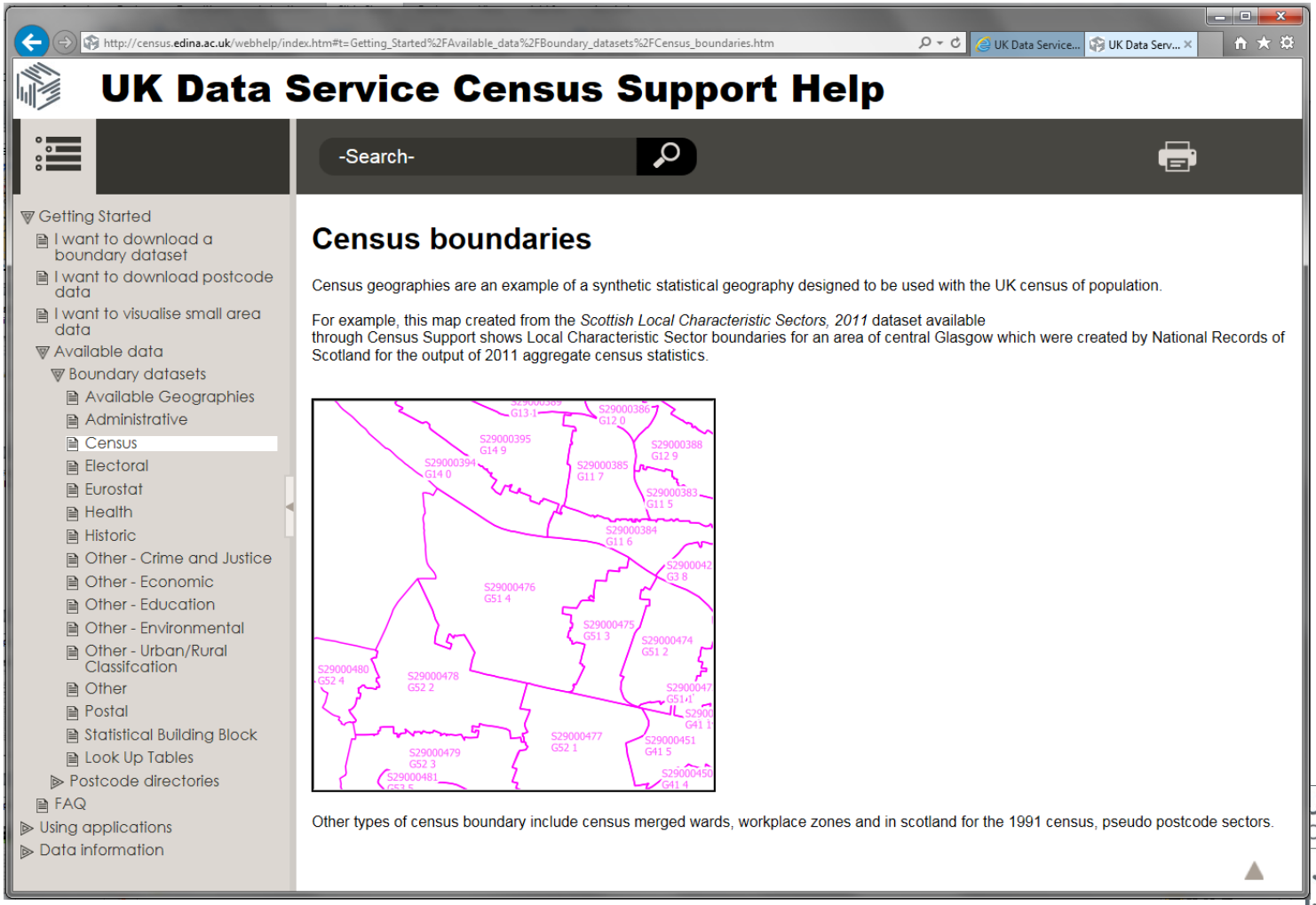
Open Government Licence

- 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 data available through UKDS-CS

- Most UKDS-CS data is now available under OGL
- Majority of boundary datasets were already or have now moved (on October 14th) to OGL including those that used to be restricted to academics e.g. 1991 census boundaries.
- Discussions are ongoing to move datasets which are still not available as open data e.g. 1981 boundaries over to open licenses to allow anyone to download.

OGL geographical boundary datasets available through UKDS-CS



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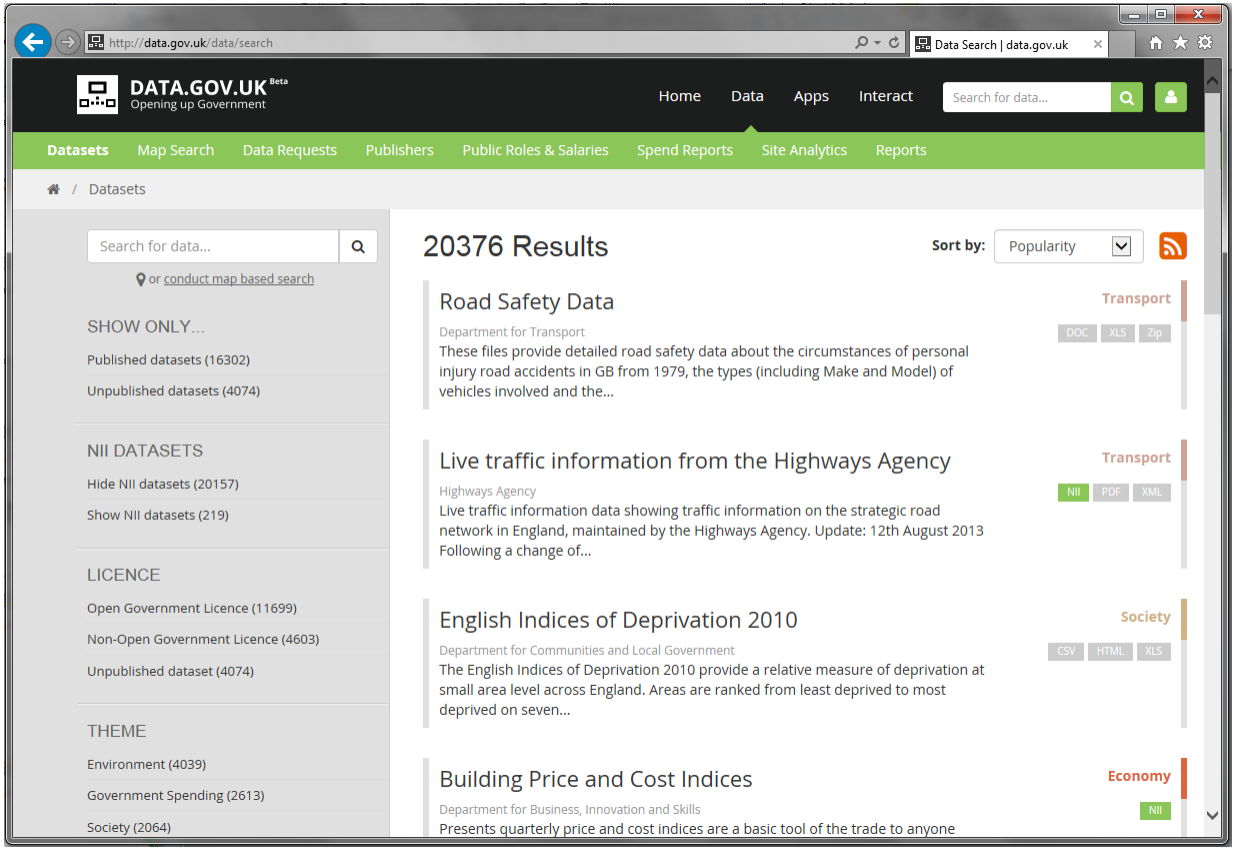
Other open data – data.gov.uk



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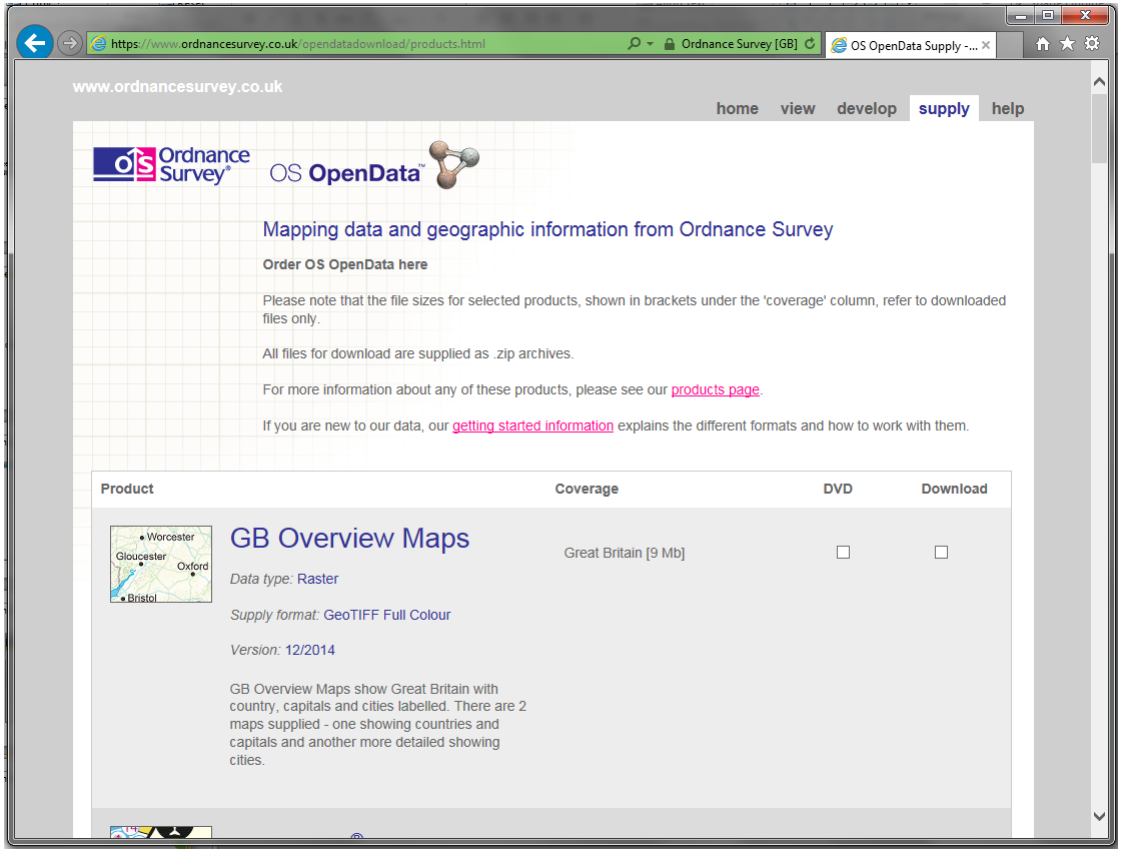
Other open data – OS OpenData



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Open-source GIS Software

What is Open-source GIS software?

Open-source (GIS) 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.

OSGeo : www.osgeo.org

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

Contributing to open software

- Report Bugs - so developers can check and fix things
- Participate in Support - on mailing lists, IRC channels, forums and user groups
- Write documentation / tutorials
- Translate
- Develop plugins and extensions to add new functionality
- Develop on core software

OSGeo projects

OSGeo Projects

Web Mapping
- deegree
- geomajas
- GeoMoose
- GeoServer
- Mapbender
- MapBuilder
- MapFish
- MapGuide Open Source
- MapServer
- OpenLayers

Desktop Applications
- GRASS GIS
- Marble
- QGIS

Geospatial Libraries
- FDO
- GDAL/OGR
- GEOS
- GeoTools
- OSSIM
- PostGIS

Metadata Catalogs
- GeoNetwork

Outreach Projects
- Public Geospatial Data
- Education and Curriculum
- OSGeo Live

Geospatial Libraries

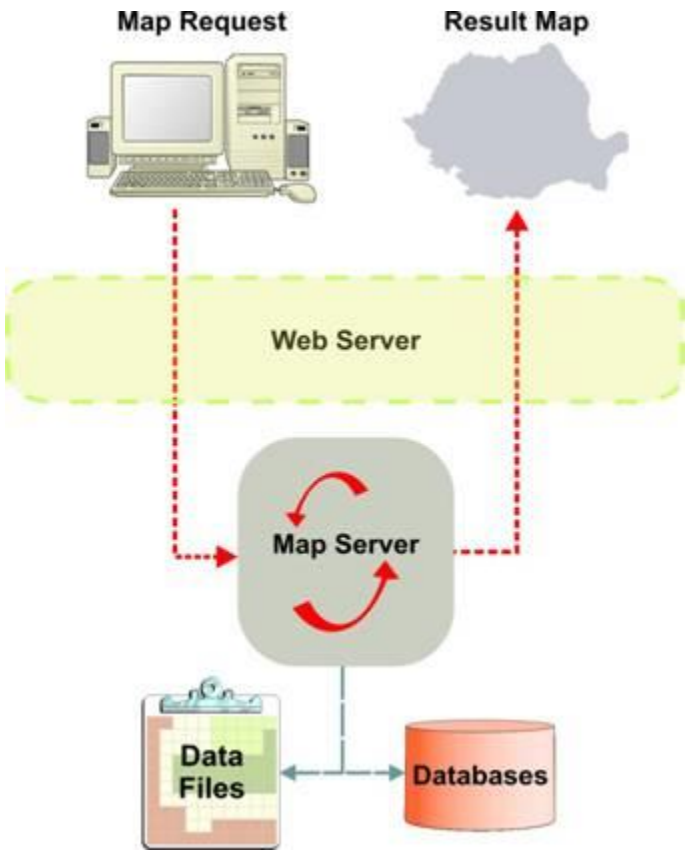
GEOS Geometry Engine Open Source

GeoTools

PostGIS Spatial PostgreSQL

```
from osgeo import ogr
import os

# Get a Layer's Extent
inShapefile = "states.shp"
inDriver = ogr.GetDriverByName("ESRI Shapefile")
inDataSource = inDriver.Open(inShapefile, 0)
inLayer = inDataSource.GetLayer()
extent = inLayer.GetExtent()

# Create a Polygon from the extent tuple
ring = ogr.Geometry(ogr.wkbLinearRing)
ring.AddPoint(extent[0],extent[2])
ring.AddPoint(extent[1], extent[2])
ring.AddPoint(extent[1], extent[3])
ring.AddPoint(extent[0], extent[3])
ring.AddPoint(extent[0],extent[2])
poly = ogr.Geometry(ogr.wkbPolygon)
poly.AddGeometry(ring)

# Save extent to a new Shapefile
outShapefile = "states_extent.shp"
outDriver = ogr.GetDriverByName("ESRI Shapefile")

# Remove output shapefile if it already exists
if os.path.exists(outShapefile):
    outDriver.DeleteDataSource(outShapefile)

# Create the output shapefile
outDataSource = outDriver.CreateDataSource(outShapefile)
outLayer = outDataSource.CreateLayer("states_extent", geom_type=ogr.wkbPolygon)

# Add an ID field
idField = ogr.FieldDefn("id", ogr.OFTInteger)
outLayer.CreateField(idField)

# Create the feature and set values
featureDefn = outLayer.GetLayerDefn()
feature = ogr.Feature(featureDefn)
feature.SetGeometry(poly)
feature.SetField("id", 1)
outLayer.CreateFeature(feature)

# Close DataSource
inDataSource.Destroy()
outDataSource.Destroy()
```

Web Mapping

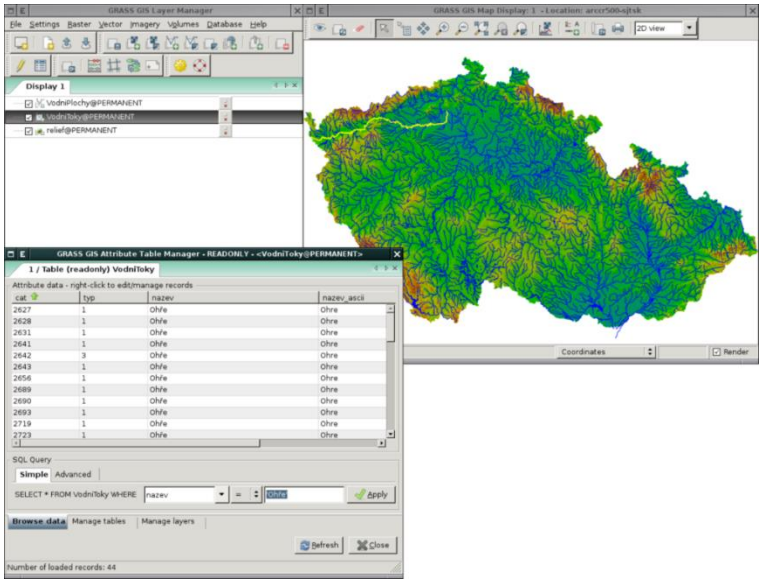


OpenLayers 3.0

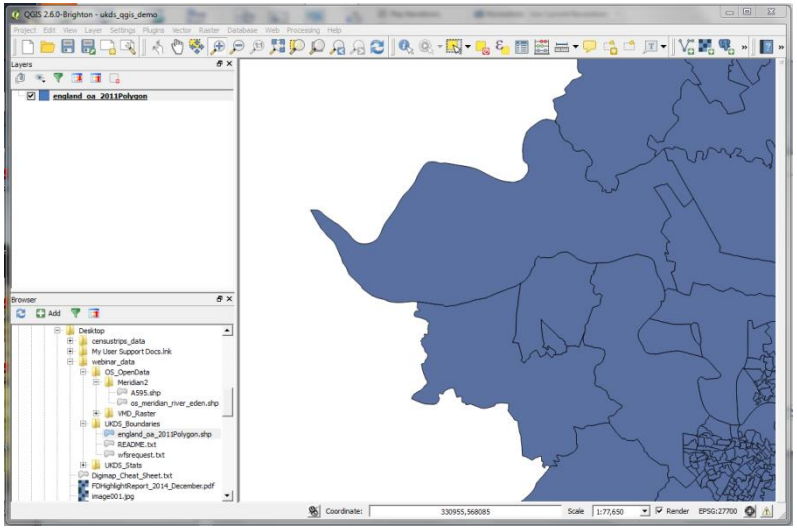
MapServer
open source web mapping

Desktop Applications

GRASS GIS



QGIS



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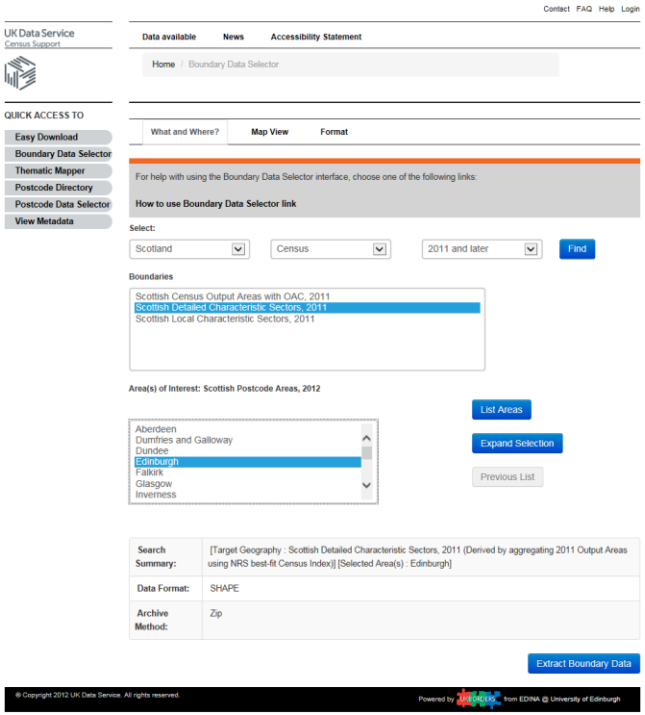
UKDS-CS Boundary Data Selector application powered by OSGeo software

QGIS used to check/prepare data

Boundaries held in **PostGIS** database

Map View in Boundary Data Selector uses **OpenLayers** to render preview maps using **MapServer**

Boundary data extracts are serviced by **GeoServer**



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Using UKDS-CS data in QGIS

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Practical demonstrations of use of open data from UKDS-CS in QGIS software

- From UKDS-CS we have downloaded a set of OGL small area aggregate statistics and boundaries
- From OS OpenData we have downloaded GIS layers & contextual background layers
- Over the rest of the webinar we`ll look at a complete process of bringing this data into QGIS, creating map`s based on the census data and doing some spatial analysis.

Demo 1: Getting started with QGIS

- Obtaining / Installing QGIS
- Introduction to the QGIS interface

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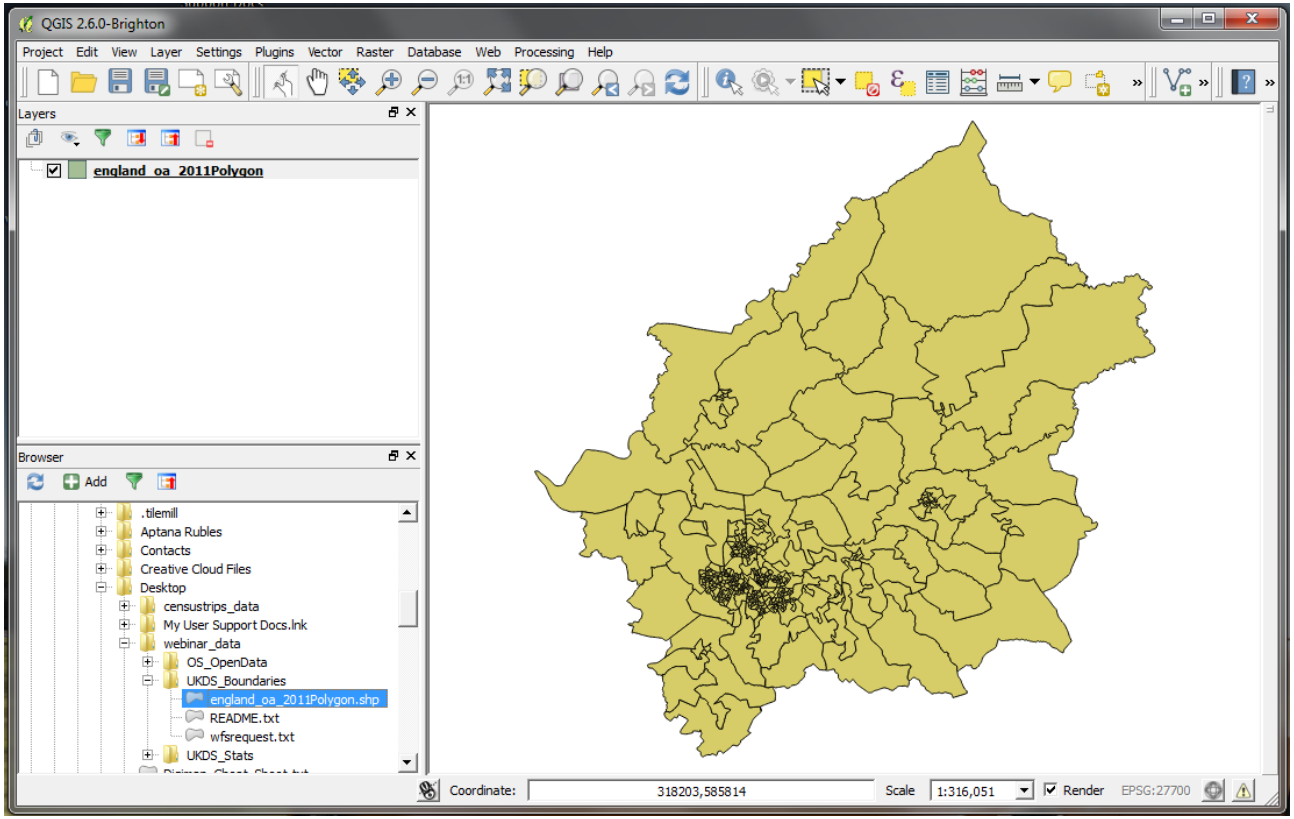
Demo 1: QGIS GUI



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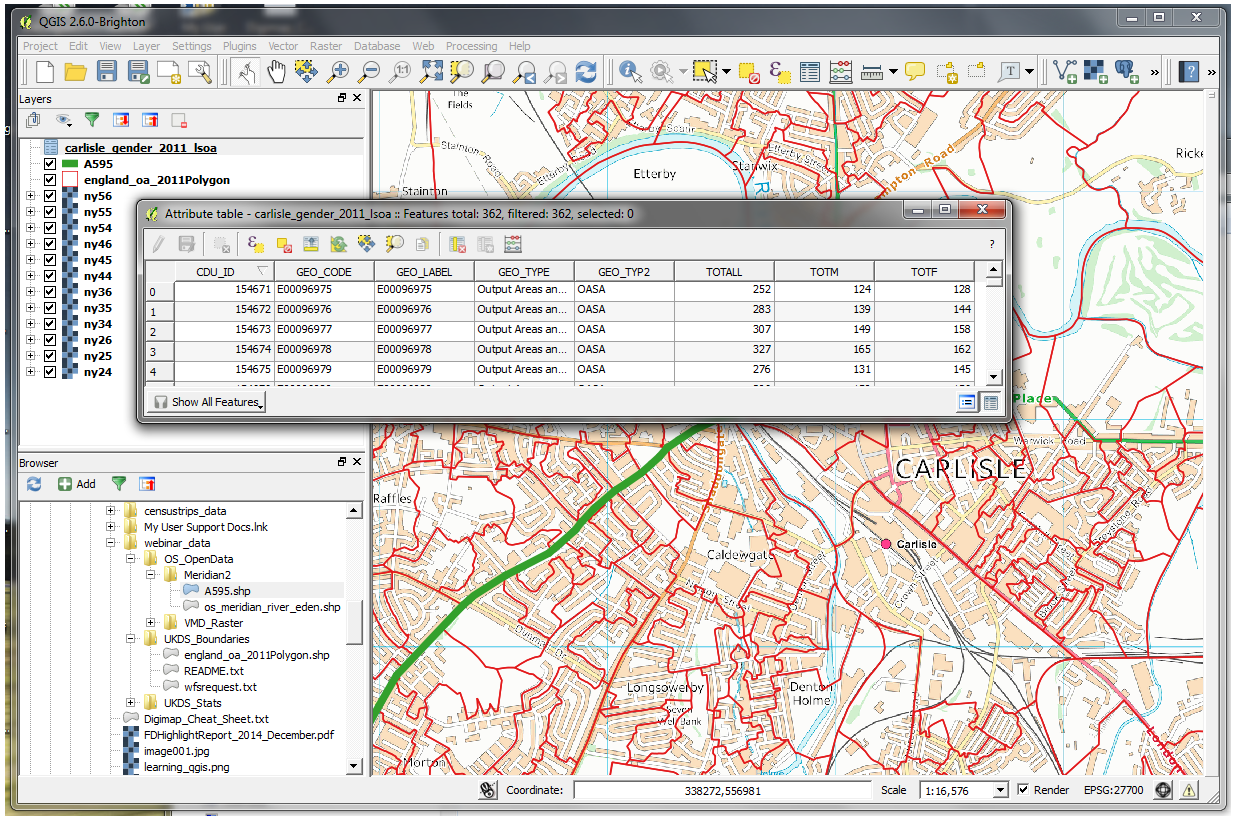
Demo 2: Opening data in QGIS

Census data downloaded from UKDS-CS can be opened in QGIS in different ways which has an effect on how that data can be used. Will show best practice.



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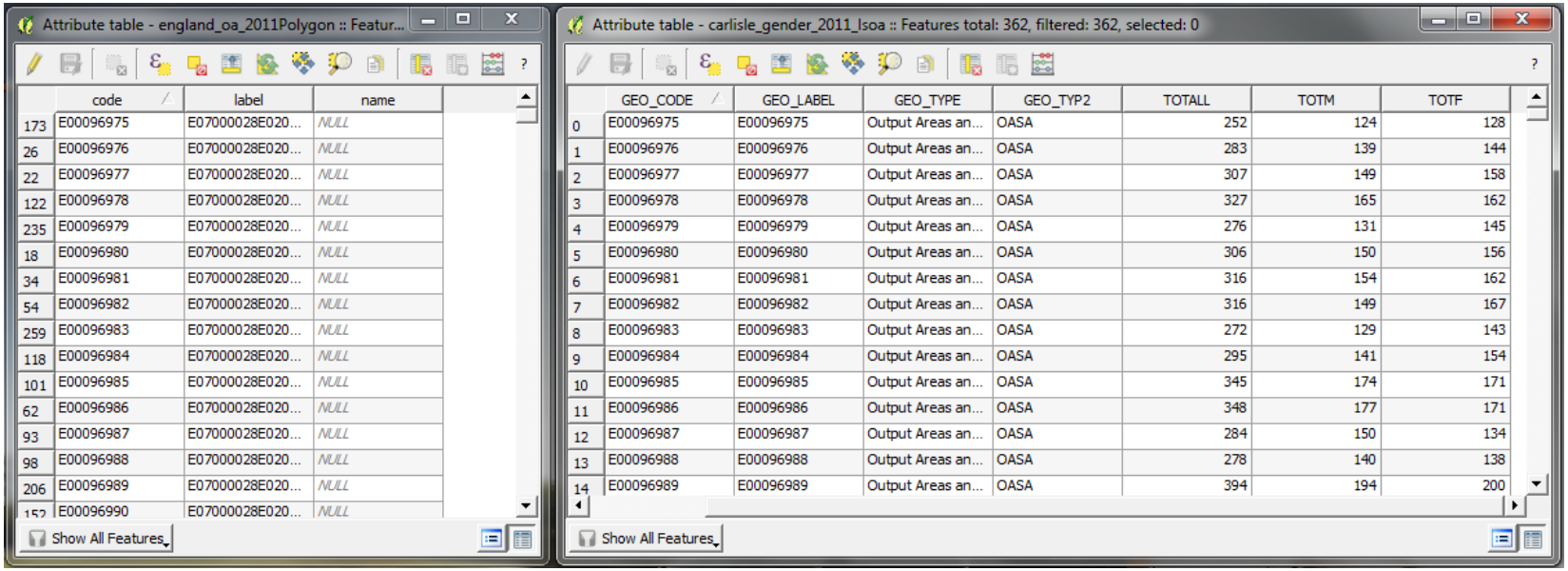
Demo 3. Linking data in QGIS

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



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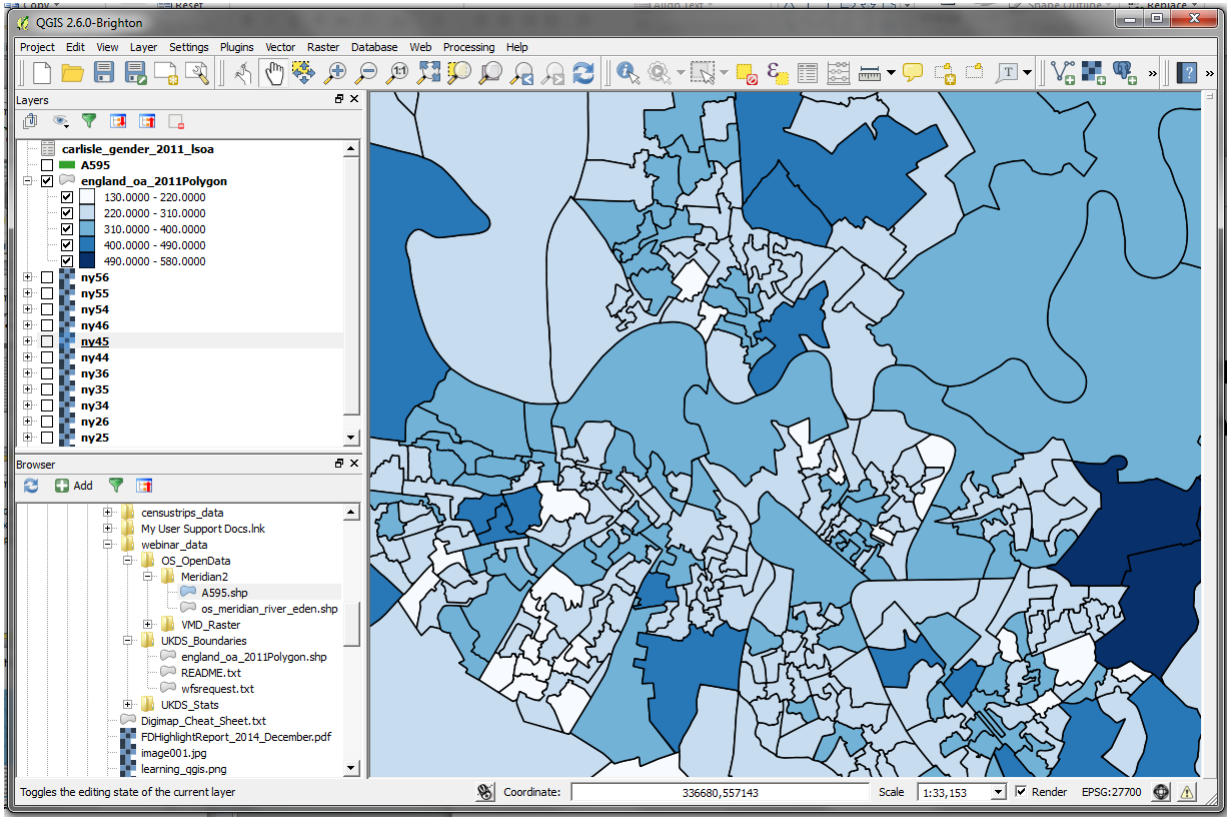
Demo 4. Making maps in QGIS

QGIS has excellent tools to create choropleth maps from UKDS-CS data and produce maps for inclusion in reports



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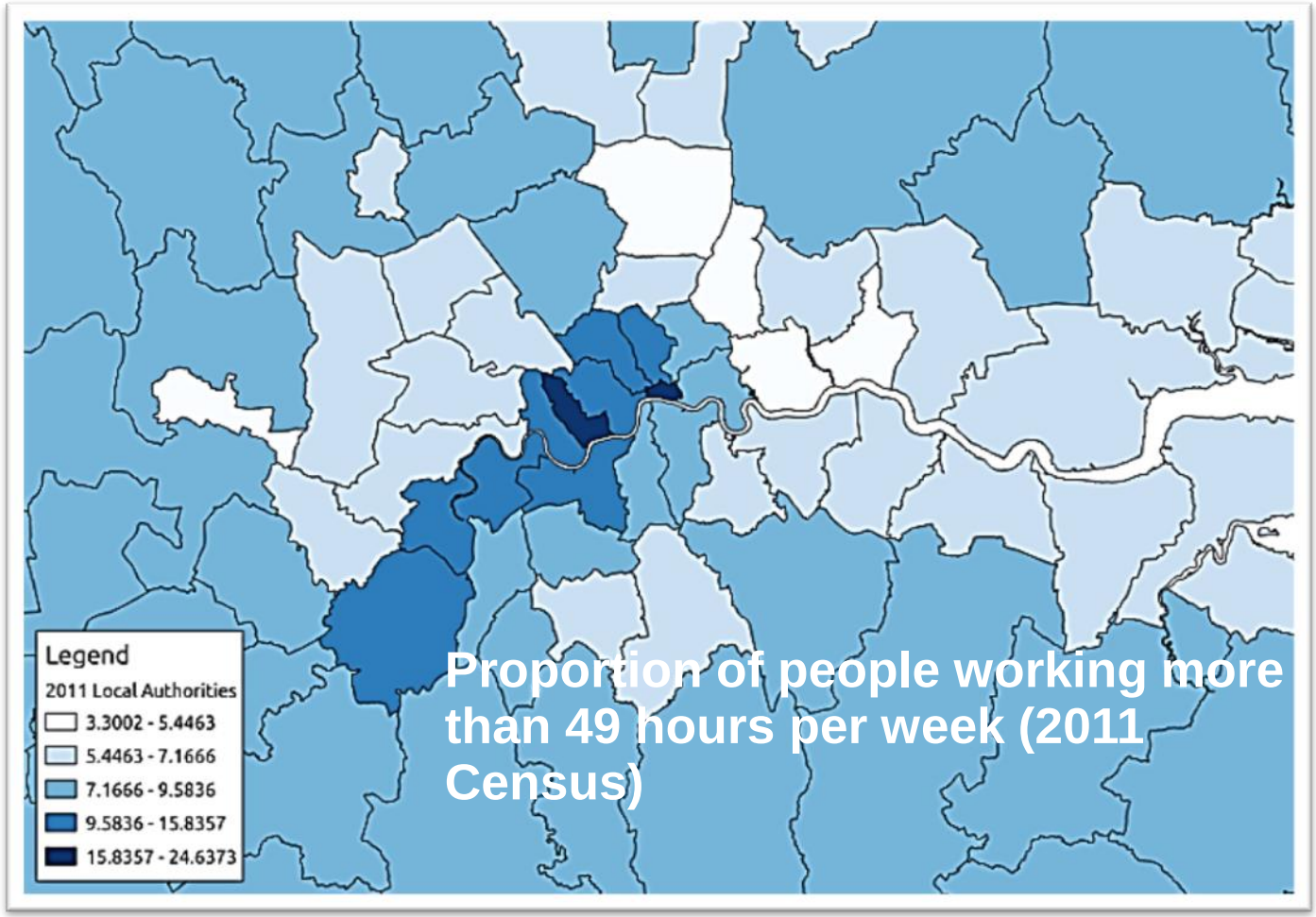
The Choropleth Map – visualize small area aggregate (census) data



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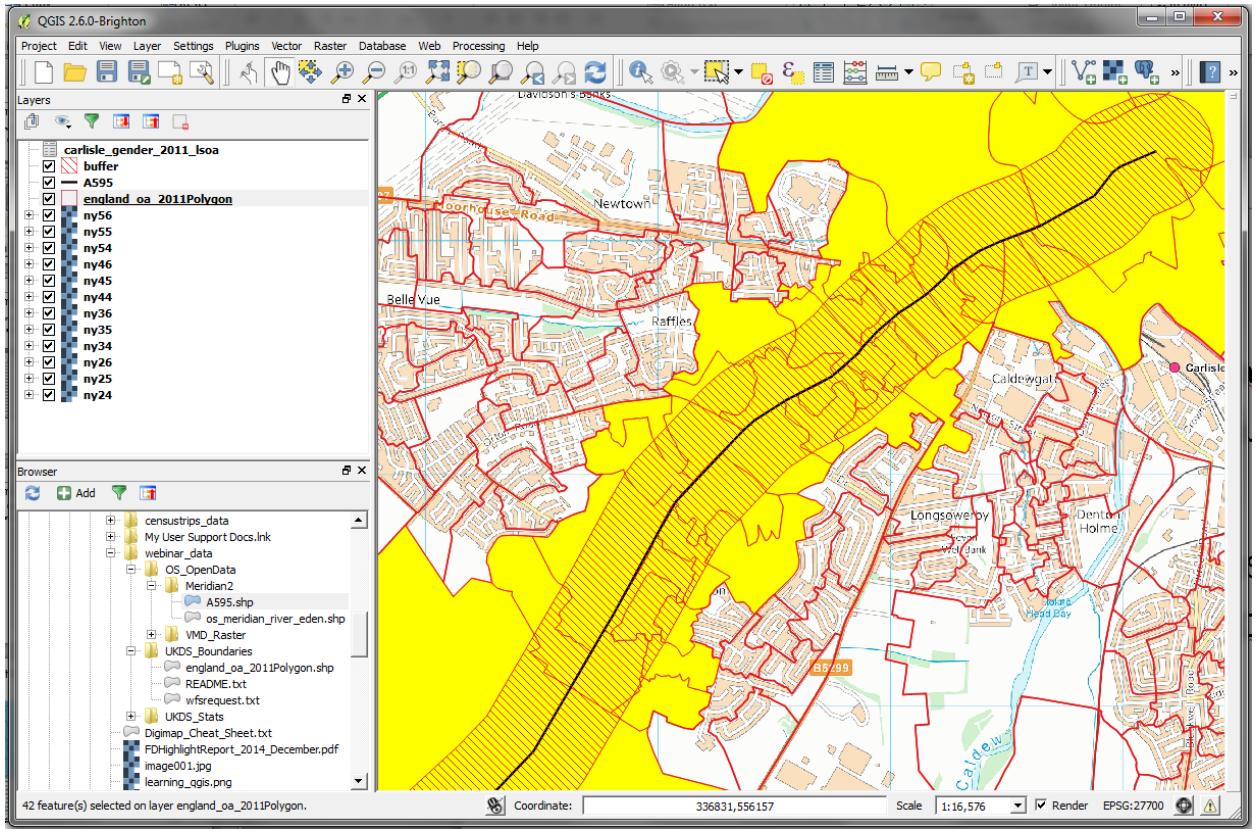
Demo 5. Analysis in QGIS

Spatial analysis between UKDS-CS data and geographical features in OS OpenData using QGIS



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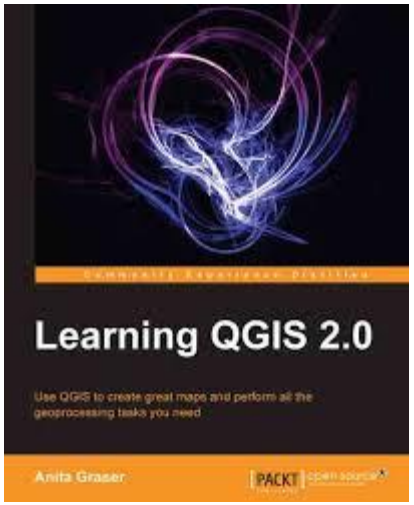
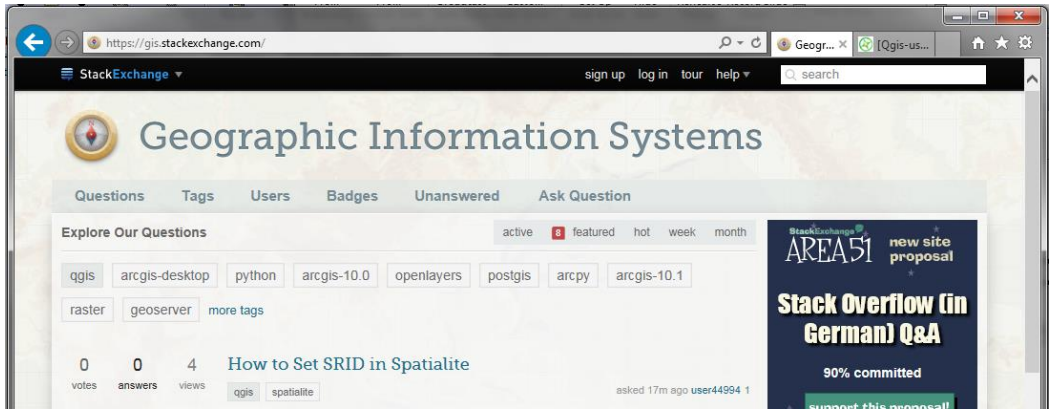
Advanced QGIS use

- Store aggregate and boundary data in a PostGIS spatial database – perform analysis using (spatial) SQL.
- QGIS Plugins – add extra functionality to QGIS. Chances are that if there is something that QGIS does not seem to do, a plugin has been written.
- If not, write own plugin or automate processes using Python language and PyQGIS.

QGIS Documentation / Books / Help





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