



ONS Census Transformation Programme

Annual assessment of
ONS's progress towards an
Administrative Data Census
post-2021

May 2016

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1. Executive summary

In March 2014, the National Statistician made a [recommendation](#) that the census in 2021 should be predominantly online, making increased use of administrative data and surveys to enhance the statistics from the 2021 Census. This recommendation was endorsed by the Government's [formal response](#), which also set out its ambition that "censuses after 2021 be conducted using other sources of data... sufficiently validating the perceived feasibility of that approach".

This paper presents ONS's first assessment of its ability to meet this ambition and to move to an Administrative Data Census in the next decade. In order to produce the type of information that is collected by a ten-yearly census (on housing, households and people), an Administrative Data Census will require a combination of:

- access to record-level administrative data held by Government
- a population coverage survey
- a population characteristics survey

The following would need to be in place to enable ONS to move to an Administrative Data Census:

1. rapid access to existing and new data sources
2. ability to link data efficiently and accurately
3. ability to produce statistical outputs that meet priority information needs of users
4. acceptability to key stakeholders
5. value for money

These high-level criteria have been used to assess ONS's current progress and where we expect the assessment to be by 2023, see figure 1 and section 6, based on a number of assumptions.

Figure 1 Current (2016) and future expected (by 2023) high-level assessment

	Access to data	Ability to link	Ability to meet information needs of users				Acceptability to stakeholders	Value for money
			Population estimates	Households and families	Housing characteristics	Population characteristics		
Where are we now (2016)	Red/ Amber	Amber	Amber	Red/ Amber	Amber	Red/ Amber	Red/ Amber	Amber
Where do we expect to be by 2023?	Amber /Green	Green	Green	Amber /Green	Green	Amber	Amber /Green	Amber /Green

The assessment is supported by evidence and a description of what will be done to improve the position. The paper also has two annexes:

- Annex A provides an update on the acquisition of administrative data
- Annex B presents more detailed evaluation criteria that, after further development, will be used to carry out the assessment in future years

2. Background

2.1 Outcomes from the Beyond 2011 Programme

In May 2010, ONS began the 'Beyond 2011 Programme' to review the future provision of population statistics in England and Wales in order to inform government and Parliament about options for the next census. In particular the programme focused on the potential to replace the census with statistics based on administrative data¹ already held by government, supplemented by ongoing household surveys.

Significant progress was made in acquiring administrative data and developing new methods. During that time, the Programme acquired a number of administrative data sources, including the NHS Patient Register, the English and Welsh School Censuses, Higher Education Statistics Agency Student record and the combined DWP and HMRC Customer Information System. Using this data, administrative data based population estimates were [produced by Local Authority for 2011](#), and compared with the 2011 Census results as a measure of assessing the quality of the administrative data.

A wide range of options for providing census type statistics were extensively reviewed, international comparisons were made and public attitudes to data sharing for statistical purposes were researched in order to formulate ONS's views on the options.

ONS carried out a [public consultation](#) in 2013 seeking views between the two front-running options for 2021 – an online census or an alternative based on administrative data plus annual surveys. The Government response to the consultation emphasised the value of the information provided by the census. An [independent methodological review](#) of the options concluded "the online census option provides a methodologically sound basis for replacing Census 2011 methodology. We do not believe that there is yet sufficient evidence to support... the administrative data option."

On the basis of the research and evidence collected, the then National Statistician [recommended](#), in March 2014:

- *"An online census of all households and communal establishments in England and Wales in 2021 ... [with] ... special care taken to support those who are unable to complete the census online; and*
- *Increased use of administrative data and surveys in order to enhance the statistics from the 2021 Census and improve statistics between censuses.*

This would make the best use of all available data to provide the population statistics which England and Wales require and offer a springboard to the greater use of administrative data and annual surveys in the future. ...[It] may offer a future Government and Parliament the possibility of moving further away from the traditional decennial census to annual population statistics provided by the use of administrative data and annual surveys."

¹ Information gathered by government departments and agencies during their day-to-day activities when delivering a service, registering people or carrying out transactions.

This approach was endorsed by Francis Maude, Minister for the Cabinet Office, in the Government's [formal response](#) to the recommendation in July 2014:

“The Government welcomes the recommendation for a predominantly online census in 2021 supplemented by further use of administrative and survey data ...our support for the dual running of an online (decennial) census with increased use of administrative data is only relevant to 2021 and not for future censuses.

Government recognises the value of the census and its history as a bedrock of statistical infrastructure. The census provides information on the population that is of fundamental importance to society....

Our ambition is that censuses after 2021 will be conducted using other sources of data and providing more timely statistical information. However, any final decision on moving to the use only of administrative data beyond 2021 will be dependent on the dual running sufficiently validating the perceived feasibility of that approach.”

Following the National Statistician's recommendation and the Government's response, ONS established the Census Transformation Programme (CTP) in January 2015 to take forward three high level deliverables:

- a predominantly online census of all 26 million households and communal establishments in England and Wales
- development of alternative administrative data census estimates, and compared to the 2021 Census
- improved and expanded population statistics through increased use of administrative data and surveys

The remainder of this paper focuses on the latter two deliverables.

2.2 What information does a census provide?

The census collects information on housing (such as number of rooms; type of central heating) and provides three types of information on the population:

1. the size of the population – how many people in each area, by age and sex
2. households and families – such as numbers, size and type of families; for example single-parent families
3. population characteristics – such as information on ethnicity, educational attainment, hours of unpaid caring provided, religion, etc

The census is unique in providing information on the whole population at a point in time, at small areas (for example down to areas of 125 households), and for small population groups (for example under 18s doing more than 50 hours of unpaid caring a week). It is this unique information which makes the census so valuable to government, local authorities, businesses and other users, and why there is a continuing need for the information provided by the census.

2.3 Ambition to meet user needs

In line with the National Statistician's recommendation, ONS is actively pursuing the use of administrative data. We are aiming to replicate the information collected through the census with administrative data already held by government, supplemented by surveys. The goal is to be able to compare outputs based on administrative data and targeted surveys against the 2021 Census to demonstrate to government and other users that the alternative can produce high quality information at a lower cost, and can do so more regularly.

Given the importance of producing accurate statistics, it would have been high risk to move straight to such a system without benchmarking new methods against the 2021 Census. This is in line with practice in other countries that have made the move more gradually, and follows the [Code of Practice for Official Statistics](#) with particular reference to Principle 4: Sound Methods and Assured Quality. It also addresses the technical concerns expressed in the [independent methodological review](#) and concerns expressed in consultation responses about risks to key outputs, especially for population characteristics.

This work addresses the Government ambition, described in Section 2.1. It is also in line with [ONS's Strategy](#) to be at the forefront of integrating and exploiting data from multiple sources, making greater use of administrative data across all statistics. This stance was supported by the recently published [Independent Review of UK Economic Statistics](#) which recommended that ONS "make the most of existing and new data sources..." (referring both to administrative and private sector data) to improve economic statistics.

Research to date suggests it will not be possible to produce the full range of census statistics from just administrative data alone – it will need a mix of data including administrative data and data from surveys, and also 'big data' (such as mobile phone data) and data held by the private sector (such as private sector data on housing).

Some data collected in the census are not available in administrative sources (for example hours of unpaid caring) and surveys alone will not provide the detail that users need to measure change over time (such as being able to spot changes over a decade in unemployment rates by ethnicity for small areas). To overcome these challenges, and to produce outputs covering a range of population characteristics similar to those that a census can deliver, ONS will need access to more administrative data, and this will need to be integrated with annual surveys. This approach is described as an Administrative Data Census in Section 4.

The major constraints on how far and fast this will progress are the availability of good quality administrative data covering the range of census topics and the ease of access to these sources for ONS. We are driving forward access to further datasets using existing legislation but this requires approval by both Houses of Parliament on a case by case basis and is slow to achieve. The Government recently consulted on a range of proposals for new legislation to enable [Better Use of Data in Government](#), including for ONS's role in producing National and Official Statistics and statistical research. This is described in more detail in Section 6.1. Such new legislation would significantly improve the current arrangements, enabling ONS to have a presumed access to administrative data held by government for statistical purposes, as well as enabling access to private sector data for statistical purposes. The consultation period ran until April 2016.

3. Introduction to this paper

This paper describes what we mean by an Administrative Data Census, highlighting key challenges and setting out what is needed to address them. Using a set of evaluation criteria, it delivers the first high-level assessment of ONS's ability to move towards an Administrative Data Census in the next decade. Further assessments will be conducted and published annually each spring.

The remainder of this paper is structured as follows:

- Section 4 describes what is meant by an Administrative Data Census
- Section 5 describes the challenges of moving to an Administrative Data Census, and explains what is needed to address them
- Section 6 delivers the current assessment and potential future assessment against the five high-level criteria (described in Section 5). Evidence is provided along with plans for improvements in future years
- Section 7 concludes with next steps

The paper also has two annexes:

- Annex A provides an update on the acquisition of administrative data
- Annex B presents more detailed evaluation criteria that, after further development, will be used to carry out the assessment in future years

This paper is also accompanied by a report '[Summary of feedback on the 2015 administrative data research outputs](#)' which summarises the feedback received from the [Administrative Data Research Outputs](#) that were published in October 2015.

4. What is an Administrative Data Census?

It is ONS's ambition to produce the type of information that is collected by a ten-yearly census (on housing, households and people) from an Administrative Data Census. Doing this will require a combination of:

- record-level administrative data held by Government
- a population coverage survey
- a population characteristics survey

4.1 Record-level administrative data held by Government

As a minimum, ONS will require access to the following data sources, to deliver an Administrative Data Census:

- Personal income and benefits data that can provide demographic information (such as age and sex) for a large proportion of the population, 'activity data' on interactions with DWP/HMRC systems (such as people in receipt of benefits, self-assessments for self-employed workers) to help improve the quality of population estimates and information about income. This range of information will also enable ONS to feed into outputs on economic status
- Health data that can provide demographic information for a large proportion of the population, 'activity data' on interactions with the health system (such as those attending hospital appointments or in receipt of prescriptions) to help improve the quality of population estimates, and information that could be used to produce a health index (good, average and poor health) for local areas
- Education data that can provide demographic information for specific portions of the population, and information about population characteristics such as qualifications
- Housing data that can provide information about housing characteristics such as number of rooms and tenure (from Valuation Office Agency (VOA) or private sector data)
- Driver and vehicle data that can provide demographic information for specific portions of the population, 'activity data' on applications for vehicle registration and road tax to help improve the quality of population estimates. It could also provide information about the number of cars and vans
- Electoral Roll and Council Tax data that can provide demographic information for specific portions of the population, and 'activity data' to help improve the quality of population estimates

Access will be required at a record level to enable these sources to be linked together. High quality linking requires name, address, data of birth and sex (as described in more detail in [Matching Anonymous Data](#)) because combinations of these variables can be used to produce links that are made with a high level of certainty. Linking together multiple sources will improve the quality and coverage of the outputs that can be produced, and will support the production of cross-tabulated outputs, for example employment by qualifications at small geographic levels within a local authority. For an update about ONS's progress in acquiring these sources, please see Annex A.

4.2 Population Coverage Survey (PCS)

Previous research in the Beyond 2011 Programme identified the need to conduct a coverage survey, similar to a Census Coverage Survey, to measure and adjust for under- or over-coverage on administrative data and to enable the production of high-quality statistics about the size of the population. A PCS may cover approximately 350,000 households annually, as described in [Paper M8](#). Further work is required to refine the detail of the survey and the methods to subsequently produce estimates using the PCS and administrative data.

4.3 Survey to produce estimates about characteristics of the population and households

Research in Beyond 2011 focused on producing statistics about population characteristics using a survey that would cover approximately 4 per cent of the population (around 900,000 households) each year. In the [public consultation](#) that was carried out in 2013, users told us that this type of survey alone would not provide the granularity of information that they need to measure change over time (such as being able to spot changes over a decade in unemployment rates by ethnicity for small areas within an LA).

While surveys alone might not be able to produce direct estimates for the cross-tabulated outputs at small area levels that users require (as outlined in [Paper M12](#)), administrative data can be used in model-based approaches to improve the precision of survey estimates, particularly where the survey sample size is too small for direct estimates, for example certain minority ethnic groups. There are different approaches to doing this, but a common feature of these methods is that they use relationships between the data and the target characteristic to produce estimates. This could be a direct relationship (for example, using ethnicity information from both administrative and survey sources) or an indirect one (for example, using ethnicity information from administrative sources to produce estimates on main language or religion from the survey because there may be a relationship between these variables and ethnicity).

An example of the application of this model-based approach is the local area unemployment estimates produced by ONS. Unemployment information collected on the Annual Population Survey (APS) is correlated with Claimant Count data held by DWP. A model using this relationship has been developed to produce small area unemployment estimates. Further information on these methods is provided in [Paper M12](#). Future plans to release income model based estimates combining administrative data from DWP and existing surveys (including LFS) are described in Section 6.3.

For characteristics that are available on administrative data, the survey would need to measure and adjust for under- or over-coverage on administrative data, in a way similar to the PCS.

A survey could also be used to provide direct survey estimates for topics that are not available on the administrative data (such as hours of unpaid caring). For such topics, it might be possible to produce estimates only at LA level.

The precise design (including size) of this survey will depend on ONS's access to administrative data (described in more detail in Sections 5.1 and 6.1) and an understanding of its statistical quality.

4.4 Other sources of data

Other data (such as 'big data' or private sector data) may also be necessary to produce some types of information traditionally produced by the census, such as commuting flows by using data from mobile phones, or information on tenure by using information from property websites.

These different sources of data will need to be linked together and used in combination with a range of methods and modelling techniques in order to produce the type of outputs that users require. This approach may additionally offer opportunities to provide users with the outputs that they need more frequently than a ten-yearly census can do.

5. What needs to be in place to move to an Administrative Data Census?

There are four key challenges to delivering an Administrative Data Census:

1. Accessing the range of data needed to produce outputs that are currently provided by the ten-yearly census
2. Linking together lots of independently collected data accurately whilst preserving the privacy and security of the data
3. Developing methods that can transform the linked data into outputs that meet the needs of users
4. Making an Administrative Data Census acceptable to key stakeholders, for example by providing value for money, and providing reassurance that data will be kept safe through this approach

To address these challenges, the following would need to be in place.

5.1 Rapid access to existing and new data sources

To maximise the breadth and quality of statistics that could be provided by an Administrative Data Census, ONS would need to have rapid access to new and existing data sources from across Government. This would also need to extend to other sources of existing data that would add value. ONS would also need to be consulted before changes are made to the administrative data that may affect the quality and stability of outputs from an Administrative Data Census over time. New legislation, such as that described in the recent public consultation on [Better Use of Data in Government](#), would offer a solution to these requirements.

5.2 The ability to link data efficiently and accurately

All countries that have moved away from conducting a five- or ten-yearly census have moved to a register-based census that is underpinned by a population register and usually an ID card scheme. This usually means that administrative data can be linked to the register(s) through a unique ID number, resulting in highly accurate linking. These registers also aim to provide complete coverage of the population, which administrative data does not provide.

In the UK we do not have ID cards or a population register. Instead, as described in Section 4, an Administrative Data Census would involve linking together multiple administrative data sources and surveys to produce statistics on the range of topics that the census currently produces. This is not a simple task.

Individuals in the UK do not have a single unique reference number that is carried across all government-held data, making this linkage challenging. For example, data about tax and benefits from DWP and HMRC use the National Insurance Number, while GP Register data uses NHS number and School Census uses a unique pupil reference number. We therefore need methods that can link together these independent data sources accurately to enable the production of high quality statistics. An additional challenge is to do this while preserving the privacy and security of the data.

5.3 Methods to produce statistical outputs of sufficient quality that meet *priority* information needs of users

Accessing and linking data is only part of the puzzle. We need to deliver methods that can transform the linked administrative and survey data into statistical outputs that meet the priority information needs of users. This means providing statistics on the topics that users need, at the right level of detail (for example, for small areas), and at the right quality. In response to a [public consultation](#) in 2013, users told us that we need to develop statistical methodologies that:

- provide robust estimates about the size of the population and the number of households
- provide estimates about population characteristics at a point in time to allow similar areas to be compared with one another
- provide the granularity of information that users need to measure change over time (for example being able to spot changes over a decade in unemployment rates by ethnicity for small areas)

Another key area, as outlined in Section 4, is developing the detail of the surveys that will be required and the methods to model from surveys and administrative data.

5.4 Acceptability to stakeholders (users, suppliers, public and Parliament)

In order to successfully move to an Administrative Data Census in the next decade, users of the data, data suppliers, the public and Parliament need to be convinced that this approach meets their needs. Acceptability to these four key stakeholders will be influenced by ensuring that:

- key information needs of users are met
- data is held, processed and linked while providing privacy, confidentiality and security safeguards

5.5 Value for money

An Administrative Data Census will need to demonstrate that it provides value for money compared with a ten-yearly census. This means showing either that it can deliver the benefits that users get from a ten yearly census at a lower cost, or that the cost saving is sufficient to justify lower benefit. For example the Administrative Data Census may not be able to deliver all the outputs that a ten-yearly census provides but it may include additional benefits such as more timely, frequent data and new outputs that are not currently provided by a ten-yearly census. This is the key trade off that will need to be taken into account.

5.6 How will ONS know if an Administrative Data Census is possible?

For the government to make a decision after 2021 about the future of the census, ONS needs to provide evidence to show whether or not an Administrative Data Census is a viable approach to census-taking. In order to do that, ONS plans to do the following:

- **Make progress in acquiring new administrative data sources**, prioritising data sources that relate to, or may provide insight on, key topics that are currently produced by a ten-

yearly census. For new data sources, record-level comparisons can be made with the 2011 Census, which provides a good benchmark of the statistical quality of the administrative data. For example, it can highlight whether an administrative source has coverage issues, or lags in updating address information. Comparisons with other data sources can also be useful to understand statistical quality. ONS will publish an annual update on the progress in acquiring data as an annex to this paper (see Annex A for an update).

- **Publish Administrative Data Research Outputs** annually. Once the statistical quality of the administrative data is understood, the most appropriate methods and combination of additional data sources (for example, surveys) can then be identified to produce outputs to meet user needs. Annual research outputs will demonstrate the type and quality of outputs that could be produced from an Administrative Data Census. The first set of [Research Outputs](#) were published in October 2015. A combination of NHS Patient Register, Higher Education Statistics Agency Student record and the combined DWP and HMRC Customer Information System data were used to produce outputs on the size of the population by local authority by five-year age sex groups.

The range of topics will be expanded in future releases, depending on the availability of data and its statistical quality. The next release in 2016 will include population estimates for small area level (within LAs), improvements to the methods used to produce administrative data based population estimates, outputs on the number of households, and research on income from combined PAYE and benefits data.

A key aim of these outputs is to allow users the opportunity to provide feedback on the data and on the methods used to help focus future developments. A [short summary](#) of the feedback received from the last set of outputs is published alongside this paper.

- **Conduct an annual assessment** of ONS's ability to move to an Administrative Data Census. This paper outlines our approach to the assessment, and provides a link to some detailed evaluation criteria (see Annex B) that will be used to make the assessment in the future. This assessment will take into account the progress that is being made in acquiring administrative data and the annual Research Outputs and subsequent feedback as evidence. This will conclude with a comparison of combined administrative data and survey based outputs against the 2021 Census outputs to benchmark this approach. This will culminate in a recommendation in 2023 on ONS's ability to switch to an Administrative Data Census.
- **Have methods and research reviewed by an external expert panel** in a similar way to the [independent methodological review](#) that was led by Professor Chris Skinner during the Beyond 2011 Programme in 2013. These reviews are currently planned to take place in 2017, 2020 and 2022.

6. Current assessment of ONS's ability to move to an Administrative Data Census – evidence and future work

Annex B presents a detailed set of evaluation criteria against which ONS will assess progress in moving to an Administrative Data Census. As described in the Annex, further work is required before these evaluation criteria can be used to make a thorough assessment. Instead, in this first assessment, a high-level assessment has been carried out against what would need to be in place, as described in Section 5. This is presented in Figure 1 below. The table also includes an assessment of where ONS expects to be by 2023. This assessment is supported by evidence and a description of what will be done in the future to improve the assessment.

Figure 1 Current (2016) and future expected (by 2023) high-level assessment

	Access to data	Ability to link	Ability to meet information needs of users				Acceptability to stakeholders	Value for money
			Population estimates	Households and families	Housing characteristics	Population characteristics		
Where are we now (2016)	Red/ Amber	Amber	Amber	Red/ Amber	Amber	Red/ Amber	Red/ Amber	Amber
Where do we expect to be by 2023?	Amber /Green	Green	Green	Amber /Green	Green	Amber	Amber /Green	Amber /Green

6.1 Access to data

Current assessment: Red /Amber

Evidence

Provisions in the Statistics and Registration Service Act (SRSA) 2007 currently enable ONS to access administrative sources for statistical and research purposes by making regulations called Information Sharing Orders (ISOs). However this process is inflexible and slow.

Additionally, the conditions of an ISO do not offer any protection from changes that may be made to the data when they are collected. Such changes may impact the outputs that an Administrative Data Census would produce. It would be risky to implement such a census without being able to ensure the security of supply of key data sources, or without sufficient notice of a change which might compromise the quality, reliability and statistical integrity of the resulting outputs.

The UK Statistics Authority set out the need to "...integrate administrative and commercial data sources..." to deliver its strategy of [Better Statistics, Better Decisions](#):

"We will be at the forefront of using new technology and identifying and exploiting new methods and data sources at ONS and across government."

[Progress on acquiring administrative data](#) through the current provisions in the SRSA was published in October 2015. The report included an early assessment of the potential for administrative data sources to provide information on different census topics, as shown in Figure 2.

This assesses only the potential of the administrative data on its own, highlighting the challenges particularly for certain topics such as number of carers and tenure. It does not assess what could be achieved by combining administrative data with surveys, nor include any extensive statistical quality assessment; this will be added to future updates. Since October 2015 ONS has gained access to a subset of data on personal level income, tax and benefit information from Department for Work and Pensions (DWP) and HM Revenue and Customs (HMRC), and to a subset of property attribute data from the Valuation Office Agency. Work is underway to assess the statistical quality of this data to understand how it can be used. Annex A provides a more detailed update on ONS's acquisition of administrative data.

Figure 2 Potential to produce information for each topic from administrative data

<p>R No data available</p> <p>A Possible data available</p> <p>G Data available</p> <p><i>The assessment provides an indication of data being available. It does not capture an assessment of quality such as coverage, accuracy or relevance</i></p>	<p>Earnings and benefits data</p> <p>Department for Work and Pensions; HM Revenue and Customs¹</p>	<p>Health data</p> <p>Health and Social Care Information Centre; NHS Wales Informatics Service¹</p>	<p>Education data</p> <p>Department for Business, Innovation & Skills; Department for Education; Welsh Government¹</p>	<p>Vehicle and driver data</p> <p>Department for Transport; Driver and Vehicle Licensing Agency¹</p>	<p>Property attributes</p> <p>Valuation Office Agency¹</p>
Individual variables					
Sex	G	G	G	G	R
Date of Birth	G	G	G	G	R
Marital status	A	R	A	R	R
Household relationships	A	R	R	R	R
National identity	R	R	G	R	R
Ethnicity	R/A	A	G	R	R
Language:					
Ability to speak English	R/A	R/A	A	R	R
Ability to speak Welsh	R	R	R/A	R	R
Religion	R	R	G	R	R
Qualifications	R	R	A/G	R	R
General health	R	A	R/A	R	R
Disability / long-term health conditions	A	A	A	R/A	R
Carers (number of)	A	R	R	R	R
Economic activity	A	R	A	R	R
Industry of occupation	A	R	R	R	R
Mode of travel to work	R	R	R	R	R
Place of work	A	R	R	R	R
Country of birth	R/A	R/A	R	R	R
Internal or international migrant	A	G	A	A	R
Term time address	R	R	G	R	R
Income	A/G	R	R	R	R
Sexual identity	R	R	R/A	R	R
Activity (interacting with system from which data are taken)	G	G	G	G	R/A
Household variables					
Size of accommodation	R	R	R	R	G
Type of dwelling	R/A	R	R	R	G
Tenure	R/A	R	R	R	R
Number of cars and vans	R	R	R	A/G	R

¹ For more information about the data that ONS has gained access to, and the data we are focusing on next, please see Annex A

Expected assessment post-2021: Amber /Green

What are we doing to improve the assessment?

The UK Statistics Authority published the [Data Access Legislation and Policy](#) in March 2016 which set out why the proposed new Powers described are needed to deliver on its strategy Better Statistics, Better Decisions. The policy illustrates how slow the existing ISO route for accessing administrative data is, and also shows that the UK lags far behind international best practice in using administrative data for statistical purposes.

This was supported by the recently published [Independent Review of UK Economic Statistics](#) which made a clear recommendation that:

“Obstacles to the greater use of public sector administrative data for statistical purposes, including through changes to the associated legal framework [should be removed], while ensuring appropriate ethical safeguards are in place and privacy is protected.”

Proposed new legislation would provide powers similar to those already held by Statistics Canada and the Central Statistical Office in the Republic of Ireland. Specifically, it would:

- give the National Statistician a right of access to data held by public authorities and larger private undertakings for the sole purpose of producing statistics and statistical research
- enable the National Statistician to securely share information with statisticians in the Devolved Administrations for their statistical purposes, to help them meet their statistical needs arising out of devolution
- re-affirm rigorous penalties for the misuse of identifiable data to maintain public confidence and trust and
- include an obligation to consult the National Statistician before changes to data collection are made in order to protect the security of data supply, and the accuracy and reliability of statistical outputs derived from these data

As described in Section 2.3, some variables may not be available on administrative data. For key topics, one solution might be to explore whether these topics could be collected on administrative data. An example of this might be to collect ethnicity on patient registration data.

A public consultation on [Better Use of Data in Government](#) closed on 22 April 2016. This set out the need for Government to do more to unlock the power of data, including better research and official statistics to inform better decision-making.

The expected assessment of amber/green is on the basis that such legislation is in place.

6.2 Ability to link

Current assessment: Amber

Evidence

Methods have been developed to anonymise and [match administrative data](#). These methods offer an efficient approach to linking large data sources, demonstrating the level of quality that could be achieved by matching in this way while offering a solution to privacy and security concerns about linking record-level data.

ONS also published different methods for estimating the population ([ONS-M8](#)), highlighting a requirement for high matching accuracy between the linked administrative data and the Population Coverage Survey (PCS). Paper [ONS-M13](#) described the maximum level of matching error that would be acceptable, and showed that the methods developed for matching anonymised administrative data do *not* deliver the level of quality required to produce estimates about the size of the population to the required level of accuracy.

As more and more data are linked together the linkage error resulting from this approach will compound, reducing the quality of the outputs even further. For example, users might require cross-tabulated data such as age x ethnicity x qualifications x labour market status. It is likely that a range of data sources would need to be linked together to provide information about all these characteristics, resulting in increased levels of linkage error. Consequently, the [Independent Review of Methodology](#) recommended that the approach to data linkage be reviewed:

“We encourage further development of matching methods.....

“The requirements for anonymisation need to be reviewed and the possibility of conducting some research in a safe setting under less stringent anonymisation considered.”

Expected assessment post-2021: Green

What are we doing to improve the assessment?

The [Better Use of Data in Government](#) paper describes how identified data accessed under the proposed power (as outlined in Section 5.1) *for research purposes*² must be linked and de-identified using a “trusted third party” model that was recommended by the Administrative Data Taskforce in a [report](#) published in 2012. ONS is working to understand how this and other approaches might address some of the challenges of the current matching approach described above.

The trusted third party model offers an alternative approach to preserving privacy when linking multiple administrative datasets, while still having the ability to improve the quality of matching to meet statistical objectives. In summary, this approach entails the separation of person identifiers (names, dates of birth and addresses) from information about their characteristics, so that record linkage can be undertaken to the highest standards while still adhering to our principle of not holding identifiable information in one place for longer than required. More information is available in Section C of the [consultation paper](#).

² For example to support accredited researchers in accessing and linking data in secure facilities to carry out research for public benefit.

We are also exploring whether:

- data provided to ONS can use harmonised principles (for example, all data on ethnicity classified using standard ethnicity classifications as described in the GSS guidance on [Ethnic Group](#))
- data can be cleaned and processed in the same way (for example, duplicate records on all data sources to be removed using the same rules)
- the same formats can be used on all data sources (for example, date of birth to be provided as DD/MM/YYYY)

These developments could lead to improvements in the efficiency and accuracy of linking large data sources together.

ONS will work with data suppliers to develop common standards on Government-held data, aligning with principles set out by a new [cross-Government Data Programme](#) that is being led by the Government Digital Service (GDS). An example would be in the context of an Address Register, with the Unique Property Reference Number (UPRN) being used in a standardised way.

6.3 Ability to meet information needs of users

6.3.1 Population estimates

Current assessment: **Amber**

Evidence

During the Beyond 2011 Programme ONS published a range of papers which described the development and evaluation of methods using linked administrative data. Once individual records are matched across data sources using the approach outlined in [Estimating the Population: In Practice](#), the information is pulled together into a single, coherent dataset that forms the basis for estimating the population. This is called a Statistical Population Dataset (SPD) and it has been used to produce estimates about the size of the population. The subsequent [Independent Review of Methodology](#) concluded that this research was promising, but that there were a number of areas where further research was required.

The first set of [Administrative Data Research Outputs](#) were published in October 2015, and provided population estimates by five year age group and sex at local authority level for 2011, 2013 and 2014. This demonstrated similar levels of quality when compared to official population estimates. Users were asked to provide feedback on the methods and these outputs. This feedback received is summarised in a [separate report](#). Feedback from users included:

- the need for a Population Coverage Survey to help with estimating the size of the population
- using 'activity data'³ to help reduce levels of over-coverage that are seen for particular age groups
- refining the SPD inclusion and exclusion rules
- developing confidence intervals around the SPDs, and reviewing the quality standards that are used to assess the quality of the SPDs
- producing population estimates for small areas, within a local authority

Users also suggested additional data sources that could improve the quality of particular

³ Information from administrative data sources about when individuals have interacted with systems or services, such as the National Insurance, tax or benefits systems, or a hospital visit through the NHS system.

population groups, such as council tax, electoral registrations, DVLA, and sources that may help to improve estimates for special population groups such as information about Armed Forces from the Ministry of Defence, and prison data from the Ministry of Justice.

Expected assessment post-2021: Green

What are we doing to improve the assessment?

The next Administrative Data Research Outputs are due to be published in autumn 2016. ONS aims to show developments to the methods for producing estimates about the size of the population (including the use of School Census and DWP/HMRC activity data), and to produce estimates at a lower geographical level in response to user feedback.

We are working closely with some local authorities to understand and develop methods to address particular quality issues that the SPDs have so far struggled to overcome.

ONS is also considering a test of the PCS in 2018 to help provide evidence about whether mandatory surveys are required. We will use data collected through this exercise, data collected in the 2017 Census test and existing survey data to demonstrate how administrative and survey data can be combined to produce high quality estimates about the size (and characteristics) of the population.

6.3.2 Households and families

Current assessment: Red/Amber

Evidence

Research into how the SPDs could be used to produce information on households and families has been limited. [ONS-M13](#) contained a case study comparing household estimates from SPDs with household estimates from the 2011 Census. This initial assessment indicated that there was potential for using administrative data to produce household statistics, and that there would be a need to supplement SPD based administrative counts with additional data from alternative administrative sources or from surveys, to adjust for definitional and coverage issues. Additionally, it is unlikely that information about families would be available on administrative sources, so this information would need to be collected through surveys.

Expected assessment post-2021: Amber/Green

What are we doing to improve the assessment?

The next Administrative Data Research Outputs, due to be published in autumn 2016, will include outputs on the number of households for 2011 and 2015 at local authority level. This work will be extended to the size and composition of households, and lower geographies in the future.

6.3.3 Housing and household characteristics

Current assessment: Amber

Minimal research has been done on housing and household characteristics. The table in figure 2 shows that some key census topics on housing characteristics are available on administrative data. This includes information on the size and type of dwelling through Valuation Agency Office (VOA)

data, and the number of cars through Driver and Vehicle Licence Agency (DVLA) data (although company-owned vehicles may be registered at a company's headquarters rather than at an individual's residence). Other information, such as tenure, may be more challenging. There may be the potential to use private sector data on housing, and information from property websites. ONS has recently obtained a sample of property attribute data from the VOA which is currently being evaluated.

Expected assessment post-2021: Amber/Green

What are we doing to improve the assessment?

For the 2017 release, ONS plans to produce research outputs on the number of rooms and floor-space using VOA data, possibly in combination with existing surveys (for example, the Labour Force Survey (LFS)) and Census 2011. This output will be dependent on an assessment of the statistical quality of the VOA data.

ONS will continue to explore additional data sources that may help to fill the gaps in what topics are available through administrative data. For example 'big data', such as that available from property websites, may help to provide information about tenure.

6.3.4 Population characteristics

Current assessment: Red/Amber

Evidence

Previous research in the Beyond 2011 Programme focused on producing statistics on population characteristics through an annual survey that would cover roughly 4 per cent of the population each year, described in [ONS-M12](#). However, in response to the [Beyond 2011 Consultation](#) users told us that this type of survey alone would not provide information to measure the granularity of change that they require (for example being able to spot changes over a decade in the ethnic make-up within a local authority). This has led to a shift in the focus of research to make greater use of administrative data in combination with surveys. More progress is required here.

Expected assessment post-2021: Amber

What are we doing to improve the assessment?

The 2016 release of the research outputs will include research on income from combined PAYE and benefits data.

For future releases, ONS plans to produce the following univariate⁴ Research Outputs from combining administrative data with existing surveys (for example, the Labour Force Survey (LFS)) and the 2011 Census:

- ONS/DWP/HMRC modelled administrative and survey-based income estimates (2017 release)
- qualifications from BIS/DfE for under 30s (2017 release)
- commuter flows from mobile phone data (2018 release)

These outputs will be dependent on access to data, and its statistical quality.

In the longer term the Research Outputs will be extended to include further topics as data

⁴ Outputs using only one variable, for example estimates of the size of the population by age.

becomes available, and also to introduce multivariate⁵ outputs. ONS will continue to seek user feedback on these outputs and focus future research in response. We are also planning three further independent methodological reviews in 2017, 2020 and 2023 to provide external assurance of the methods.

The next assessment paper (in 2017) will include an assessment of what census-type topics would be possible by combining administrative data and surveys. This will supplement the table presented in Figure 2. More work will be done to understand the design of the surveys and the methods that are needed to produce the type of outputs that users need.

An Administrative Data Census offers opportunities to bring additional benefits and ONS is also looking at the potential for combining administrative, big and survey data to produce new outputs such as housing affordability or fuel poverty which are not provided by a ten-yearly census.

6.4 Acceptability to stakeholders

Current assessment: Red/Amber

Evidence

Users

The assessment here reflects the fact that until ONS can demonstrate that our methods can deliver outputs that meet the key information needs of users, it is challenging for an Administrative Data Census to be acceptable to stakeholders, in particular the users.

ONS has engaged with a range of stakeholders about this work. A set of regional working groups have been set up to discuss research findings from the Administrative Data Research Outputs and improvements to the methods. Feedback on the first set of outputs is summarised in a [report](#) accompanying this paper. ONS has communicated progress through presentations delivered to, for example, the Market Research Society, the Royal Statistical Society and the Statistics User Forum.

Data suppliers

As described in Section 6.1, ONS is working closely with data suppliers to understand and improve statistical quality issues identified in the data. A Data Suppliers Group has been set up and includes members from key Government Departments across Whitehall. This group is a forum for discussing issues relating to data sharing, sharing research and building stronger relationships.

Public

In 2013 the Beyond 2011 Programme published a [policy for safeguarding data for research](#) and a paper detailing new methods to [match anonymous data](#). This work was critical to progress the research to link record-level administrative data while taking a strict approach to protecting the privacy and security of administrative data. A [Privacy Impact Assessment](#) was also published in 2015.

[Public attitudes research](#) conducted during the Beyond 2011 Programme about the public acceptability of using personal data revealed that the public express mixed opinions about the use

⁵ Cross-tabulated outputs using more than one variable, for example unemployment rates by ethnic group at small areas.

of their personal data for research and statistical purposes. The majority support the sharing of data with ONS for statistical purposes, but there are strong concerns about security and privacy which must be allayed.

The key issues in gaining public acceptance of the use of data are:

- appropriate communication, in particular, explaining what government is doing with data and the benefits that will result and
- ensuring that safeguards relating to security and privacy are in place, and communicated effectively

Additionally, some concerns were raised in response to the [Beyond 2011 Public Consultation](#) about the privacy of using a combination of administrative data and surveys. Further work is required to address these concerns.

Parliament

Parliament is likely to be concerned about the usability of the outputs, protecting the confidentiality and security of data, and public acceptability. Therefore all the evidence provided in this section is relevant. Additionally, Section 6.5 outlines what is being done to deliver value for money from an Administrative Data Census.

Expected assessment post-2021: Amber/Green

What are we doing to improve the assessment?

Users

ONS plans to improve the methods to produce outputs that meet information needs of users, as described in Section 6.3. This should help to improve the acceptability of the methods to users.

ONS will host a Research Conference in summer 2016, enabling further engagement with users.

Data suppliers

If the new Data Access legislation (described in Section 6.1) goes ahead, relationships forged through the Data Suppliers Group described earlier will be vital to the success of unlocking data across government as work will need to be done to put in place practical arrangements for data supply.

Public

As described in Section 6.2, ONS will continue to develop the linking methods. This research will focus on understanding how the 'trusted third party' model (described in the Data Access legislation [consultation paper](#)) and other approaches might overcome some of the challenges of the current matching approach described earlier, while also preserving the security and privacy of the data. ONS will review the approaches to matching adopted in other statistical offices.

Further public acceptability research will be carried out around these issues, and in 2023 a public

consultation will gather views about an Administrative Data Census.

Parliament

As outlined previously, the work that is being done to improve the assessment with regards to users, data suppliers and the public should also improve the acceptability of an Administrative Data Census to Parliament. Additionally, Section 6.5 describes what is being done to deliver value for money.

6.5 Value for money

Current assessment: Amber

Evidence

In the Beyond 2011 Programme, ONS published a [Summary of benefits of census information](#). ONS worked closely with a wide range of stakeholders through public consultation, and in communication with government departments, local authorities, user groups and commercial organisations, to understand the financial value of the benefits that a census provides. These benefits were quantified for both the ten-yearly census and for the approach that was being considered at that time as an alternative (administrative data supported by an annual population coverage survey and an annual 4 per cent survey).

To derive the benefit value for the alternative approach, adjustments were made to reflect both the increased frequency of Administrative Data Census statistics (for example annual rather than once a decade), offset by the reduced detail and precision in the statistics. In the [summary paper](#), ONS estimated that the administrative data approach would cost around two-thirds as much as the online census over the next 30 years. The expected benefits of this approach were estimated to be less than those of a ten-yearly census, because the method considered at that time could not meet user requirements for small area cross tabulations and the risks involved. The costs, benefits, methods and risks will all change by 2023 so this work will need to be re-done.

Expected assessment post-2021: Amber/Green

What are we doing to improve the assessment?

More work will be done to quantify the benefits that an Administrative Data Census can deliver to ensure a cost-benefit analysis accompanies the recommendation on the future of census and population statistics that ONS will deliver in 2023. This will take on board the work conducted between now and 2023 and includes quantifying the further benefits that an Administrative Data Census could provide in addition to more timely, frequent data, such as statistics on fuel poverty, income and housing affordability that are not provided by a ten-yearly census. The key trade off will be assessing these benefits against the fact that an Administrative Data Census may not be able to deliver all the outputs that a ten-yearly census provides. Key to this will be gaining greater access to administrative data, which should help to deliver the maximum benefit from this approach.

7. Conclusion and next steps

This paper describes an Administrative Data Census, and what would need to be in place for it to be possible to move to this alternative approach to conducting a census. It presents the first assessment of ONS's ability to move to an Administrative Data Census, including supporting evidence and what we plan to do to improve this assessment in the future in order to meet our expected assessment by 2023.

Over the next year, ONS will do the following:

- Host a Research Conference in summer 2016, to present our current plans and recent research
- Publish the next set of Administrative Data Research Outputs in autumn 2016 and seek feedback from users
- Continue to work on the detailed evaluation criteria (presented in Annex B) to ensure they can be used for the next Assessment in 2017
- Continue progress on acquiring administrative data and understanding the statistical quality of the data that are accessed
- Conduct an assessment about what census-type topics would be possible by combining administrative data and surveys, to be published as part of the next Assessment in 2017
- Continue to engage with users and data suppliers through the Census Advisory Groups, Data Supplier Groups and other working groups with users.

Annex A Update on acquisition of administrative data

In October 2015 ONS published an [Administrative Data Update](#). This annex provides a further update on data that ONS has obtained access to, and data that we are focusing on next.

In the Beyond 2011 Programme, statistical quality assessments were carried out on the key data sources which ONS has obtained access to. These include primarily demographic and geography variables with little characteristic information. The findings were written up as source reports and published on the ONS website:

- [Administrative Data Sources Report: NHS Patient Register \(S1\)](#)
- [Administrative Data Sources Report: Electoral Register \(S2\)](#)
- [Administrative Data Sources Report: The English School Census and the Welsh School Census \(S3\)](#)
- [Administrative Data Sources Report: Higher Education Statistics Agency: Student Record \(S4\)](#)
- [Administrative Data Sources Report: CIS combined \(S5\)](#)

Administrative data sources that ONS is currently focusing on

Personal level income and benefit information

Personal level income and benefit administrative data, if of sufficient statistical quality and legally accessible, will provide income, household and 'activity'⁶ (using evidence of interactions with an administrative system) data to further improve the population statistics research outputs. ONS has access to a subset of variables within this data from HM Revenue and Customs (HMRC) and the Department of Work and Pensions (DWP) to conduct feasibility research. This data includes some income and benefits variables for the population receiving benefits (excluding Universal Credit and Personal Independence Payments), tax credits and on the Pay As You Earn system (this excludes self-assessment and self-employment).

The first statistical quality assessment has confirmed the data meet a number of ONS requirements and access to the full data is now being prioritised. This will require new legislative approval to access the more detailed variables required and some specific subsets, such as self-assessment data.

All Education Dataset for England

ONS is working with the Department of Business Innovation and Skills (BIS) to develop a longitudinal education dataset using existing National Pupil Database, Further Education and Higher Education data. The dataset is expected to include variables on attainment and qualifications for everyone born from 1985 onwards through their secondary, further and higher education as well as a range of socio-demographic variables. Coverage is for England only at present.

The data can potentially be used to improve estimates of specific population groups such as schoolchildren and students by using available 'activity' information to determine where they are resident in the country and patterns of movement during period of study. The data are also expected to help with estimating the population by characteristics such as age, sex, ethnic group

⁶ 'Activity data' use how an individual interacts with an administrative system to provide confidence in their location and residence status.

and qualifications held. ONS is comparing a first version of this dataset (with a subset of variables) with the 2011 Census in order to assess the coverage and statistical quality of the matching used to create the data. This will inform further development of the dataset. A legal assessment is being completed to establish how the full dataset can be accessed.

Health data

ONS has had access to demographic data from health datasets from the Health and Social Care Information Centre (HSCIC) for population statistics purposes. This data can be used to provide 'activity' information, from patients interacting with NHS systems through new registration or to update their address or other details. Initial research has shown that this 'activity' data can be used in the development of SPDs by providing evidence to confirm an individual's location. We plan to include the findings from this research in the 2016 release of the Administrative Data Research Outputs.

Vehicle and driver data

ONS has held an initial requirements meeting with the Driver and Vehicle Licensing Agency (DVLA) to discuss accessing vehicle and driver administrative data. This administrative data may allow the production of information about the number of cars or vans in households (although there would be limitations related to how business cars are recorded) which assists central and local government with transport and new housing planning. The data may also improve the administrative data population statistics research outputs (particularly among young males who may be less likely to update other administrative sources).

Property attribute data

In March 2015, Parliament approved an Information Sharing Order to allow the Valuation Office Agency (VOA) to share information about addresses with ONS. The dataset should be received later this year and contains variables on characteristics of addresses such as property type (for example detached, terrace) and size of property. This data will be reviewed to assess whether or not it can be used to produce estimates for the number of rooms and size of property.

Administrative data sources ONS plans to pursue access to in the future

[2021 Census topic consultation](#) and users (through feedback to the [Administrative Data Research Outputs](#) published in 2015) have pointed to various administrative data sources for further investigation. These will be analysed and investigated based on their potential for meeting our aspirations including replicating census outputs.

Electoral Register

Electoral Register data was assessed in 2013 as not sufficient to be used as the sole source of information for the production of population and small area socio-demographic statistics. In June 2014 the Electoral Register moved to an Individual Electoral registration, ONS continues to work with the Electoral Commission to understand these changes and assess whether the Electoral Register data may be used in future.

Further health data

Further health data collected by the NHS could provide 'activity' data (such as hospital visits) and non-health characteristics (such as language) information. These could be used to improve the population and characteristics outputs.

Council tax information

Council tax is being considered to indicate the extent of population churn at an address and to indicate activity at an address. Data on individuals could provide evidence on their location which would be used to improve population research outputs.

TV licence

Data from TV licences may be another source of data which could provide additional information such as churn at an address or 'activity' data (when individuals move their licence) and information on addresses which may not be captured on other sources (such as caravan parks).

Annex B Detailed evaluation criteria

This Annex presents a detailed set of evaluation criteria against which ONS's progress in moving to an Administrative Data Census will be assessed. These criteria have been designed to evaluate the progress in having the five high-level criteria (described in Section 5) in place. The next step of this work will be to develop definitions for the RAG status for each of the criteria to provide a transparent way of assessing progress in future assessments. There is also some further work that needs to be done to refine the criteria for assessing the quality of Administrative Data Census outputs, before these criteria can be used. It is our plan to carry out this work so that the detailed evaluation criteria can be used in the 2017 assessment.

Rapid access to existing and new data sources

Topic	Criteria	How it's measured
Data access	Legal access to a wide range of data	RAG
	Route to ensure solution is robust to changes	RAG

Ability to link data efficiently and accurately

Topic	Criteria	How it's measured
Data sources	Able to improve statistical quality of input / admin data	RAG
	Able to accurately link individual records and addresses across sources	RAG

Methods to produce statistical outputs of sufficient quality that meet *priority* information needs of users

NOTE: The criteria for measuring the quality of the population estimates have not changed since they were developed for Beyond 2011. (For more information, see [Options Report 2](#)). However, in Beyond 2011 ONS took a pragmatic approach to assessing various options and this had some limitations – further work will be done on these before the next assessment in 2017.

Topic	How it's measured	Quality dimensions
Population estimates (the current criteria are described in more detail in Annex A of the Options Report published by Beyond 2011)	Measure for variance: P1 - current maximum quality at least once every 10 years P3 - current average quality every year	Accuracy & reliability, timeliness
	Measure for bias	
Ability to produce data on a broad range of topics, and level of detail, in line with <i>priority</i> information needs of users (inc. ability to measure small-area multivariate change)	RAG	Relevance, Accessibility and clarity
Ability to produce more timely outputs, more frequently than the current system	RAG	Timeliness, Punctuality
Provides coherence with the wider UK statistical system	RAG	Coherence
Outputs are comparable over space	RAG	Comparability
Outputs are comparable over time	RAG	Comparability

Acceptable to stakeholders

Topic	Criteria	How it's measured
Acceptability	There is a broad acceptance of the option by our users	RAG
	There is broad acceptance of the methodology by informed users	
	There is a broad acceptance of the option by data suppliers	
	There is a broad acceptance of the option by the public	
	There is Parliamentary support for this option	
Impact assessments	Allows for the collection, use and production of statistics with minimal privacy concerns	RAG
	Allows for the collection, use and production of statistics with minimal equality concerns	
	Allows for the collection, use and production of statistics with minimal environmental concerns	
Systems	Accredited systems and services to securely hold , produce and output integrated data	RAG
	Fit-for-purpose production systems securely hold, produce and output integrated data	

Value for money

Topic	Criteria	How it's measured
Value for money	Administrative Data Census provides value for money, compared with a ten-yearly census	RAG

