

The Future Provision of Census of Population Information for Northern Ireland

October 2014



The Northern Ireland Statistics and Research Agency

The Northern Ireland Statistics and Research Agency (NISRA) is an Executive Agency within the Department of Finance and Personnel (DFP) and has been in existence since April 1996. The Agency also incorporates the General Register Office (GRO) for Northern Ireland. NISRA's core purpose is to provide a high quality, cost effective, statistics, research and registration service that informs policy making and the democratic process and the wider public.

The overall corporate aims of NISRA are to:

- provide a statistical and research service to support decision making by Northern Ireland Ministers and Departments and to inform elected representatives and the wider community through the dissemination of reliable official statistics; and
- administer the marriage laws and to provide a system for the civil registration of births, marriages, civil partnerships, adoptions and deaths in Northern Ireland.

NISRA can be found on the internet at www.nisra.gov.uk

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Foreword by the Registrar General for Northern Ireland

Demographic statistics, such as those produced by the Census, represent key information required by Government and the wider population. For Government demographic statistics underpin the allocation of scarce resources, for example, the Barnett Formula that allocates funds to Northern Ireland is based on estimates of the size of the population. In the recent formation of new councils for Northern Ireland the number of people domicile in each council area was crucial and this information was derived from the Census. Planners and politicians need to know how many people live in the new administrative areas.

As Registrar General I have a statutory duty to undertake the Census and produce annual estimates of the size of the Northern Ireland population. I am happy to report that the last Census in 2011 was a success. The Census is the largest statistical exercise conducted by Government and it is appropriate in the light of developments in technology, such as those related to the internet, to review the way the Census is delivered. Northern Ireland is not alone in reviewing the Census; England & Wales and Scotland have completed similar reviews.

I have considered the work of the other Census offices in the UK along with our own research programme, which point to the conclusion that the 2021 Census should be predominantly online, quality assured by administrative data held by the public sector, building on the successful approach developed in 2011.

I welcome comments on this information paper. I hope you will find it informative and useful.



Dr Norman Caven
Registrar General for Northern Ireland &
NISRA Chief Executive

Executive Summary

A Census based on a full survey of the population has been run periodically in Ireland / Northern Ireland for two hundred years, with the first all Ireland Census in 1813.¹ In total there have been 21 Censuses in Northern Ireland with the last Census held on 27 March 2011. Over the last two centuries significant changes in Census-taking have occurred. For example, up until the 1960s the Royal Irish / Ulster Constabularies undertook Census fieldwork. In contrast today a large temporary civilian fieldforce has been required to deliver this part of recent Censuses.

The primary aim of any Census is to provide an estimate of the size of the population.² The Census provides unique information for monitoring small populations and supports service-planning and service-delivery across Northern Ireland. The scope and extent of the Northern Ireland Census has widened greatly over the last two centuries. Today the Census is used to provide detailed socio-economic statistics (for example labour market, education and equality), is a major research tool (for example the Northern Ireland Longitudinal Study) and is used outside Government in the private sector (for example by the retail sector to assess customer demand) and by the public (for example in the voluntary sector to assess the need for local community services).

When looking to the recent past¹ other significant changes in Census-taking are clear. In the previous two Censuses there has been an increased use of information technology. A major initiative in the 2011 Census was the ability for respondents to fill in their response online.

Today NISRA makes much greater use of administrative data in the Census and annual small area population estimates than ever before. Mid-year population estimates produced by NISRA use the Census as the base, ageing-on the current population, adding births, removing deaths and adjusting for migration by estimating the number of people moving to / from GB derived from the number of transfers of health cards between GPs.

NISRA has considered the evidence produced by the UK national statistics offices along with its own research, which points to the conclusion that the 2021 Census in Northern Ireland should be undertaken predominantly online building on the approach which was successful in 2011. NISRA recognises that special care will need to be taken to support those who are unable or unwilling to complete the Census online.

In addition, NISRA will make increased use of administrative data and surveys in order to quality assure the statistics from the 2021 Census and improve annual statistics between censuses.

Consequently, the design of Census 2021 in Northern Ireland will broadly be replicated in the other countries of the UK.

1.0 Introduction and Background

This information paper provides an overview of the Northern Ireland Statistics and Research Agency's (NISRA's) vision for the future provision of population data, collected to date through the Census of population.

It acknowledges that there are different approaches to counting the population, from a traditional Census and modernised Census methodologies through to the use of administrative data that Government routinely collects in the delivery of services to the citizens of Northern Ireland.

Northern Ireland is not alone in researching approaches to count the population. In Scotland the National Records of Scotland (NRS) ran a parallel programme and the UK Statistics Authority (UKSA) asked the National Statistician (through the Office for National Statistics (ONS)) to review the future provision of population statistics in England and Wales. The Beyond 2011 programme tasked ONS with reviewing approaches to the Census including possibilities to modernise the Census process while considering the issues of cost, benefit, statistical quality and public acceptability.

Population and social statistics underpin most decisions taken by Government. Knowledge about the number and characteristics of the population influence important areas such as allocating public finance and service planning. The last Census of Population in Northern Ireland, in March 2011, is now the principal source of statistics on the population and society of Northern Ireland.

1.1 The macro-environment towards 2021

Over the last two decades, there have been significant changes in society. Rising costs and an increasing population, combined with a period of austerity in the UK have increased the impetus to reduce costs across Government. As with most statistical investigations amongst the population, fieldwork comprises the bulk of the cost of the decennial Census. Improvements in technology and administrative data sources offer opportunities either to modernise the census process, or to develop an alternative by re-using existing data already held within government. Whilst this would require investment in the short term, it should deliver real-term savings in the longer term.

The political and social landscape of Northern Ireland has changed dramatically. In the early part of this century (notably 2000-2007) increased migration to Northern Ireland has led to a more diverse and mobile society. Alongside this Northern Ireland has witnessed an increasingly ageing population. Socially the increased use of information and communication technology has led to transformations in the delivery of services. Within this political and social landscape demand for official population and social statistics has grown markedly; those planning services and monitoring equality require more official statistics at both the Northern Ireland and local levels.

The people of Northern Ireland, in common with the rest of the UK and beyond, expect Government to make use of technological developments for the efficient and effective delivery of services. The expectation of the population and indeed Government is for interactions between them to be digital by default. As the largest statistical exercise in Northern Ireland the Census is the main area of interaction between NISRA and the public. NISRA has embraced technological developments throughout the Census process including introducing an online response mode in 2011. This area of technological development will be developed, with Census 2021 planned to be predominantly online.

People are now more than ever concerned with the environment in which they live. Moving to a predominantly online Census in 2021 will lead to a reduction in the level of printing and paper used in the Census questionnaire.

1.2 NISRA research supporting the development of Census 2021

NISRA in support of this information paper has produced three research papers:

- The use of Administrative Data in Population Estimates³;
- Data Matching Using Northern Ireland Administrative Data; a Worked Example⁴; and
- Online Data Collection in the Census⁵.

These three research papers will be discussed in this paper (see 5.5, 5.6 and 6.0).

Building on the research above, NISRA will develop the themes of administrative data, digital solutions and data matching. Public acceptance of the plans for Census 2021 will be crucial and NISRA will both consult and undertake research in this area.

1.3 Census 2021 in the four countries of the UK

The culmination of the ONS Beyond 2011 work to date was the recommendation from the National Statistician on the future of the Census. For the 2021 Census in England and Wales the National Statistician recommended:

- *“An online census of all households and communal establishments in England and Wales in 2021 as a modern successor to the traditional, paper-based decennial census. ONS recognises that special care would need to be 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 annual statistics between censuses”.*⁶

The National Statistician’s recommendation was commended to Government by the UK Statistics Authority and subsequently accepted on behalf of the UK Government by the Minister for the Cabinet Office, the Right Honourable Francis Maude MP.⁷

The Government’s response was supportive of an online Census supported by administrative and survey data in 2021.

NRS has adopted a Census model for 2021 that is to all intents and purposes the same as that for England and Wales.

NISRA has considered the evidence produced by the UK Census offices and the position accepted by the UK Government and concluded that Census 2021 should take the following format:

- A predominantly online census of population and housing in 2021 as a natural development to the traditional, paper-based census;
- Where an online response is not received NISRA will follow up such people fully by telephone, paper and eventually doorstep contact; and
- Supplementing the information from an online Census and improving intercensal population statistics NISRA will make further use of administrative and survey data.

Section 7.0 of this paper will outline key design concepts to deliver Census 2021 in Northern Ireland.

2.0 International Developments in Census Taking

Before focusing on the local position it is worth noting that Census reform is also being considered internationally. Countries such as New Zealand⁸, Canada⁹ and Australia¹⁰ are actively looking at Census alternatives. Indeed a number of countries which previously surveyed the whole population are now using an administrative data based approach. For example the Netherlands, Austria, Switzerland, Israel and Singapore have fully or partly replaced their full Census with an administrative data and survey approach.

Other countries have considered alternative reforms. France now runs a rolling survey which covers most of the population over a five year time-window. The United States has also undergone significant reform with the 2010 Census being only 10 questions in length.¹¹ However the United States meets the demand for other population and social statistics with an annual compulsory survey – the American Community Survey (ACS).¹² The ACS is a wide ranging complex survey that gathers significantly more information than the Northern Ireland Census, for example income data.

While the use of technology in Census taking is not new, the 2010 round has evidenced unprecedented use of improved technology in all aspects of Census taking. The 2010 round witnessed a rise in the use of the internet for data collection. Of the 138 countries or areas that responded to the United Nations survey of the 2010 round, 32 (23 per cent) utilised the internet for data collection.¹³

Census 2011 was the first Census in Northern Ireland to offer an online response mode. Fifteen per cent of responses in Northern Ireland were made online. In England and Wales Census 2011 was also the first Census in which an online response mode was offered and 16 per cent¹⁴ of returns were made using this mode.

For all countries of the UK, Census 2021 is planned to be predominantly online. Given this focus NISRA has undertaken research related to online data collection. Section 6 of this paper provides a summary of this research.

3.0 User Needs

The decennial census is a crucial part of the Northern Ireland statistical system; it provides vital infrastructure for household surveys, including those conducted by the private sector. The Census provides estimates at the national and local level of groups, such as short-term residents,

children, older people, and single-parent families. The Census also gives an accurate and comprehensive picture of the socio-economic characteristics of the population for example ethnicity, religion, family, education, occupation, and housing. The Census provides a granularity of results not currently available from any other source(s). Key statistics for small geographies and / or small population sub-groups can only be sourced, to a satisfactory degree of accuracy, from the Census.

After the 2001 Census NISRA undertook a number of user consultation events the first of which was in December 2004¹⁵ followed up by roadshows to determine the content of the 2011 Census questionnaire. A major driving force in the 2011 questionnaire content was the legal requirement defined by Eurostat, the statistical arm of the European Union. The EU regulation mandates European Union countries to produce a sequence of 60 socio-economic tables of statistics.¹⁶

In terms of the future NISRA believes the Census must meet a number of user requirements detailed below:

- a. The primary requirement is resource allocation. Population estimates from the Census are used to allocate public funds at the UK level through the Barnett formula and at regional and local levels. As an example in the health sector, population estimates underpinned the allocation of approximately £4.8 billion of public funds in 2014/15¹⁷;
- b. Policy making and monitoring. Government policies need to be evidence based and the Census is a key source especially for policies affecting small population groups or areas. In Northern Ireland the equality requirements under Section 75 of the Northern Act 1999¹⁸ require public bodies to evaluate their actions on equality groups, for some of which, due to their size, the Census provides the key quantitative information source;
- c. Public service delivery. Accurate population counts and counts by population attributes are key for service delivery. If an area's population can be defined by population attribute(s) then public services for that area can be tailored to suit the area's profile. For example if an area has a concentration of older people then the area's allocation of the health budget can reflect this. For more localised, small area, service delivery Census provides robust statistics relating to small areas that a sample survey cannot provide;
- d. Academic and market research. The ability of the Census to produce robust multivariate statistics for small areas is critical for many research projects; and

- e. Statistical benchmarking. Many statistics are benchmarked or grossed up using the Census and as such the Census is a key component in the design and delivery of sample surveys. The Census can also be beneficial to the appropriate use of administrative data.

In addition the European Union (EU) places an obligation on all member states to provide Census type data. The central EU requirements will be set out in the EU 2020 data tables regulations. The emerging message from the EU is that the 2008 regulations will be repeated within the next few years.

4.0 Census 2011

The last Census was undertaken in Northern Ireland on 27 March 2011. As mentioned previously a major part of the design of the 2011 Census was around the need to meet the 2010 Eurostat requirements. To help make UK level outputs consistent, the processing of the Northern Ireland Census was undertaken with external contractors jointly by NISRA and ONS. This also helped to ensure economies of scale and helped drive down costs in the Northern Ireland Census.

NISRA will continue to work with the Census offices of the other countries of the UK to deliver Census 2021 as efficiently as possible.

4.1 Objectives for Census 2011

Census 2011 is currently being evaluated by NISRA the results of which, along with a Census General Report, will be published in due course. In the interim, however NISRA is content that Census 2011 met the four key objectives to:

1. Provide high quality, value for money statistics that are fit for purpose and meet the needs of users;
2. Maximise response rates by actively encouraging public participation in the Census and raising awareness of its important role;
3. Protect, and be seen to protect, the confidential personal information collected through the Census; and
4. Secure public and user confidence in the final results and deliver them in a timely manner.

4.2 Intercensal developments 2001 – 2011

One of the principal elements of the last Census was that it was built on developments in the 2001 Census and brought layered reform. Key developments included:

- Thoroughly testing the approach for 2011 in an early Census Test in 2007;
- Using and developing a Census Address List to enable households to receive their forms by post (a post-out Census);
- Given the costs of a large fieldforce, using a post-out and post-back approach to surveying which requires less enumerators and is more cost-effective;
- Allowing households, who choose to do so, to use an online option to return their forms;
- Attempting to achieve as full a response as possible by investing in marketing, community liaison and guidance; and
- Recognising that not everyone will respond and use administrative data and a follow-up survey (the Census Coverage Survey) to estimate the scale of non-response and use this information to provide final estimates from the Census.

4.3 Census 2011 response rates

The final response rate to the Northern Ireland 2011 Census was 94 per cent of households and 92 per cent of people. This was broadly in line with the 2001 Census (95 per cent household response) but down on the 1991 Census (98 per cent household response). Moreover national statistics institutes have to expend more resources to maintain social survey response rates and increasing non-response to surveys remains a strategic challenge for all national statistics agencies. This was part of the rationale behind using the postal provider to deliver and collect forms from compliant households, leaving a smaller and more flexible fieldforce to follow-up non-respondents. This flexibility also extended to the marketing campaign and using the internet as a means of data collection - 15 per cent of households responded using the internet channel in 2011.

4.4 Census 2011 outputs

Census outputs cover a range of themes encompassing:

- Demography;

- The labour market;
- Qualifications;
- Ethnicity, identity, language and religion;
- Health;
- Housing and accommodation;
- Migration; and
- Travel to work or place of study.

Within NISRA the Northern Ireland Neighbourhood Information Service (NINIS) is the home of Census 2011 results. Each phase of the Census release data was disseminated via the NINIS website¹⁹ and each dataset is available to download individually or all datasets are available in bulk download files.

NINIS has also transformed raw Census data into infographics. For example Figure 1 is a graphic visualisation, or infographic, of key Census data related to the new Belfast Local Government District, produced along with similar infographics for all the new local government districts, in advance of the 2014 elections for the new councils.

In addition to these infographics, NINIS has developed a range of interactive data visualisations. The difference with such visualisations is the ability of the user to interact with and explore the data. These include spatial representation of Census data in the form of interactive maps and comparator population pyramids which enable the examination of population structure by age group and sex and the comparison of demographics between local government districts. Within the population pyramids, the user has the ability to interact with the data, for example by selecting a specific age group to examine within a wider population structure.

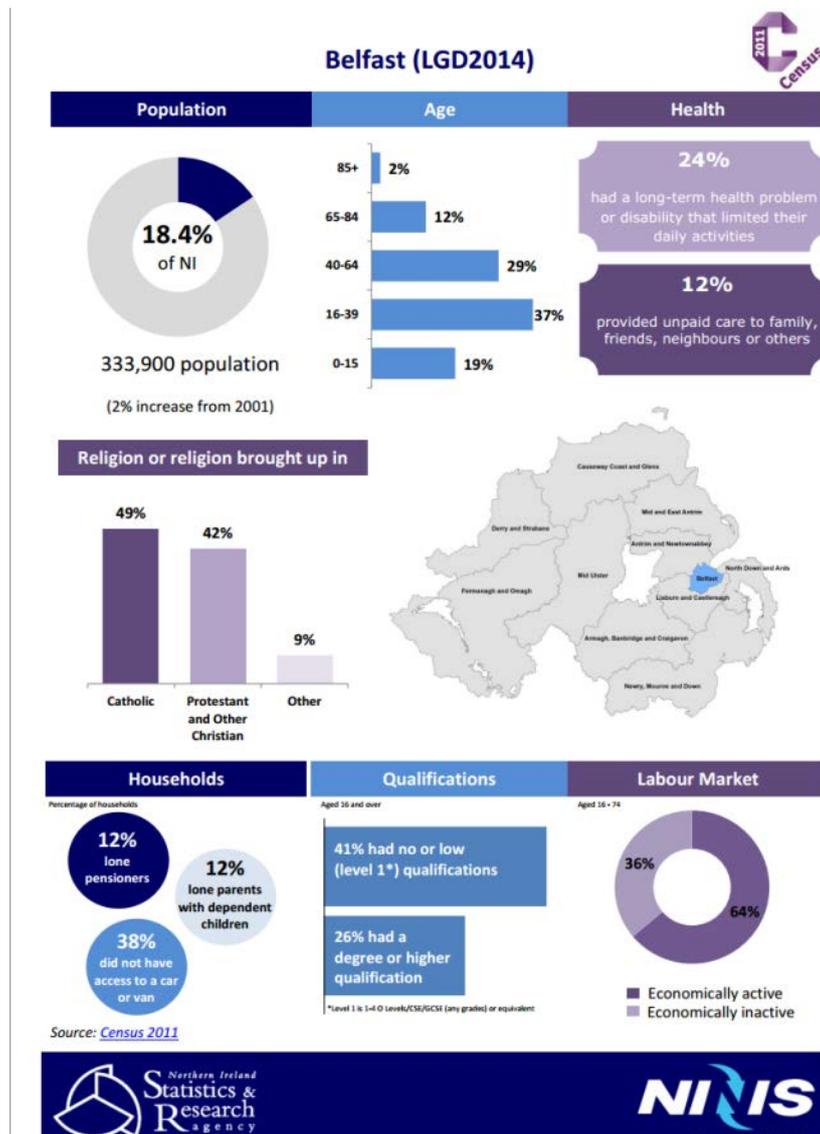
NISRA contributes Northern Ireland Census data to ONS for the production of UK level Census information. The website of the ONS hosts the data, at small area levels, for the UK as a whole.²⁰

A requirement of the EU, as stipulated in the 2008 Census Regulations, is that member states provide Census outputs to Eurostat, the statistical arm of the EU. NISRA has complied by providing 60 Northern Ireland data cubes to ONS, to enable UK data to be accessible on the Eurostat Census Hub.²¹

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The United Nations (UN) also receives Northern Ireland Census outputs. NISRA has planned to make available the required data by December 2014. In order to meet UN requirements NISRA works in partnership with ONS, providing the required information in the first instance to ONS for onward transmission to the UN.

Figure 1 Belfast Local Government District 2014: Infographic.



Source: NINIS

5.0 Looking Forward: Using Administrative Data to Assist in Counting the Population

This section of the report will cover the area of administrative data held by Government and Annex A describes proposed legislation being taken forward by the UK Government that aims to enable greater and more efficient sharing of administrative data held by public sector bodies.

Administrative data held by Government and other public bodies refer to information collected in the delivery of services. Administrative data are collected, as the name suggests for administrative purposes and not primarily for research and statistics.

5.1 Administrative data; dissemination in Northern Ireland

The sheer volume of administrative data held by the public sector makes such data a valuable asset and many Government departments in Northern Ireland produce statistics based on the administrative data that they hold.²²

The breadth of statistics based on administrative data published on NINIS has grown significantly since the inception of NINIS in 2003. NINIS was rebranded in 2012 with the launch of a new and improved website designed to host the Census 2011 results. The updated, 2012, version of NINIS currently holds over 2,300 datasets of which approximately 1,500 relate to Census 2001 or Census 2011. Of the remaining 860 datasets over 95 per cent are based on administrative data.

5.2 Administrative data; the advantages and disadvantages for research and statistics

Administrative data, while attractive to producers of statistics for reasons such as coverage, timeliness, cost and reduced burden on survey respondents, are not without certain limitations. Table 1 summarises the advantages and disadvantages of using administrative data.

Administrative data are collected for a specific population; in other words the administrative system counts what it was developed to count. This population may not conform to the needs of the statistician often acting as a proxy to the actual population of interest. For example the claimant count is a count of the number of people in receipt of unemployment benefit. However the claimant count does not cover the entire population facing labour market disadvantage due to unemployment. This is because the receipt of benefit depends on certain qualifying conditions and some unemployed persons may not meet these conditions, for example, if they have savings above a certain level.

Table 1 Advantages and disadvantages of administrative data.

Advantages of administrative data	Disadvantages of administrative data
Already collected for operational purposes and therefore no additional costs of collection (though costs of extraction and cleaning).	Information collected is restricted to data required for administrative purposes – limited to users of services and administrative definitions.
Collection process not intrusive to target population.	Lack of researcher control over content.
Regularly (sometimes continuously) updated.	Proxy indicators sometimes have to be used.
Can provide historical information and allow consistent time-series to be built up.	May lack contextual/background information.
Proxy indicators sometimes have to be used.	Changes to administrative procedures could change definitions and make comparison over time problematic.
Subject to rigorous quality checks.	Missing or erroneous data.
Near 100 per cent coverage of population interest.	Quality issues with variables less important to the administrator e.g. address details may well not be updated.
Reliable at the small area level.	Metadata issues (may be lacking or of poor quality).
Counterfactuals and controls can be selected post hoc.	Data protection issues.
Captures individuals who may not respond to surveys.	Access for researchers is dependent on support of data providers.
Potential for datasets to be linked to produce powerful research resources.	Underdeveloped theory and methods.

Source: Smith, G., Noble, M., Anttilla, C., Gill, L., Zaidi, A., Wright, G., Dibben, C and Barnes, H. (2004) The Value of Linked Administrative Records for Longitudinal Analysis, Report to the ESRC National Longitudinal Strategy Committee.

5.3 Administrative data and the Code of Practice for Official Statistics

Government departments in Northern Ireland list the administrative data that they use for statistical purposes as a requirement under the UK Statistics Code of Practice for Official Statistics (the Code).²³

The Code contains three detailed protocols on:

1. User engagement;
2. The release of statistics; and
3. The use of administrative data for statistical purposes.

5.4 Administrative data Censuses

Administrative, or register based, Censuses are not new. Administrative data have been used in Censuses in the Nordic countries for some time. For example Statistics Finland has used register data to produce statistics since the 1970s and Census 1990 in Finland was collected exclusively from registers without any direct data collection from the population. In total Statistics Finland sources 96 per cent of all the statistics it produces from register data.²⁴ The move to a register based Census takes a significant amount of time and wider resources. In Finland the process to a full register based Census took around twenty years.

The core of the Finnish population information system is the Central Population Register (subsequently called the Population Information System), which is a statistical population database covering everyone with a permanent domicile in the country. While this register covers basic demographic data it can be linked by a “personal information code” to a range of other administrative data registers such as social welfare. While such a unique identifier makes data linkage possible it is not a necessity (see 5.5).

Cost is a key driver in researching different methods of collecting demographic data on the population. Statistics Finland stated;

“lowered costs are without question the biggest advantage of using administrative register sources..the volume of statistics produced over a ten-year period has increased ten times over, while costs are down to one-third the costs of one single major questionnaire survey.”¹⁷

The Government’s response to the National Statistician’s recommendation for Census 2021, referenced previously, makes it clear that post 2021 the England & Wales Census will involve “other sources”; such sources include administrative data.²⁵

An administrative or register based Census was one of the two final options considered for Census 2021 in England and Wales. However “The Independent Review of Methodology” led by Professor Chris Skinner concluded that:

“there was not sufficient evidence that a census using administrative data and surveys provides a methodologically sound basis for replacing the 2011 Census methodology at present.”²⁶

Professor Skinner’s conclusion reflects both the need for population attribute statistics and the granularity of Census data that to date has not been evident in the administrative data programmes in either ONS or NISRA. However as these programmes progress towards 2021 it is

possible that administrative data could be used to supplement the 2021 Census process and to quality assure outputs.

5.5 NISRA research; “The Use of Administrative Data in Population Estimates”

The NISRA paper “The Use of Administrative Data in Population Estimates” published alongside this information paper shows how a basic prototype *Administrative Data Population Estimate* (ADPE) can inform the current mid-year population estimates²⁷.

In the study of survey and Census data, microdata relate to information at the level of individual respondents. For instance, the Census collects age, home address, educational level, employment status, and many other variables, recorded separately for every person who responds; these are microdata. In comparison aggregate data are combined from several measurements. When data are aggregated, groups of observations are replaced with summary statistics for that group based on those observations. However, summarising results to an aggregate level results in information loss. For instance, if statistics for age and gender are aggregated separately, they cannot be used to explore a relationship between these two variables. Access to microdata allows researchers much more freedom to investigate such interactions and perform detailed analysis.

5.6 NISRA research; “Data Matching Using Northern Ireland Administrative Data; a Worked Example”

Administrative data constitute a potential source for a wide range of demographic and socio-economic statistics. However no one administrative dataset will provide all the information that is required. It is therefore a requirement to be able to link a number of administrative datasets.

To link administrative datasets a unique identifier across the datasets is the most obvious methodology. For example Finland adopted a unified system of personal identity codes in 1963 and in the Republic of Ireland (RoI) citizens have a Personal Public Service Number (PPSN). In the UK adults have a unique National Insurance Number, but it is not used across all administrative sources.

The research “Data Matching Using Northern Ireland Administrative Data; a Worked Example” shows that an administrative dataset can be matched to another administrative dataset without a unique identifier.

The research, based on just two data sources, found that almost all individuals on one administrative source could be linked to another administrative source with a high degree of

confidence. The matching methodology used was deterministic, or 'rule based', and is referred to as match-keys. Several of match-keys were developed, each of which was designed to resolve a particular type of inconsistency that often occurs between records belonging to the same individual. Match-keys were created by amalgamating pieces of information, such as date of birth and gender, to create unique keys that can be used for automated matching.

5.7 From an address register to a statistical population dataset

A statistical population dataset (SPD) forms the "spine" of an administrative data system to be used for the production of statistics.

Census 2011 was the first Census in Northern Ireland to employ a "post-out" method to deliver Census questionnaires rather than the traditional doorstep delivery by Census enumerators. NISRA used, as a starting point, the Land and Property Services' POINTER address product. NISRA analysed POINTER for accuracy and added value to the register using information received from and assistance provided by the NI Local Government Districts, Royal Mail, NISRA's Central Survey Unit and the Electoral Office.

The process of comparing, matching and updating the register continued into 2011 to make the register as up to date as possible. Additionally, during Field Operations, Census Enumerators carried out a full address check across all Northern Ireland to identify addresses which were missed from the register or those which were duplicated, mis-classified or did not exist.

POINTER is simply an address list with no details of the people that live at an address. The administrative data referenced above for example the School Census data include demographic attribute data such as gender and age.

After data linkage and manipulation of POINTER and administrative datasets a SPD for Northern Ireland could be created. Thus, administrative datasets could be linked, at the micro level, with POINTER to produce a SPD for Northern Ireland. The SPD would include both address details, for delivery of Census questionnaires, and also population attribute data, for quality assurance purposes.

The key administrative dataset is the Health Card Register. The coverage and accuracy of the Health Card Register depends on all patients registering with a National Health Service (NHS) General Practitioner (GP) when they move into or within Northern Ireland. NHS Health Card Registers are prone to list inflation, caused by for example delays in registering a death with the Health Service or someone leaves the UK and not informing their GP.

The Business Services Organisation (BSO) which maintains the Health Card Register (along with the Public Health Agency) has worked with NISRA to develop the notion of an “Active Patient” indicator to apply to the Health Card Register. The Active Patient data provide the number of “live records” on the Health Card Register. A record is considered as “live” if there has been any activity in the previous period e.g. 24 months, for example dispensing of prescriptions, and / or treatment by a dentist or an optician and / or admission and discharges to hospitals and / or accident and emergency data.

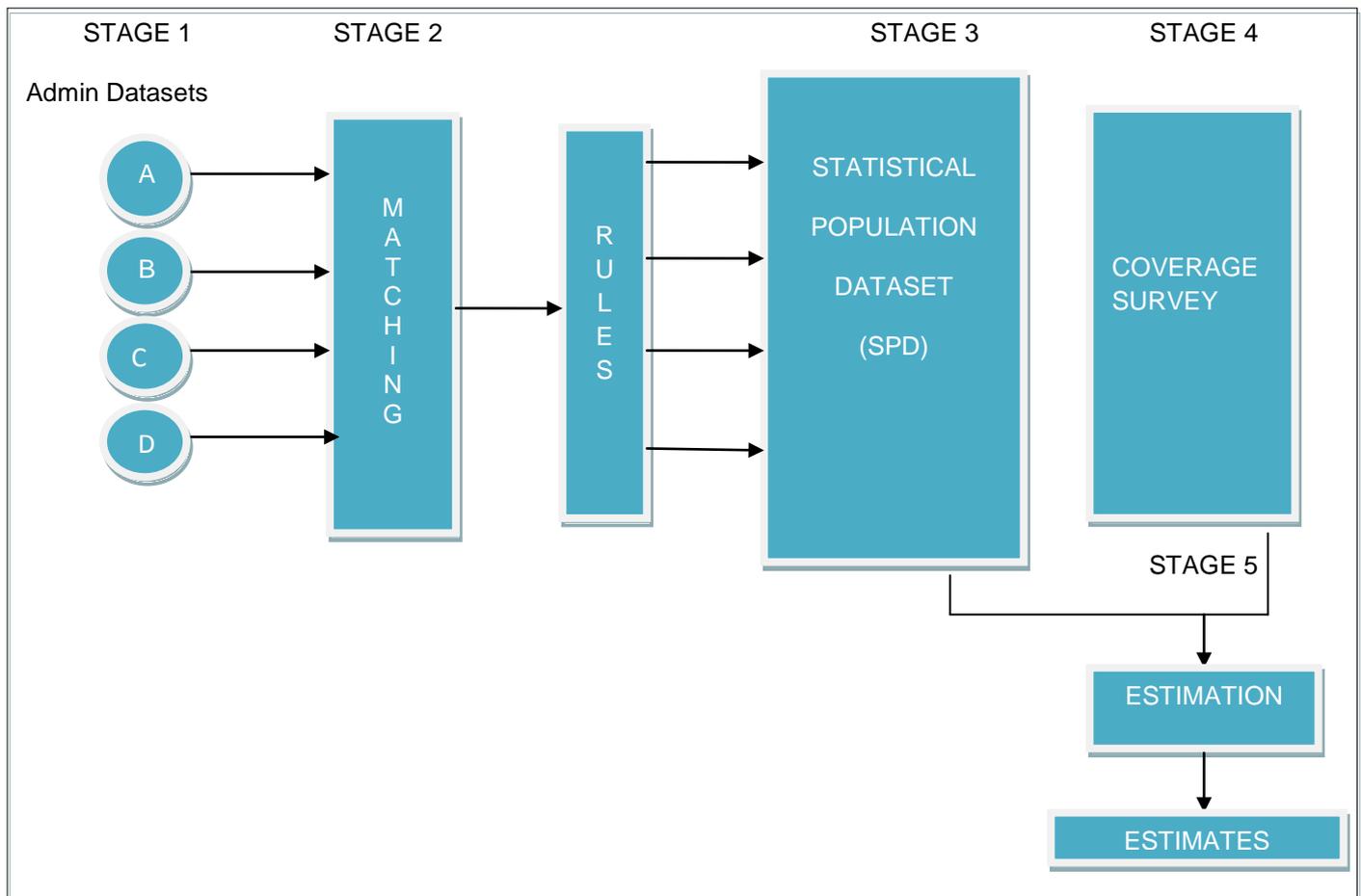
The Active Patient count will, however, by definition, be an undercount because there are people who currently live in Northern Ireland but have no interaction with the Health Service. The use of other administrative datasets will assist in counteracting this undercount.

Figure 2, sourced from the ONS paper “Beyond 2011 Producing Population Estimates Using Administrative Data”²⁸, illustrates the five stage process in the creation of a SPD. In Figure 2 POINTER would be one of the administrative datasets, A, B, C or D. Note that the process shows four administrative datasets but this number is for illustrative purposes only.

Figure 2 also shows a Population Coverage Survey (PCS) and how it interacts with the framework. The PCS is a household survey; the aim of which is to facilitate the estimation of the population at the required geographies (local government district being the lowest level for Census quality standards) by making adjustments to population totals for Census quality assurance purposes. The PCS is to the SPD as the Census Coverage Survey is to the Census count – in other words the survey adjusts the initial population totals. When designing a survey to measure coverage, either a PCS or a CCS, the availability of information about likely coverage patterns and the variability of such patterns is important. Such prior information on coverage issues enables the coverage survey to be designed with smaller or larger sampling fractions for areas with coverage issues and those without.

In addition to providing a range of experimental statistics, such a dataset, updated to match the timing of Census 2021, will allow the Census results to be compared with estimates from administrative data sources.

Figure 2 Framework for producing population estimates under a linked-record level administrative data design.



Source: ONS

6.0 Census Online Data Collection

The Census design proposed for 2021 retains a whole population survey, albeit with the aim of having an online response mode the option of choice. The NISRA paper “Online data collection in the Census”, published alongside this information paper, provides background to inform the evidence base for an online data collection mode in Census 2021.

A solid foundation for developing an online solution for Census data collection was laid in 2011 when 15 per cent of responses were made online.

The research also showed that this level of response was similar to first attempts by other countries such as Canada (18 per cent of responses online)²⁹ and Australia (10 per cent of responses online).³⁰ In England and Wales 16 per cent of responses were made online.

The delivery of the Census will need to be re-designed to achieve a predominantly online Census in 2021. This will be returned to in section 7.

Benefits that an online response mode brings to the Census, reported by national statistics institutes, and referenced in the research “Online data collection in the Census”, include:

- Reduced postage, mail – back and registration of paper questionnaires;
- Reduced item non response;
- High quality data;
- Simplified processing of returns;
- Data in machine readable format;
- Environmentally friendly in nature;
- Reduced calls to the contact centre for help;
- Savings in paper scanning / capture; and
- Speedier capture of data.

Users of Census data have indicated that there is significant demand for small area and population sub-group statistics³¹. The proposed design for Census 2021 will provide the same level of statistics on small areas and small population sub groups as the “traditional” Census design in 2011.

Estimating the costs for the new design with an online whole population survey and, as appropriate, increased use of administrative data will be developed in the Census 2021 business case, and NISRA will bid for the appropriate level of funding.

7.0 Census 2021: Design for a Predominantly Online Census

A predominantly online Census will require different design aspects to those used in 2011.

The research referenced previously, “Online data collection in the Census and surveys”, investigated the design of Censuses that had the objective of maximising online returns.

There are several design aspects that, based on the research, should be incorporated into the design of Census 2021 in Northern Ireland to maximise online returns. The design aspects outlined in the remainder of this section relate to the delivery of the Census and not functional design aspects, i.e. related to the questionnaire structure and content. As for Census 2011 the questionnaire content for Census 2021 will be the subject of consultation.

Based on the research evidence, three aspects to Census design are proven to maximise online responses:

- A focused pre Census publicity campaign;
- A unique internet code for each household; and
- A wave survey design.

The pre Census publicity campaign should have a focus on the benefits to the respondent and beyond in completing their Census return online. For example completing the questionnaire online should reduce the burden on the respondent in respect of time taken to complete and post back. Other aspects such as privacy and data confidentiality and socially desirable outcomes such as the environmentally friendly nature of an online data collection mode should be publicised. The media used should include traditional media such as print and also new media such as web based social media, for example, Facebook and Twitter. The outsourcing of the publicity campaign should be to an organisation with speciality in new media campaigns.

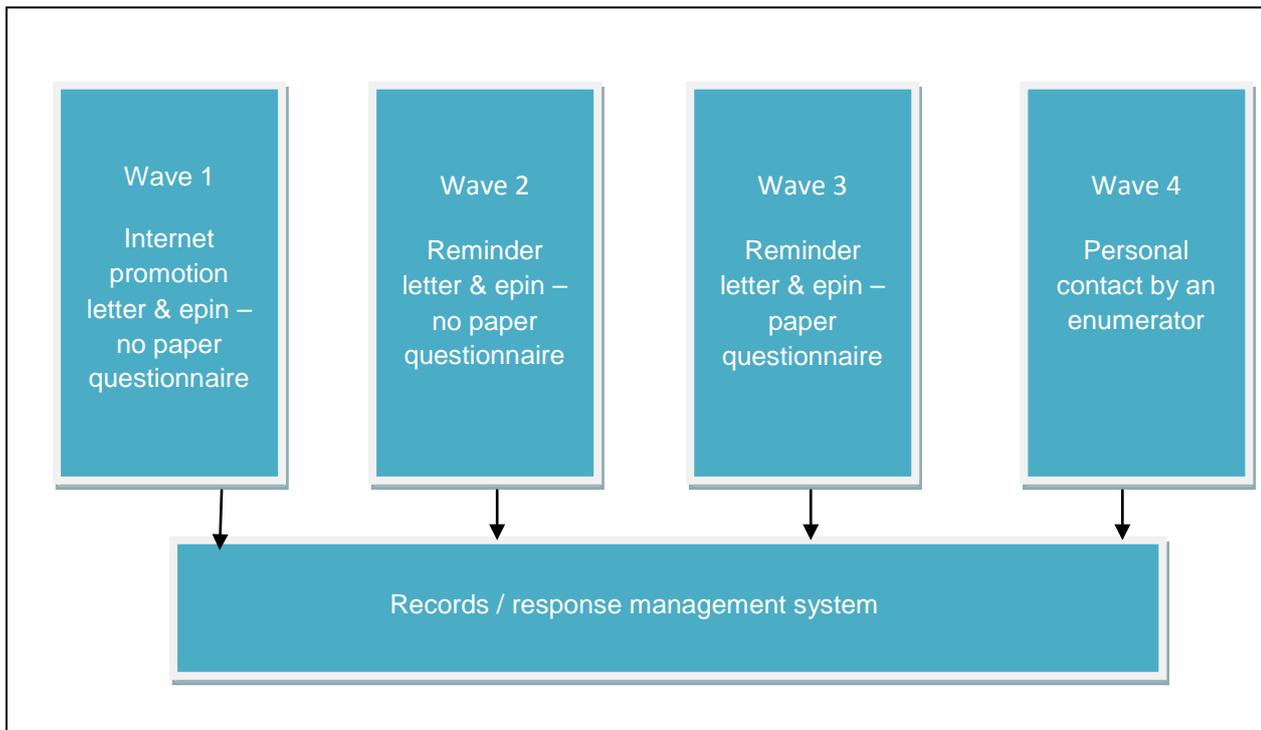
Each household requires a unique internet code or “epin”. This epin allows confidential access to the online questionnaire assigned to a particular household.

Figure 3 is a pictorial representation of the wave methodology employed in, for example, the Canadian Census of 2011. A wave methodology means contacting households in a succession of time periods. In the first two contact waves there is no paper questionnaire, rather the “epin” for the household only to encourage responses online.

The objective of the wave methodology is to encourage the respondent to choose online as their preferred response mode. However, as stated by the National Statistician and by the Skinner review all cases where an online response is not received must be followed up fully by telephone, paper and eventually doorstep contact for those people that either cannot or do not want to complete their Census form online. There will be no degree of compulsion for the individual to respond online, rather encouragement and support to do so.

An electronic response / records management system (RMS) is recommended. An electronic RMS links the fieldforce, via mobile devices, to the Census office. Addresses can be checked, workloads distributed / amended in real time.

Figure 3 The Canadian Wave Methodology.



Source: Author's pictorial interpretation of Statistics Canada text³². Note the RMS was added by the author.

While the digital solution has focused on the internet there will also be the requirement to enable other forms of responding digitally, for example “apps” and solutions aimed at mobile devices in general.

As detailed in sub-section 5.7, ahead of Census 2021, NISRA will construct a statistical population dataset for Northern Ireland. The SPD will be compared with the Census for quality assurance purposes and further research. The construction of a SPD will also provide NISRA with *a priori* information on which to focus non response follow-up to areas of poor coverage in relation to the SPD.

The digital market is characterised by a high speed of change and it will be incumbent on NISRA to keep a watching brief. It is quite possible that between now and Census 2021 new digital products will have come to market that are relevant to the delivery of the Census.

Public acceptance of responding to the Census online is obviously key to achieving a predominantly online Census and NISRA will be undertaking further research into public attitudes in this area.

8.0 Conclusion

Although research has indicated that it is possible to change to a digital Census model, there is some uncertainty about whether this will work for the majority of the population. Government recognises that a significant proportion of the population remains digitally excluded and there are a raft of policies and initiatives to increase the digital competence of the population.

The move to a predominantly online Census in 2021 represents a natural progression of Census methodology. In Northern Ireland a solid foundation was laid in Census 2011 and based on the international evidence and digital take-up in Northern Ireland there is the real possibility of achieving between half and two-thirds of Census returns digitally.

The digital market is evolving at a significant pace. Although restricting an online mode to PC / laptop based application is likely to be the most popular digital means of responding to the Census, technologies such as “apps” and mobile devices will also be required. As 2021 is still a significant number of years in the future it is highly possible that currently unforeseen digital technologies will be available. NISRA will keep a watching brief on technological developments relevant to the Census.

Northern Ireland Statistics and Research Agency

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Annex A: Legislation

Census Legislation

Regulations (EC) No 763/2008³³ and No 519/2010³⁴ of the European Parliament and of the Council on population and housing censuses, implemented through Commission Regulation (EU) No 1151/2010³⁵, required Member States to provide the Statistical Office of the European Communities (Eurostat) with census-derived statistical information, or equivalent, referring to the reference year 2011. The United Kingdom has provided the required information based on the Censuses held in England & Wales, Scotland and Northern Ireland in 2011.

National Censuses are of greater value in the EU if their results can be compared between Member States. This is why the EU has taken steps to harmonise Census outputs.

While output harmonisation is being taken forward the EU does not prescribe a single Census methodology, rather Member States may base the statistics on different data sources as specified below:

- (a) conventional censuses;
- (b) register-based censuses;
- (c) a combination of conventional censuses and sample surveys;
- (d) a combination of register-based censuses and sample surveys;
- (e) a combination of register-based censuses and conventional censuses;
- (f) a combination of register-based censuses, sample surveys and conventional censuses; and
- (g) appropriate surveys with rotating samples (rolling censuses).³⁶

The Census Act (Northern Ireland) 1969 allows for the carrying out of a Census no less than five years after the previous Census. However, various other legislative requirements need to be fulfilled before a Census can be held. Following detailed consultation, development work and testing, the legislative process was initiated through the publication, in March 2010, of a proposals document, 'The 2011 Census of Population in Northern Ireland'³⁷. This informed the Census Order (Northern Ireland) 2010³⁸, which was debated and approved by the Northern Ireland Assembly in June 2010. The Census Order determined: the date of the Census; the people required to complete the form; those to be included on the form; and the topics on which questions would be asked. The operational aspects of the Census also required legislative

approval. This information was set out in the Census Regulations (Northern Ireland) 2010³⁹, which contained details of how the Census was to be conducted and included a copy of the Census form.⁴⁰

Data Sharing Legislation

NISRA has taken forward legislation to enable data sharing using the legislative basis of the UK Statistics and Registration Services Act 2007⁴¹ and the powers conveyed to the Registrar General Northern Ireland under the Census Act (1969) Northern Ireland, the rationale for these data shares being the production of population statistics.

While this legislative gateway for population statistics will remain, the Cabinet Office is taking forward proposed UK wide data sharing legislation.

The rationale for the new legislation is to make the data sharing process more efficient and to enable public bodies to share a wide range of information.

The legislation is being proposed on the basis of three strands of data sharing, specifically in support of:

- Tailored public services;
- Fraud error and debt to the public sector; and
- Research and statistics.

The policy process is being taken forward by an open policy making process. This process involves Government working in partnership with Civil Society to gain a consensus on the way forward.

At the time of writing, this open policy making is fully underway with initial policy proposals due to be published by end 2014. The reader is referred to the website of the project

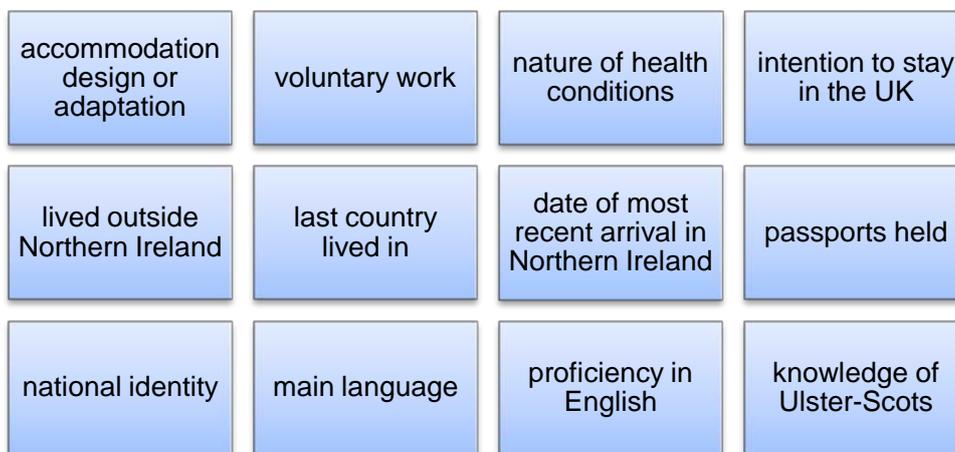
(www.datasharing.org.uk) for further details.

Annex B: Content of 2011 Census in Northern Ireland

The content of the 2011 questionnaire came about as a result of consultation with key users and the topics included were those shown to meet the strongest user need for census information. Significant change in society has taken place over the last 10 years and as a result new questions were introduced as well as amendments to existing questions in an attempt to deliver more relevant statistics, for example the introduction of Civil Partnerships.

Twelve new questions were introduced to the Northern Ireland Census questionnaire in 2011. These are shown in Figure A.1.

Figure A.1. New questions for 2011



Source: Comparability of the Census Questionnaire in Northern Ireland between 2001 & 2011

Four previous questions were excluded from the 2011 questionnaire, as shown in Figure A.2.

Figure A.2 Questions omitted for 2011



Source: Comparability of the Census Questionnaire in Northern Ireland between 2001 & 2011

In total, the 2011 questionnaire contained 59 questions (14 household questions and 45 individual questions).

Annex C: Digital Inclusion

Government administrations at all levels across Northern Ireland and the UK, recognise that not all citizens maximise the benefits that digital technologies offer.

Not all people experience the same level of digital exclusion. Particular groups of the population, for example, people with disabilities and older people, are more likely than others to experience digital exclusion.

Reasons for digital exclusion are varied; some people may simply not want to use digital technologies and others may not have the necessary skills required to, for example, successfully use the internet.

The achievement of a predominantly online Census in 2021 will require targeted efforts from both government and the individual to improve basic online skills.

Government contributes to reducing digital exclusion through a range of strategies and initiatives, some of which are described in this annex.

A complete synopsis of all government efforts to tackle digital exclusion is outwith the remit of this paper. For further information the reader may refer to research commissioned by the Office of the First Minister and deputy First Minister of Northern Ireland. The research, published in October 2013, “E-Government and Older People in Ireland North and South”, authored by Professor Irelene Hardill provides a detailed analysis of the situation and is available to download from the OFMdfM website (www.ofmdfmi.gov.uk). Hardcopies are also available on request to OFMdfM.

The UK Government has an overarching Digital Strategy⁴² that includes an action to reduce digital exclusion. To achieve this aim a Digital Inclusion Strategy was launched in April 2014.⁴³

In 2003 a Digital Inclusion Strategy⁴⁴ was published, and the Digital Inclusion Unit established. The Digital Inclusion Unit is based within the Delivery and Innovation Division in the Department of Finance (DFP) and Personnel. The unit is responsible for digital inclusion, and focuses on ensuring that NI citizens are capable of accessing new digital services and establishing, funding and operating a number of digital support projects.

The strategy covered the period to 2005, although many of the actions such as the partnership initiative with LibrariesNI continued after 2005. This initiative enabled libraries across Northern Ireland to provide free internet access and support to help people get online.

MyGroupNI (www.mygroupni.com) is another e-government initiative which aims to tackle digital exclusion. It was set up to urge non-profit making, voluntary and community organisations that would normally consider it too costly or challenging to maintain a website, to join in the digital movement. Those who meet the criteria are provided with a free website.

More recent initiatives include the launch, on the 15 April 2014, of Go ON NI (www.nidirect.gov.uk/go-on-ni). Go ON NI aims to increase the basic online skills of people, small business and charities in NI. The programme in partnership with Go ON UK aims to deliver a 25 per cent reduction in people below the basic online skills threshold in 12 months. The programme's website reports;

“Over 345,000 adults in Northern Ireland – just under a quarter – lack the Basic Online Skills needed to send and receive email, use a search engine, browse the internet and complete online forms. Almost a third of businesses and charities are also missing out”.

The Northern Ireland administration is also proactive in the area of online service delivery. The Digital Transformation Service – Citizen Contact Strategy looks at how citizen-facing services are delivered now, and sets out a vision for the future. One of the six main principles is to:

- *“Promote a ‘digital first’ ethos, meaning that digital online services are the primary means of interacting with citizens and businesses”.*

As part of a major digital inclusion initiative across Northern Ireland, the Northern Ireland Housing Executive, Supporting Communities NI (SCNI), the Department of Finance and Personnel, MyGroupNI and M.M.C. Consulting worked in partnership to design and implement a programme of digital inclusion for members of the Housing Community Network. The programme consisted of providing training and ongoing support to groups to establish and maintain their own mini-site free of charge. This began with MyGroupNI providing formal training to SCNI staff and a designated Digital Inclusion Officer. A comprehensive training programme was then rolled out to groups across Northern Ireland.

In May 2010 the Department of Employment and Learning (DEL) announced free entry-level computer skills classes. The initiative follows on from DEL's launch of ICT as the third Essential Skill in 2009. The announcement also coincides with two further initiatives, Adult Learners' Week and Silver Surfers Day, which aim to promote learning to everyone, irrespective of age. The most recent Silver Surfers Day was in April 2014. The day involves volunteers from the business community showing people over 50 years of age the basics of:

- How to use a computer;
- How to register for their free e-mail account; and
- How to e-mail family abroad, book cheap flights, save time on shopping, find a computer course, bank safely and more.

Census 2021 is still a significant number of years in the future and the digital capabilities of the Northern Ireland population can only improve. Government will continue to be at the forefront of tackling digital exclusion. NISRA will contribute to this work with engagement events incorporating publicising the digital solution for the next Census.

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