

# Defining Census Geographies: International Perspectives

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## Introduction

Censuses are about geography: there are far simpler ways to both measure national populations and estimate their overall characteristics in considerable detail. However, the results have traditionally been presented mainly as tables, not maps, with the individual data values associated with place-names, not polygons. Although the most recent censuses have been provided with detailed and sophisticated geographical frameworks via Geographical Information Systems technology, 'historical' censuses from as recently as the 1970s are full of pitfalls for the unwary. Most census reports are designed to permit detailed comparison with the previous census, but longer term comparisons are usually obscured by changing reporting units. One consequence is that sub-national analysis of census data tends to be based on comparative statics, not long-run dynamics.

This article begins by discussing the complex saga of the changing census geographies of England and Wales, and then presents comparative material for five other European countries. The final section discusses how such information can be systematised, arguing that traditional approaches based on gazetteers and placename thesauri are inherently flawed and that the long-term solution lies in holding census data in spatially-enabled databases in which statistical data are associated directly with polygons.

## England and Wales

What follows covers England and Wales, Scotland and Ireland having separate censuses. We have been conducting population censuses for 200 years, during which there have been three complete changes in the principal reporting geography, two other systematic redrawing of boundaries and a constant trickle of boundary changes:

- **1801-51: Ancient Counties and Hundreds.** The origins of this system is lost in the mists of time; it certainly dates from a time when government was far smaller than today. The country was divided, traditionally, into 55 counties (including the three Ridings of Yorkshire) and these were in turn divided into approaching a thousand 'Hundreds', so called because a very long time ago they contained a hundred households; in some parts of the country, these units were called 'lathes', 'wappentakes' or 'wards'. Towns with legal status existed as 'Boroughs' at the same level as Hundreds. These units were employed by the first four censuses, from 1801 to 1831, conducted by the priests of the state church, the only sub-county officials in place everywhere. The following geography applied in 1801; note that two thirds of the individual 'places' listed were described as being parishes, but another 4,000 were townships, sub-units of the large parishes often found in the north of England and other units like chapelries and even just 'places' were listed:

Level	Number of areas	Average no. of people
<b>Ancient County</b>	55	162,000
<b>Hundred/Borough</b>	1,017	8,800
<b>'Places'</b>	15,105	590

It is fairly clear from the 1851 census report, which contained population counts from all censuses back to 1801, that the original censuses were often confused, and left no clear records. For example, we find for two villages in Kent, 'the parish church of Hurst being in ruins, the inhabitants attend divine worship at Aldington, with which parish the population of Hurst was probably returned in 1801'; and, more simply, 'the parish of Elham was not returned in 1801'.

- **1851-1911: Poor Law Unions/Registration Districts (PLUs/RDs)** (and sub-Districts): Poor Law Unions were created by the Poor Law Amendment Act of 1834, and England and Wales was divided into about 630 unions by commissioners on the basis of market towns and their spheres of interest, as part of the almost complete reconstruction of the English state in the early nineteenth century (many British institutions, *especially* the ones with robes and Latin rituals, are newer than their US equivalents). The new Poor Law created a new layer of sub-county paid officials. When civil registration of births, marriages and deaths was introduced in 1837, the Registrar General used almost the same set of areas as Registration Districts but also sub-divided them into about 2,000 Registration sub-Districts. Although the set of names of Registration Counties was almost identical to the list of Ancient Counties, they were aggregates of Registration Districts and often had substantially different boundaries. Unions and Registration Districts declined in importance in the late 19th century, were ignored by the census after 1911, but disappeared only in 1930. The following figures come from the 1881 census:

Level	Number of areas	Average no. of people
<b>Registration County</b>	54	474,000
<b>Registration District</b>	625	41,000
<b>Registration sub-District</b>	2,148	11,900
<b>Parish</b>	15,172	1,680

- **1881-1971: Local Government Districts (LGDs)**: Starting in the 1870s, but especially as a result of the Local Government Acts of 1888 and 1894, approaching 2,000 LGDs were formed. They first appeared as Urban and Rural Sanitary Districts: once local government became involved in water suppliers and sewers as well as administering the poor, urban areas had to be managed differently from rural ones. Like Registration Districts, LGDs were aggregations of parishes and were usually formed by designating urban parishes as County or Municipal Boroughs, or Urban Districts, and designating the remainder of each Poor Law Union as a Rural District.

Urban and rural parishes tended to have very different populations, so urban areas were further divided into wards whose function was primarily electoral; in rural areas, civil parishes had a limited administrative role but tended to be grouped into electoral wards. Between 1931 and 1939, 1,805 boundary changes through a series of County Reviews reduced 1,800 LGDs to 1,472, creating an essentially new geography but based on the same set of district types. In 1951, the census geography was as follows, but there was enormous variation in population sizes within levels, districts ranging in size from Llanwrtyd Wells Urban District (Breconshire) with 561 people to Birmingham with over 1.1m:

<b>Level</b>	<b>Number of areas</b>	<b>Average no. of people</b>
<b>Administrative County</b>	59	740,000
<b>District</b>	1,467	30,000
<b>Civil Parish</b>	12,521	3,500
<b>Ward</b>	16,611	2,600

- 1981-2001: Districts and Unitary Authorities:** In 1974, the local government system was reformed, most smaller towns being merged into the surrounding rural area but major urban regions, such as Merseyside and the West Midlands being recognised as Metropolitan Counties carved out of the traditional shires; one aim was to create districts large enough to offer a wider range of services to their inhabitants. Overall, 1,366 districts in 1971 became 403 in 1981. More recently, political conflict between the Thatcher government and Labour-controlled Metropolitan Counties led to these being abolished in 1986, all powers going to the districts. In 1996 many of the shire counties and their districts were replaced by new unitary authorities, but elsewhere counties and districts remain. With the creation of the Welsh Assembly in 1999 and the Greater London Authority in 2000, the geography of local government in England and Wales is as messy as it has ever been, and the census has had to reflect this. From 1971 onwards additional ‘Small Area Statistics’ were released electronically at ward level and sometimes for enumeration districts, purely statistical units with no administrative function, but while new technologies made it easier to provide additional detail, growing concerns about confidentiality have made it harder. The anonymisation of census micro-data usually involves the removal of geographical detail as well as personal names, so the only geography within the 1991 Sample of Anonymised Records are 278 ‘SAR areas’ which are local government districts or combinations of them. Confidentiality concerns also rapidly ended the 1971 experiment in publishing data by 1 km grid square, as any grid dense enough to provide useful detail for major cities would inevitably contain just one or two households in mountainous districts. One final problem for modern censuses is that the only unambiguous geographical code most people can locate themselves by is the Post Code, but that system was designed by the Post Office without reference to administrative geographies.

Level	Number of areas	Average number of households
County	55	400,000
District	403	50,000
Ward	9,930	2,000
Enumeration District	113,465	200

- Minor Administrative Units:** Although the above geographies are used by almost all thematic census tables, the reports also contain population counts for many other geographies. For example, 1871 census report claims to list information for: “Counties; Parliamentary Divisions and Parliamentary Boroughs; Hides, Tythings, Hundreds, Wapentakes, Wards, etc.; Lieutenancy Sub-Divisions; Petty Sessional Divisions; Police Divisions; Highway Districts; Local Board Districts; Boroughs and Towns with Improvement Commissioners under Local Acts; Civil Parishes and Townships, and Extra-Parochial Places; Military Districts and Sub-Districts; Post Office Districts; Inland Revenue Districts; Poor Law Unions; Registration Districts and Sub-districts; Census Enumeration Districts.” There is no systematic record of the boundaries of most of these units, although the majority were probably aggregates of parishes.
- Mapping the Census:** Systematic Digital Boundary Data (DBDs) were created as part of the 1981 and 1991 censuses, although these data are not freely available because the Ordnance Survey, the national mapping agency, operates semi-commercially and seeks to maximise income from its copyrights. My own project has created systematic DBDs down to parish level for all censuses 1871 to 1971, based partly on systematic lists of boundary changes which appeared in the census reports. One problem that has emerged is that the geographies used by these censuses were not identical to the administrative geography as legally defined on the census date and nor were they documented in the reports, so some details have had to be inferred via a careful comparison of the administrative geography and the parish-level population tables. For pre-1871 censuses, we are converting the results of a separate research project by Richard Oliver and Roger Kain of Exeter University, based on unpublished tithe and enclosure maps, into a true GIS. However, a complete record of census boundaries for this period is probably impossible as the Ordnance Survey did not complete its recording of parish boundaries until the 1880s; this must have created difficulties for the census officials themselves. All these DBDs are or will be downloadable from the UKBORDERS service, which is probably unique in the world (but only accessible to UK academics because it contains Ordnance Survey data):

<http://edina.ac.uk/ukborders>

### Other European examples

The British experience is perhaps uniquely complicated. Researchers into historic boundaries often relate change to political upheavals and assume that Britain’s political

stability will mean stable boundaries. The above account emphasised the economic and social pressures driving boundary changes and the creation of new administrative systems, but another key factor was the extreme centralisation of political power in Britain: **all** sub-national units existed at the discretion of the Westminster parliament, and could be swept away by any party with a simple majority in the House of Commons. The history of local government over the 20<sup>th</sup> century is essentially about central government wishing to deal with and supervise a manageable number of units while ensuring that no individual unit became a significant rival for power; this is why the governance of London has been so problematic.

The history of **Portugal's** census geography is very different. The first census was carried out in 1864 and has been repeated at ten year intervals. It follows a three-tier administrative geography consisting of 18 districts, 275 municipalities (*municípios*) and 4005 parishes (*freguesias*). This geography was created in 1835 following the Liberal Revolution, replacing an earlier system of 8 provinces and 816 districts in which parishes were purely ecclesiastical units; earlier censuses in 1527 and 1801 were carried out by the church. The number of districts was cut from 351 to 256 in 1855, and one new district was created in 1926, but the overall history is one of great stability apart from a single episode of revolutionary change.

The area now occupied by the **Czech Republic** was part of the Austro-Hungarian empire until 1918; an independent Czechoslovak Republic 1918-39; the German-controlled Protectorate of Bohemia and Moravia 1939-45; the Czechoslovak (Socialist) Republic 1945-90; Czech and Slovak Federal Republic 1990-92; and finally the Czech Republic or Czechia since 1993. Despite this complex history, a census has been taken every 9-11 years apart from WWII: 1869, 1880, 1890, 1900, 1910, 1921, 1930, 1950, 1961, 1970, 1980, 1991. The main geographical units employed by the census have been parishes, municipalities, districts and regions. The system of parishes dates from 1817, with a few changes; the municipalities from 1850; the districts from 1960 and the current system of regions from 2000. Very detailed mapping, at 1:2,880 scale and showing individual land holdings as well as administrative units, was first assembled in 1824 as under the Habsburgs a land tax was the state's main source of income.

Year	1849		1855		1868		1928		1948		1949	1960	2000
	PD	JD	PD	JD	PD	JD	PD	JD	PD	JD	D	D	D
<b>Bohemia</b>	79	208	208	-	89	208	105	228	115	227	-	-	-
<b>Moravia</b>	25	76	76	-	30	76	45	106	48	108	-	-	-
<b>Silesia</b>	7	7	27	-	7	7	-	-	-	-	-	-	-
<i>All Czechia</i>	131	291	311	-	126	291	150	334	163	335	187	75	76
<b>Av. km.<sup>2</sup></b>	602	271	254	-	625	271	526	236	484	236	421	1052	1038
PD = Political District    JD = Judicial District    D = District													

The first **Norwegian** census was taken in the 1660s but limited to men; women were first included in 1769 and the first full nominative census was taken in 1801. There were

decennial statistical censuses from 1815 to 1855, and mostly decennial nominative censuses from 1865 to 2001. The main geographical units used are municipalities and counties/provinces, but before 1837 the parishes, judicial districts and regions were more important. The lowest layer, whether parishes or municipalities, has consisted of 450 to 725 units with populations ranging from 500 to half a million, so variations in the size of units at the same level have been as large as in England. Boundary changes are approved by parliament, plus sometimes a referendum, and since 1837 they have been published in parliamentary reports, giving year and often a precise date. However, descriptions of boundary lines are often vague, especially in remote and mountainous areas.

Like Portugal, **France's** administrative geography was drastically altered by the Revolution. Up to the eighteenth century, it was based mainly on c. 40,000 parishes which in 1789 were grouped into 117 *évêchés* and 18 *archevêchés*. The modern administrative system is still essentially that created by the revolution: the smallest units are the *communes*, 36,559 now, but around 40,000 in 1790; next the *cantons* (3,861 today); then the *arrondissements* (329) and the *departments* (96). The 22 *régions* were created only in 1982. Change has been limited, so for example the only new *departments* to be created have been Loire (1793), Tarn-et-Garonne (1808) ; three in Savoy and Nice (1860), Territoire-de-Belfort (1871); five around Paris (1964) and one in Corsica (1975). All boundary changes have to be approved by the Ministry of the Interior, and since 1943 they have been systematically recorded by the Institut National de la Statistique et des Etudes Economiques, but earlier changes have yet to be systematically studied. Although attempts were made to conduct censuses from 1774 onwards, they were of irregular quality and the first regular census was taken in 1836. For the next century they were taken at five-yearly intervals but since WWII the frequency has been reduced for economy. The data have always been gathered and tabulated for administrative units from *communes* upwards.

**Denmark** has also experienced great stability, most of the units in use today appearing in sources from c. 1000 AD. The three main tiers are the parish, district and county. Parishes (*sogn*) are the oldest and smallest units, and probably predate christianisation. Their boundaries did not change from the Middle Ages until the Reformation in 1536. After the Reformation some of the smallest parishes were merged into bigger parishes, and in the wars of the 17<sup>th</sup> century many churches were destroyed and their surrounding parishes abolished. However, since parish boundaries have remained stable to a very large degree, some new urban parishes being created in response to population growth in the twentieth century. Districts (*herred*) may have been created as areas large enough to equip a specific number of troops and horses; they usually consist of five to fifteen parishes. Finally, the counties (*amt*) were introduced by law in 1662, although based on an earlier system of *fiefs*, and were reformed in 1793 to make them more equal in size and population; they then remained very stable until 1970 when a major reform created a two tier system of 277 municipalities and 14 counties. The Danish census has always used these administrative units, especially districts and parishes; an aggregate census was taken in 1769 and the first census gathering information on all individuals was in 1787. From 1840 there was a census every five years until 1970, when it was replaced by snapshots taken from a computerised population register.

More example could obviously be given but this is sufficient to draw some conclusions. Firstly, the geography of the census is almost always closely related to that of local administration. Secondly, there is surprisingly little relationship between political stability and the stability of administrative geographies: England has had fewest major upheavals, and no invasions, but has experienced frequent transformations of its internal boundaries; far more than the Czech Republic, despite the latter's fragile history. Revolutions led to massive revisions in Portugal and France, but the rest of their history is fairly stable. Thirdly, all accounts admit to some changes especially in the twentieth century, the main pressure for change coming from urban growth. Lastly, there must be a suspicion that claims that boundaries did not change reflects a lack of research. It is not hard to find American historians who assume that US county boundaries changed only through progressive subdivision, but the Newberry Library's *Atlas of Historical County Boundaries* project has demonstrated the falsity of this (see [www.newberry.org/ahcbp](http://www.newberry.org/ahcbp)).

### **Approaches to Systematisation**

The need to link census data to geography was understood early on: for England and Wales, the 1851 census reports include a 288 page gazetteer, giving for each listed place the Parish, County, Registration District, "Hundred, Wapentake or other Division of County", the Parish and, for places that were parishes, "the nature of the Benefice and the Name of the Diocese". The earliest correspondence between the Registrar General, responsible for the census, and the Ordnance Survey was in connection with the 1881 census, and the resulting maps are one of the sources used in constructing our GIS. However, maps and GIS have tended to be seen as the specialist and expensive province of the geographer, and the main emphasis has been on textual metadata. Unfortunately, there are two major problems.

The first is that stability of naming can be very misleading. Every English census has included data for 'counties', and the lists of county names do not change all that much. However, more careful examination shows that at least four kinds of counties have been used in English civil administration over the last two hundred years, and their boundaries were often strikingly different. For example, the 1851 census reports are organised primarily in terms of registration counties but also provide information on 'ancient' counties. The Registration County of Cambridgeshire had a population of 191,894, but of these 23,331 (12%) lived outside the ancient county. Conversely, 18,191 (9%) were in villages within the ancient county but outside the Registration County. The Association of British Counties ([www.abcounties.co.uk](http://www.abcounties.co.uk)) is 'dedicated to promoting awareness of the continuing importance of the 86 ancient or geographical (traditional) Counties of Great Britain' but arguably needs to be clearer about which set of historical counties they are devoted to.

Boundary changes also create great scope for confusion. For example, in 1911 Swansea Rural District had a population of 43,228, but by 1921 this had fallen to 24,752, a decline of 42%. Is this evidence of the demographic impact of World War I? The real cause was a transfer in November 1918 of an area containing 26,221 people into the adjacent County Borough of Swansea. Comparing like for like, the 1911 population of the district as it was defined in 1921 was 20,465; and in 1911 it had been only 12,221, so this was a rapidly growing area on the edge of a great city. This is obviously a

particularly extreme example, but the cumulative impact of smaller changes also matters. Our textual database of boundary changes, not all of which we have been able to map, includes 383 changes to Poor Law Union and Registration District boundaries up to 1911, 5,874 changes to local government districts from the 1890s to 1973, and 26,944 changes to parishes between 1876 and 1973. Almost all this information was tabulated at the back of census reports, but it is almost impossible to 'bear these in mind' when consulting the more interesting tables at the front.

Secondly, administrative geographies appear to offer neat hierarchies, easily captured in a relational database and forming the basis for geographical thesauri. Boundary changes and transfers of sub-units complicate matters. However the real problem, for England at least, is that many obvious generalisations about hierarchical relationships turn out to be false: Hundred boundaries often sub-divided Ancient Parishes; although Registration Districts were always aggregates of Civil Parishes, sub-Districts were not; in the twentieth century, some Local Government Districts straddled two Administrative Counties, while Wards were sometimes sub-divisions of Civil Parishes and sometimes aggregates of them. There were and are Extra-Parochial Areas, often nameless tracts of "undivided moorland". Perhaps the crowning glory were "Bishop's Peculiars", the official name of Ecclesiastical Parishes which came directly under a Diocese (roughly equivalent to a county), by-passing the intervening hierarchy of Rural Deaneries and Archdeaconries. Even neat hierarchies can be deeply misleading. An example was given earlier of two units with the same hierarchic level whose populations differed by more than three orders of magnitude. This was not the most extreme example: if we go back to 1931, before the County Reviews, Birmingham was still the largest LGD with 1,002,603 people but the smallest was Newcastle upon Tyne Rural District with just 4, consisting of a single building within the city of Newcastle.

There is a way to cut through all this complexity: forget about hierarchies, place less emphasis on place-names and other labels, and concentrate instead on 'footprints': on the actual location and coverage of each unit, recorded via as detailed a set of geographical co-ordinates as possible. With traditional technology, this approach lies somewhere between the impossible and the absurd: can we imagine a census report in which all tables were replaced by maps, and maps on a large enough scale to make out the boundaries of the most compact urban units shown relative to familiar landmarks? If we can, should the numbers be simply printed onto the areas they relate to, or should they be presented graphically? Computers and electronic publishing provide relevant solutions, but there are still large problems, even if we can assume that the boundaries we are interested in, modern or historic, are available in digital form.

An obvious conclusion is that 'we need a geographical information system'. At one level this is an obvious implication of the previous paragraph: any computer system containing geographical coordinates is a GIS. However, off-the-shelf software packages sold as GIS systems can create more problems than they solve. They are expensive, and may simply be unaffordable if the aim is to provide every employee of a large organisation, or every computer in a major library, with geographically-enabled access to information. They involve many new concepts and some of the best known packages can be very unfriendly, so adopting them involves introducing a new and expensive group of IT professionals into an organisation. Transferring existing data 'into a GIS' may mean



massive disruption of both computing infrastructure and an organisation's procedures, and the new system may prove to be less effective than what it replaced in key areas; for example, GIS packages often have date handling facilities far inferior to mainstream relational databases, which is an obvious issue for organisations working with historical information.

The existing Great Britain Historical GIS consists of a large database of date stamped boundary lines — 64,170 arcs for the parishes — held within ArcInfo GIS software, and an Oracle database containing c. 30m. statistical data values held in over 200 tables. Our custom software written in Arc Macro Language understands how we have recorded dates and can manipulate the boundary database to create a set of polygons mapping the boundaries that existed at a particular date. A fundamental limitation of this architecture is that ArcInfo can access information held in Oracle, most obviously to create maps, but not vice-versa. Given that ArcInfo can write manipulated data back into Oracle, this limitation does not pose insuperable problems for our analytic research but providing public access is another matter.

Our new funding from the UK National Lottery requires us to make our content web accessible to 'life-long learners', which means pretty much anyone and everyone interested in local history. This is a very large audience and includes, for example, all the 8 to 11 year olds in England, who are required by law to prepare 'A study investigating how an aspect in the local area has changed over a long period of time, or how the locality was affected by a significant national or local event or development or by the work of a significant individual', using information on 'education; population movement; houses and housing; religious practices; treatment of the poor and care of the sick ...'. One implication is that our site must be able to handle very large numbers of users and, although tools exist for web-enabled GIS, they are arguably immature and impose a heavy computational burden on the server. Further, many of our users will be looking initially not for a map, or a census table covering the whole country, but for information for just their home area. As we have seen, searching for their home village or town by name may yield very misleading results, and the most interesting information may be for units they have never heard of.

We therefore need to use our locational information not just to draw maps but to offer different kinds of spatial searching. If users type in a placename, they need to get back not just a list of matching census reporting units but a map showing their locations. This means not just choosing between the nine 'Newtown's listed in different parts of the 1851 census but also between, for example, the parish, sub-district and district of Ledbury, all centered on the same settlement but covering progressively larger areas. However, we will encourage our users to specify not a name but a geographical location. One way to do this is by zooming in through a series of maps they can click on, but a quicker route is by specifying a post code; these identify individual business premises or a handful of houses within a street, so they are more precise than traditional US zip codes and are much more widely known than [what do you call the new longer ones?]. An available rather large look-up table converts these to geographical coordinates. Our dissemination system will be based entirely around Oracle database software but taking advantage of not just the mature web access features but the spatial extensions. Boundary polygons will be actually loaded into the database and once the user has specified a geographical

location we will search these polygons for those that contain this point. There will be a many-to-one relationship between polygons and our authority list of reporting units to permit boundaries to change over time.

The resulting system will not be just a spatially-searchable database of historical census information. Firstly, as it will ‘know’ the geographical area covered by each row in each census table held in the system it will be able to present tables as maps. To keep the computational burden on the server manageable this will be done in two ways: maps prepared in advance and stored on the server as GIFs or JPEGs, and interactive visualisation running within the browser. This will be achieved using GeoTools, an open source Java class library (see [www.geotools.org](http://www.geotools.org)), and the combination of GeoTools and the spatial extensions to Oracle will together support the Open GIS Consortium’s model for client-server GIS (see [www.opengis.org](http://www.opengis.org)); this really needs another article. The end result will be an on-line historical atlas of Britain, and although our current plans are limited to the period since the first census in 1801 there is clear potential for adding sources from earlier periods back to the Domesday Book of 1086.

Secondly, a system which knows so much about historical places — where they were; what boundaries they had at different dates; their changing populations and other demographic, social and economic characteristics; what they were called in different sources — will be a remarkably comprehensive historical gazetteer. The creation of a systematic gazetteer and place-name authority list for Britain is another major goal of our project, intended to support not just effective resource discovery within our primarily statistical holdings but also spatial metadata creation, especially in the archives sector, and casual reference enquiries. This aspect of the system is designed to be compliant with the Alexandria Digital Library Project’s Gazetteer Content Standard (see <http://alexandria.sdc.ucsb.edu/~lhill/adlgaz>) but this will not be a separate body of content, just another view of the underlying database. Adopting the ADL model means we are actively rejecting a hierarchical thesaurus model for our gazetteer facilities; many examples have already been given of real-world exceptions to apparent hierarchies, as well as the absurdity of equating units that contain 4 people and over a million.

## **Conclusions**

- The majority of census data, and much other public data, relate to specific geographical areas and are quite meaningless without a clear record of the areas’ boundaries.
- In most countries, these boundaries change substantially over time, not just through political upheavals but through the inevitable processes of urban growth and the changing scope of public administration. Ignoring boundary changes can lead to grossly inaccurate measures of demographic and social change.
- If these boundaries were not clearly mapped at the time, subsequent reconstruction will be enormously time-consuming and costly; the Great Britain Historical GIS project began in 1994 with a one-year grant to reconstruct 19<sup>th</sup> century Registration Districts but, after raising just over \$2m. in 24 grants from 14 different funding bodies, has fifteen staff and several years to run.

- In the past, geographical metadata for censuses has meant, primarily, place-name indexes and hierarchical thesauri; in the future we should rely more on direct recording of locational data.
- We need not just to create separate maps of reporting units, whether on paper or electronic, but to closely link this information into the census data themselves.
- GIS technology is a useful servant in this task but a poor master; if we want to make census data geographically-accessible ‘for the rest of us’, we need to spatially-enable mainstream databases.

### **Acknowledgments/Further Information**

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<http://www.geog.port.ac.uk/hist-bound>

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<http://www.lga.gov.uk> (see briefing notes on local government structure)

[http://census.ac.uk/cdu/Datasets/1991\\_Census\\_datasets/Area\\_Stats/General\\_Topics/Geography/](http://census.ac.uk/cdu/Datasets/1991_Census_datasets/Area_Stats/General_Topics/Geography/)

One useful published overview is: Redfern P. (1981) ‘Census 1981: an historical and international perspective’, *Office of Population Censuses and Surveys Occasional Papers*, No.25 (London: OPCS), especially section 3 on census geography.