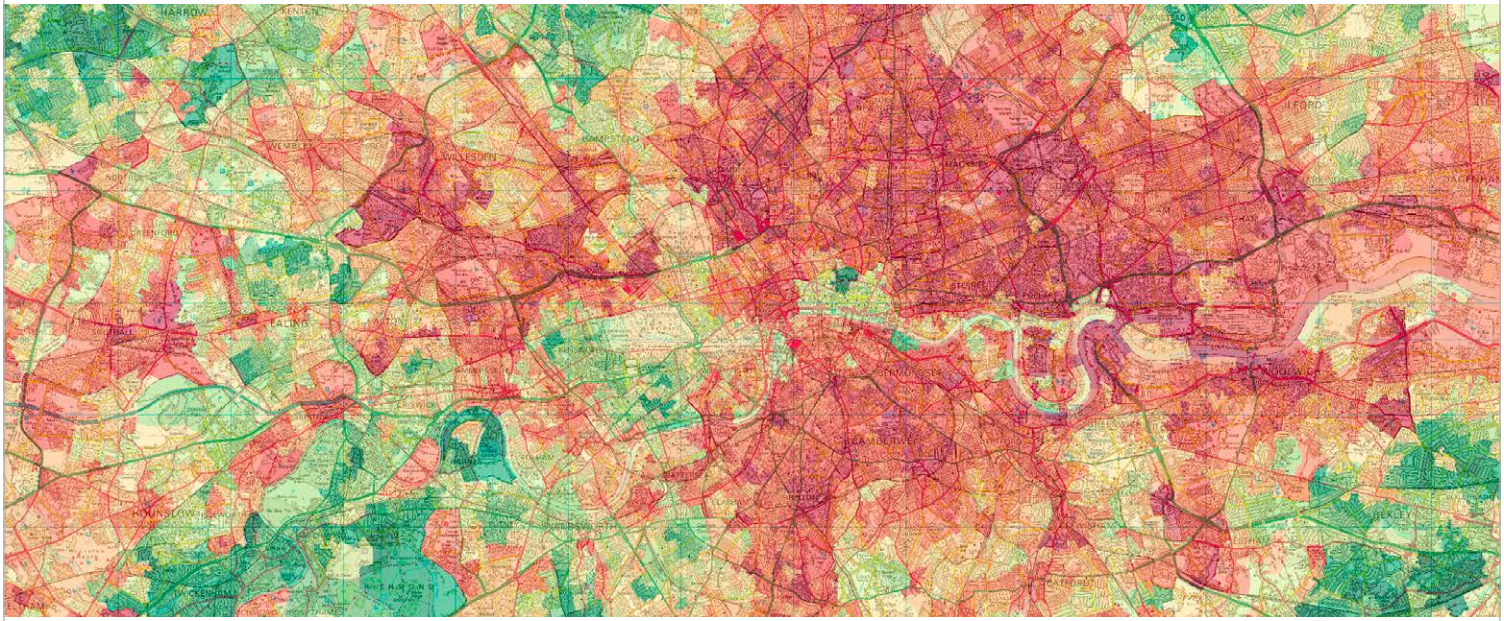
Ordnance Survey

Office for National Statistics

Central government **Case study**

Public Sector Mapping Agreement (PSMA)

Office for National Statistics created output areas using Ordnance Survey and census data



The Office for National Statistics (ONS) is the UK's largest independent producer of official statistics on the economy, population and society of England and Wales at a national, regional and local level. ONS conducts a census in England and Wales every 10-years, the last being in 2011, taking data from over 32 million questionnaires. The information from the questionnaires is then processed and turned into invaluable data and statistics which can then be used to inform and support government policy, decision-making and services in the public and private sector.

The challenge

Census estimates are published for various levels of geography, from national down to local geographies such as wards and parishes. One significant challenge for the census is not to reveal information about any individual, household or business, either from estimates released at the lowest level of geography, or by comparing estimates from one geography to another, overlapping one to get the 'difference' between them. The lowest level for which census estimates are published is the output area (OA).

The solution

ONS created OAs for England and Wales, using the 2001 census data and spatial data now available under the Public Sector Mapping Agreement (PSMA). The PSMA is a licensing agreement that allows all public sector organisations across England and Wales to use geographic data provided by Ordnance Survey, completely free at the point of use. Around 175,000 OAs were created, each containing an average of around 300 people or 125 households. No OA could contain less than

100 people or 40 households to ensure no estimates released for them disclosed information about a person, household or business.

OAs were created, firstly by drawing synthetic polygons around each census household address point, sourced from Ordnance Survey ADDRESS-POINT data, containing grid-references for all postal addresses on Royal Mail's Postcode Address File (PAF). These address polygons were then dissolved into a set of postcode polygons, to which were attached information about the number of persons, households and the type of housing in that postcode. The postcode polygons were then grouped to form the OA zones using automated zoning software, with minimum and maximum population thresholds and with roughly homogeneous social groupings based on housing type. The OAs also aligned to the ward and parish boundaries current at the time, sourced from Ordnance Survey Boundary-Line data, to road and rail lines and other natural boundaries where possible. The 2001 OAs were later grouped together to form super output areas (SOAs), a lower layer (LSOAs) and a middle layer (MSOAs). An upper layer of super output areas (USOAs) was created for Wales only.

For the 2011 Census, ONS needed to adjust the OAs to reflect the population change that had occurred since 2001. Where populations had grown very large, a 2001 OA was split into two or more smaller 2011 OAs. If the population in a 2001 OA had fallen below the minimum threshold (100 people and 40 households), it was merged with a neighbouring OA so that estimates released for the merged area could not now identify a person, household or business. A very small number of 2001 OAs were adjusted to align with local authority boundaries that had changed since 2001 and also where they were considered not socially homogeneous and unsuitable as a small area for statistics. To maintain the stability of the OA and SOA geography, only 2.6% of the OAs and SOAs in England and Wales were adjusted, and because they were largely splits or merges of the 2001 OAs/SOAs, this made it easierto compare 2001 and 2011 statistics published on the different versions of the OA/SOA geography.

The 2011 OA/SOAs maintenance used key PSMA datasets, such as Boundary-Line for the local authority boundaries, and OS MasterMap Integrated Transport Network (ITN) Layer to align maintained zones to road and rail lines.

Return on investment

'OAs and SOAs are now widely understood and used across the research community as stable statistical geographies from which data from different themes can be brought together and presented and compared on a common geographical base.'

Andy Tait,
Head of ONS Geography.

Data products used:

- **ADDRESS-POINT®**
- **Boundary-Line™**
- **OS MasterMap® Integrated Transport Network™ (ITN) Layer**

As well as maintaining the OA and SOAs from the 2011 Census, ONS also created a set of workplace zones, based on where people worked rather than where they lived. Workplace zones were either splits or merges of the 2011 OAs, and nested within the MSOA.

The benefits

- The census is available at a level of detail that does not compromise the privacy of individual households by making them identifiable.
- Statistical areas are consistent across the two censuses, so data is comparable, both in the 2011 Census, and against 2001 Census information.
- The spatial mapping of census data makes the information much more useful to its users, with overlays on established boundaries allowing easy comparison with existing statistics and new information.
- The introduction of workplace zones alongside OAs now allows researchers a geographical base on which to mine data on the working life of the UK as well as the domestic life.

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