Data visualisation and beyond: A multi-disciplinary approach to promote user engagement with official statistics

Alan Smith OBE
Data Visualisation Centre, Office for National Statistics, Segensworth Road, Titchfield, Hants PO15 5RR, UK
Tel.: +44 1329444969; E-mail: alan.smith@ons.gsi.gov.uk

Abstract. As the World Wide Web becomes a source of increasingly rich content, the appetite among users for data visualisation continues to grow. This perspective resonates with calls from senior figures in UK official statistics for web content that transforms vast amounts of data into meaningful information. To enable this transformation towards rich content, evolving web technology is increasingly facilitating 'integrated content' – text, images, tables and other content types, featuring animation and interactivity, intelligently bound together in the same document. Despite this trend, the outputs produced by many official statistics agencies continue to follow a strict, static linear publication format largely defined by the inertia of print publishing. There are advantages to be obtained by optimising statistical presentations for the web – content is more likely to be syndicated by mainstream press, dramatically increasing outreach. But producing such content requires a multi-disciplinary approach, involving the collaboration of statisticians, designers and developers. This is not a natural approach for most statistical agencies. Experience of producing interactive content as part of the UK 2011 Census first release is described along with the critical user reaction on social media and other channels.

Keywords: Statistical literacy, visualization, syndication, engagement, public, communication

1. Introduction

Although the World Wide Web is now a long-established medium, the nature of its content is continually changing and evolving. Studies have shown [1] that the size of an average web page grew from 93.7 kb in 2003 to 679 kb in 2011. This metric reflects the shift of the web away from static, text-based content to something more immersive, visual and social. While there may be some concerns [ibid.] about whether this richness is always a good thing, there is undoubtedly an increasing expectation among web users for rich and immersive content – if an 'information broadcaster' fails to deliver on the web, it will find itself increasingly bypassed as a source of information. This trend is accelerated by citizens using social media services such as Twitter and Facebook to share, recommend and aggregate content. There is no reason to think that producers of official statistics are immune from this process. Indeed, it seems logical to conclude that those statistical agencies seeking broader public outreach have a further challenge in terms of content production: The move from print publishing to web publishing has brought with it a changing audience, something that is not always reflected in the portfolio of online content offered by National Statistics Institutes (NSIs).

In the UK, the Office for National Statistics (ONS) has a clear remit to engage more widely with citizens: The UK Statistics Authority, the independent body with responsibility for ONS, declared in 2010 that "*the public has a right to know the statisticians' understanding of the messages from the statistics, just as they have a right to the data itself*" [2]. Moreover, the current chair of the Authority, Sir Andrew Dilnot, stated in his pre-appointment hearing before a parliamentary select committee that "*The people I care about even more* [than official users] *are the citizen users. At the*

moment, the citizen user is essentially held away from all this data by the difficulty of access, so one of the things I will argue for very strongly is a new prioritisation for all forms of communication." [3]. He went on in the same hearing to express the view that the ONS website should be both a source of data *and* interpretation – and that if the ONS website was not better in this respect within one year of his appointment, he would consider his appointment a failure. Against this backdrop, there is a clear and pressing need to consider *what* kind of content to produce and *how* to publish it.

2. Towards richer content – The role of data visualisation

In 2007, ONS established a dedicated Data Visualisation Centre (DVC), a central remit of the team being to explore the potential of interactive, animated data visualisations to create a richer experience for users on the web. This team has delivered a series of graphics – population pyramids, maps and other statistical interfaces – which gained positive feedback from many users. But data visualisation is a wide field, covering everything from graphical data explorers (largely without narrative or context) to 'visual storytelling' (predefined stories and interpretation, reported with rich visual content) – the potential approaches and applications are myriad and reflect the wide range of users (and uses) of official statistics. The first release of 2011 Census data for England and Wales in July 2012 represented a good opportunity to develop, deploy and assess the demand for different types of rich web content as part of a major statistical release.

3. 2011 Census of England and Wales

The 2011 Census of England and Wales took place on 27 March 2011 with a number of new approaches designed to improve census return rates in all areas and with all population groups. These included online completion, post-out of questionnaires, questionnaire tracking and wider engagement of the community via partnerships and an extensive national publicity campaign. The first results were released on Monday 16th July 2012. These results included the headline national figure for England and Wales (with breakdown by individual year of age/sex) at the national level together with sub-national usually-resident population estimates by 5-year age/sex bands. From this data, the ONS DVC prepared 2 interactive content items with the intention of maximising outreach by:

a. Providing users an immersive, engaging environment for exploring 1st release data and stories
b. Syndicating the content with media agencies
c. Encouraging and observing the use of social media to share and promote the content.

The published graphics were picked to occupy different positions on the visualisation spectrum – one was primarily a data explorer interface, the other largely a 'storytelling' visualisation, featuring a significant narrative element.

## 4. An 'Exploratory interface' – Data comparator tool

ONS DVC produced an interactive (dual) population pyramid display [4] (Fig. 1), which allows a user to compare the size and structure of any 2 areas in England and Wales down to Local Authority level. In total, 393 areas are available in the application, from country level, down through regions, counties and local authorities. Animation is employed to allow the user to overlay any 2 areas for visual comparison, while the display itself can be switched from viewing the size (population estimates) to structure (% of population in each age band), facilitating hierarchical as well as magnitude comparisons. 2001 population estimates are also available for visual comparison, so that users are able to explore change over time as well as geographical comparisons. Finally, users can export images from the application and share their own discoveries via Twitter (tweets are automatically generated by the application using the geographical areas currently displayed in the tool as Twitter hash tags).

5. A 'Narrative' interface – 100 years of Census

An interactive, animated population pyramid looking at national data for England and Wales over the 100 years from 1911 to 2011 [5] (1911 is the earliest year for which individual age/sex band data is available). As well as an interactive population pyramid, this interface features extensive narrative which details the demographic changes over a century:

– Stories: linked to the data, with hyperlinks. For example, clicking on the link 'post-World War II baby boom' in the narrative highlights the appropriate part of the graph and displays the relevant data. The narrative doesn't relate solely to the census data being displayed – it also references data
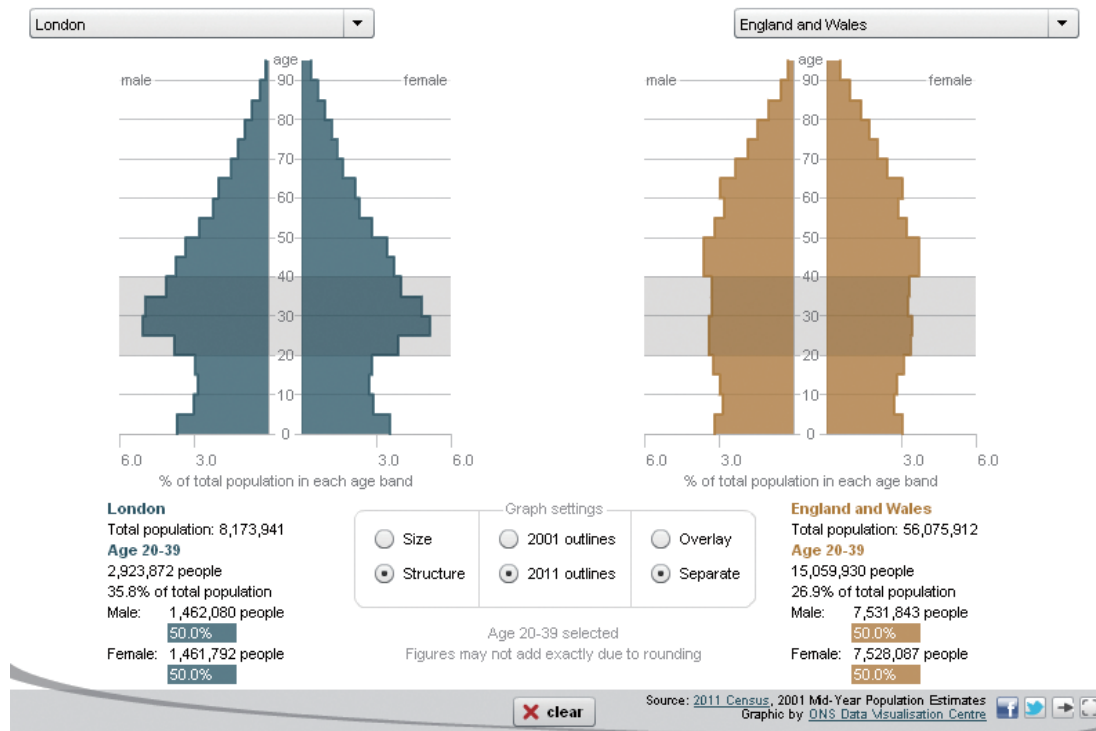
Fig. 1. Data comparator tool. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/SJI-130783)
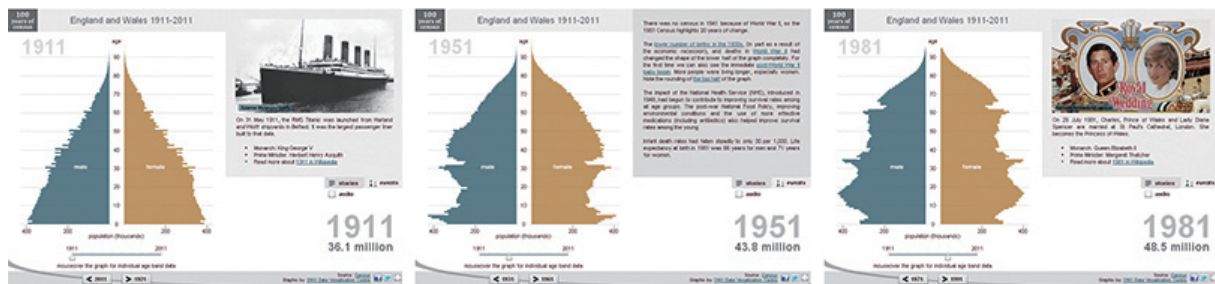
Fig. 2. 100 Years of Census Animation. (Colours are visible in the online version of the article; http://dx.doi.org/10.3233/SJI-130783)

from other sources (for example, Total Fertility Rate) to try and explain the patterns in the population structure. The text for the 'stories' is also offered in the application as an MP3 audio stream, synchronised to user interaction: If a user navigates to a particular time period, the audio stream follows. This functionality is switched off by default to ensure compliance with web accessibility standards – screen readers used by some users would otherwise be in conflict with the audio.
– Events: a key event of wide public interest from each census year supported by a photo, together with a link to further information about that year

on Wikipedia. Inspired by the charts of William Playfair, the graphic also included references to the reigning monarch and prime minister to provide further historical context.

6. Development process

Both content items used a multi-disciplinary approach to content creation. This involved a development process whereby staff with distinct but complementary skills work collaboratively on a project at the same time, rather than in a traditional linear publi-

cation process. The disparate skills required can be broadly categorised into one of three areas:

– Data analysis – first and foremost, an understanding of the data being produced by the Census and, cascading from this, the key information from that data that would be of interest to users and – at a broad level – how it should be symbolised or otherwise represented. Central elements for the data comparator tool would be to allow users to compare change over time (with the 2001 Census) and comparisons geographically (neighbours at the same geographic level and through hierarchy via parent/child comparisons). Underpinning this was a recognition that users would want to compare both the *magnitude* of the estimates and the population *structure* of the areas (by looking at proportions in each age band). For the narrative '100 years' product, detailed historical narrative was crafted by the Population and Demography team at ONS – cohorts from the narrative were identified and made into hyperlinks which highlighted the groups on the population pyramids when users click on them.

– Design – an appropriate and attractive visual layout. This was most demanding on the '100 years of Census' where the various elements of the display – the graph, table, text for stories and events, photos and user interface elements all compete for attention. The skill of the designer's role here is in achieving balance and elegance without distracting from the symbology used for the data visualisation or the clarity of content. Colours were picked for a combination of aesthetic (attractive) and functional (colour-blindness) requirements. Additional roles included sourcing appropriate photographic images, arranging licensing for them and reformatting as appropriate.

– Develop – implementing the design using appropriate web technologies. In this case, the chosen content technology was Adobe Flash, a de facto standard for rich content, which in the longer term is likely to be increasingly deprecated in favour of open standards content based on HTML5. Importantly, the choice of format does not necessarily influence the look and feel of the graphic which should be dominated by the design process, not led by the IT. Of course, occasionally, the limitations of a particular technology (or development time) might prevent a particular design element from being implemented – and in this case needs to be fed back into the ongoing design pro-

cess. The graphics themselves were linked to data stored in a simple XML (eXtensible Markup Language) format, which ensures separation of data from appearance of the graphic, making the whole item easy to reuse and republish. The XML files were generated from automated SAS routines.

The combination of activities involved leads to a rapid, iterative development process – prototypes are produced quickly and assessed from different viewpoints before being either discarded or elaborated further. This contrasts with traditional developments involving extensive 'functional requirements' identified at the outset. The advantages of moving towards a more rapid, iterative process include increased innovation, flexibility and timeliness.

Of course, there is a fundamental question about whether programming graphics in this way is the right approach. For some organisations, given the plethora of 'off-the-shelf' tools, it might be tempting to simply choose one or more software products and implement them. But effective visualisations are 'context-dependent' – individual outputs might be linked by a consistent set of underlying principles, but it is difficult to industrialise their production around a single set of software rules. Instead, the aspiration must be for a flexible toolkit capable of dealing with wide-ranging content requirements: 'Off-the-shelf' tools might form part of that toolkit, but custom programming is a good way of ensuring design control is with the author, not the software vendor. We believe that 'hand-crafting' graphics in this way delivers products that are optimised for the user rather than constrained by a software vendor. Using this approach, efficiencies in production (such as exploiting Web Services and Application Programming Interfaces) can be achieved without short-cutting the design process. The final choice of which tool to use for any given project will obviously be dictated by available resource and competing priorities.

7. Media syndication

In advance of the release, the DVC team met with UK media agencies specialising in 'data journalism' – the BBC, The Guardian and the Daily Telegraph – to gauge enthusiasm for syndicating the content. Having being shown previews of the content (with 'placeholder' data), they all expressed interest in syndicating the content onto their own websites with agreement that they would share metrics with ONS to enable aggregate viewing figures to be compiled, along with ac-
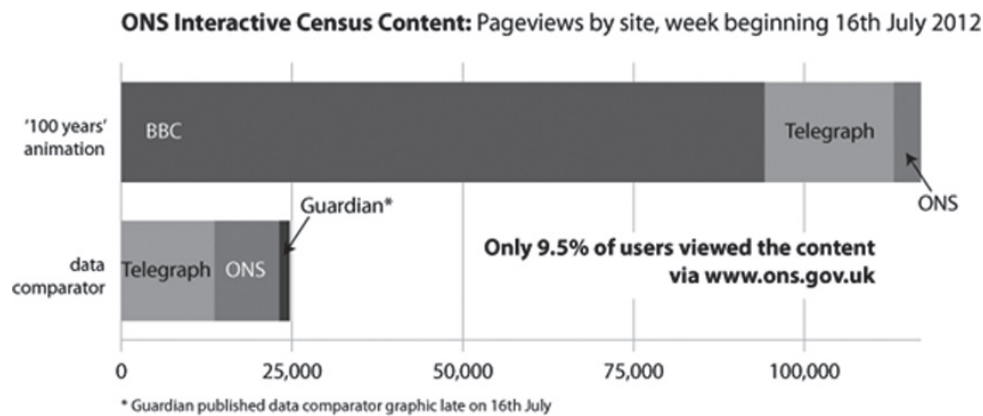
ONS Interactive Census Content: Pageviews by site, week beginning 16th July 2012

Fig. 3. Metrics for ONS Census Interactive Content.

knowledgement of ONS as the source of the graphics. Arrangements were made to release zip files containing the interactive content to the agencies at 11 a.m. on 16th July (the time of release). The Telegraph loaded both items onto their website by midday [6,7], with the BBC syndicating the '100 years' animation shortly after [8] as part of a wider item on the News section of their website. The Guardian syndicated the Data Comparator tool [9], but it appeared on the site much later in the day. The graphics were obviously also published on the ONS site at 11 a.m. on release day, via prominent links on the 2011 Census landing page [10].

8. Metrics

In the first week following release, the ONS website received 9,500 page views for the data comparator tool and 4,000 views for the '100 years' animation. These figures are largely in keeping with what would be normally expected from a relatively prominent release on the ONS website. Interestingly, more than twice as many users played with the data explorer on the ONS site as opposed to the narrative-driven graphic – suggesting that users were coming to the ONS website primarily for the data rather than a story. This is very different from what was experienced with the syndicated content in the media where the narrative interactive graphic was far more popular.

There was no dedicated promotion strategy for the interactive graphics, but the Census results were newsworthy in their own right, and featured on the front page on most online UK news websites for most of release week. As a result, the BBC's page for the '100 years' animation, which was placed alongside their own reporting of the Census results, received around 94,000 page views in one week. The Telegraph website received 18,936 views for the same graphic, while reporting 13,638 views for the data comparator tool. The Guardian's site received just 1,493 page views for the comparator tool, primarily due to the late publication on the site on release day. Figure 3 shows the dominance of the narrative '100 years' product and clearly emphasises the importance of media syndication to increasing outreach – less than 10% of users who viewed the interactive content did so through the ONS website. Syndication of the content boosted circulation by 128,211 page views in one week.

9. Reaction on social media and elsewhere

Quantitative metrics are useful but cannot give direct measures of how much users appreciated or engaged with the content. For this kind of qualitative feedback, the content was monitored on Twitter by following comments directed towards @statisticsONS (the official ONS Twitter account) and tweets including variations of the #census hash tag – a representative selection of these tweets are included in appendix A. Most tweets were very positive indicating that users were engaged with the content and keen to share – for example, there were repeated uses of adjectives such as '*fun*', '*fascinating*', '*cool*' and '*interesting*'. One observation is that several tweeters appeared to credit the hosting media agency with creating the content, even though ONS Data Visualisation Centre was clearly acknowledged as source on each page. This raises the issue of branding in relation to syndicated content – text acknowledgements alone may not be sufficient.

The appeal to users of the '100 years animation' – the interactive graphic with narrative – was neatly sum-

marised later in the week by a blog post [11] on coffeespoons.me, a blog dedicated to 'examining how we measure our lives', noting "*what makes this different* [from standard population pyramids] *is the context that the ONS has added that the strict data pulls lack*". The post goes on to emphasise that the added context of the narrative helps users to understand '*why*' in addition to '*what*'.

The graphics – along with subsequent visualisations of the 2nd release of small area census data – were awarded the runners-up prize at the 2013 Royal Statistical Society Awards for Excellence in Official Statistics [13].

10. Exploiting opportunities for innovation

In aspiring to move towards innovative new outputs, it is important for NSOs to recognise that many of their existing outputs are likely to be 'producer-oriented': The form of such outputs are often a reflection of the mechanics of data collection and compilation, rather than being designed deliberately around user needs. Moving to a multi-disciplinary environment for content creation presents opportunities for optimising content around users and in doing so challenges traditional models of product development used by NSOs. For example, many NSO products and online services start off from an exhaustive focus on 'functional requirements' and consequently suffer from long development periods, by which time the original requirements may be superceded or obsolete. Such a process also inadvertently stifles creativity. We have found that interactive visualisations benefit from a rapid, iterative development process: Release a visualisation early to see how users react, then introduce refinements based on watching how the products are used in the online environment. The Census graphics discussed here are in fact the latest iteration of graphics developed over the previous 5 years. This approach also resonates with the growing practice of so-called 'Agile' development methods in public sector IT projects.

11. Organisation, skills and infrastructure

Moving to a multi-displinary model for content development presents challenges for an NSO and ONS has learned a lot in this respect from the development of its own interactive content. Barriers include the organisational structure: Traditionally, the communica

tions departments of NSOs are not over-populated with statistics professionals, while the statistical business areas themselves are not necessarily regarded as natural storytellers. This contrast in skills and background sometimes makes for a comprimised approach to publishing, with communications deparments and statistical teams often sharing a contrasting opinion of what makes a good statistical product. We have found that locating the DVC in the Methodological/Best Practice area of ONS' organisation has brought with it substantial benefits in this respect – many DVC staff have a background in the research, analysis or statistics environment, facilitating dialogue with statistical business areas. And those staff with a design or developer background are generally able to talk effectively with communications teams. As a result, interdisciplinary project design decisions are brought into a smaller team environment, rather than across the organisational structure, making them easier to discuss frankly and resolve. The role of the manager in such an environment is important, making sure that all viewpoints are heard and discussed, while keeping projects proceeding in the right direction. A 'light touch' on behalf of the manager is essential to promote trust and foster enthusiasm within the team.

Bringing staff together from different parts of the organisation also encourages an organisation to make better use of core skills. For example, statisticians who can program in SAS or R are certainly able to handle the programming logic of modern web languages. Indeed, many modern web programming libraries like D3 (Data-driven-documents) particularly benefit from statistically literate programmers.

Producing this type of content requires a small investment in hardware and software – the DVC has moved to a small network of dedicated Apple Macs (with virtual Windows machines) for content creation. In the context of overall budgets, the cost is relatively small – the bigger issue we faced at ONS was that the existing corporate IT contract was not developed to provide equipment of this type, so a dedicated procurement process had to be implemented.

12. Conclusions

Producing engaging, web-optimised content is a challenge for NSIs – but it is a challenge which brings with it rewards in terms of broader public outreach and increased understanding of official statistics. Such content can clearly act as a 'hook' to get people interested

in official statistics. As one post on Twitter commented on the Census graphics "*statistics in animation – actually makes sense*!" [12]. The bigger challenges involved largely relate to skills and infrastructure and the extent of NSO ambitions in this area.

For example, formalised syndication agreements are likely to be a difficult reality to achieve for a number of reasons. From a user-engagement perspective, ONS is unlikely to want to form exclusive arrangements with individual media agencies for content. And media agencies themselves would be unlikely to find direct benefits in a formalised arrangement, instead preferring to assess items for syndication on a per case basis. Nevertheless, widespread syndication on an informal basis, as with the case of the Census visualisations, can form a compelling performance measure for an NSO that its content is 'fit-for-purpose' and user-focussed. An associated lesson from our syndication experience is to spend further time on looking at the branding of outputs to make it clear of provenance.

Migrating from traditional print publishing, not many NSIs will be naturally organised to produce this kind of multi-disciplinary content. Bringing people with different skills together to produce content – as in the small example of the ONS Data Visualisation Centre – seems a logical step, but a shortage of design and developers skills in NSIs to work alongside statistical analysts may represent a barrier. Lack of skills in writing effectively for the web is another potential obstacle. Finally, many NSI publishing infrastructures, such as the one in ONS, are based around a portfolio of content largely bound in inertia and usually managed through a central Content Management System. Bringing innovative content to users might involve publishing challenges (the ONS data comparator tool required load of 393 data files as individual components into the CMS – not a trivial process). None of these barriers are insurmountable, but require strategic attention based on a desire to create high quality content that goes beyond simple 'data visualisation' and moves more broadly towards 'richer content' produced by multi-disciplinary teams.

Ultimately, the decision for an NSI on whether to invest in skills and resource in this area depends on the extent to which visualisation is seen as a core activity. This will vary from country to country, as each NSI has its own perceived pressures and opportunities. There are implementation options – partnering with third parties is an obvious one. Our experience suggests that many third parties (for example, media agencies) have the design and developer skills required to produce great web content. However, many such organisations have complementary scarce skills in data analysis and insight – the very elements upon which NSIs should thrive. In this respect, developing a capability to exploit that using visual interfaces, would seem to be a logical step forwards for an NSI in the 21st Century.

References

[1] J. Naughton, Graphic designers are killing the web – http://www.guardian.co.uk/technology/2012/feb/19/john-naughton-webpage-obesity Retrieved 27th July 2012.

[2] UK Statistics Authority The Value of Statistical Commentary http://www.statisticsauthority.gov.uk/news/the-value-of-statistical-commentary.html Retrieved 27th July 2012.

[3] House of Commons Pre-appointment hearing for the post of chair of the UK Statistics Authority http://www.publications.parliament.uk/pa/cm201012/cmselect/cmpubadm/c1634-i/c163401.htm Retrieved 27th July 2012.

[4] Office for National Statistics 2011 Census Data Comparator http://www.ons.gov.uk/ons/interactive/vp2-2011-census-comparator/index.html Retrieved 16th July 2012.

[5] Office for National Statistics 100 Years of census: England and Wales 1911–2011 http://www.ons.gov.uk/ons/interactive/vp1-story-of-the-census/index.html Retrieved 16th July 2012.

[6] Daily Telegraph Census 2011: How the population has changed in the last 100 years http://www.telegraph.co.uk/earth/greenpolitics/population/9402836/Census-2011-How-the-population-has-changed-in-the-last-100-years.html Retrieved 16th July 2012.

[7] Daily Telegraph Census 2011: Explore the changes in your area http://www.telegraph.co.uk/earth/greenpolitics/population/9403239/Census-2011-Explore-the-population-changes-in-your-area.html Retrieved 16th July 2012.

[8] BBC Census animation: 100 years of population growth http://www.bbc.co.uk/news/uk-18854073 Retrieved 16th July 2012.

[9] The Guardian Census 2011: the changing shape of England and Wales, visualised http://www.guardian.co.uk/datablog/interactive/2012/jul/16/ons-census-2011-visualised Retrieved 16th July 2012.

[10] Office for National Statistics 2011 Census http://www.ons.gov.uk/ons/guide-method/census/2011/index.html Retrieved 16th July 2012.

[11] Coffee Spoons blog England and Wales: 500k More People Than Expected http://coffeespoons.me/2012/07/england-and-wales-500k-more-people-than-expected/ Retrieved 27th July 2012.

[12] @BusinessM8 via Twitter "BBC News – Census animation: 100 years of population growth bbc.in/NMeOwc wow! Statistics in animation – actually makes sense! ϑ" Retrieved 17th July 2012.

[13] [new] – Royal Statistical Society Awards 2013 – retrieved from http://www.rssenews.org.uk/2013/07/2013-rss-official-statistics-awards-winners-announced/.
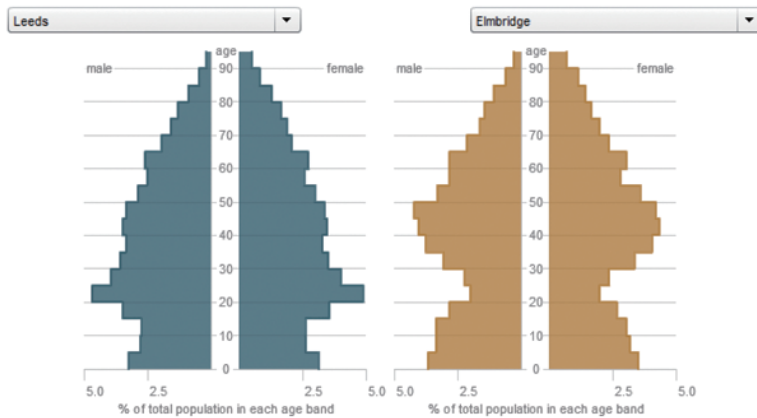
Appendix A – Feedback via Twitter

Comparator tool

Georgina Orso @georginaorso   16 Jul
The Census 2011 tells me exactly why moving from Leeds to
Elmbridge was a bad thing for making new friends:
pic.twitter.com/SR2MoY1V

tamsinbishton @tamsinbishton   16 Jul
The new ONS census data tool is fun to play with of you're a
data geek or if you are interested in the world
ons.gov.uk/ons/interactiv…
Expand

tamsinbishton @tamsinbishton   14d
@theboysmithy Congrats on the
census stuff - my 11-year-old
daughter started playing with the
tool and immediately found stories.
Impressed!

Carl Schmertmann @CarlSc…   14d
@theboysmithy Alan, great
graphic! I'll probably use it as an
example in my demography
courses.

GuardianData @GuardianData   16 Jul
Census 2011: the changing shape of England and Wales,
visualised gu.com/p/393t6/tf
Expand

Daily Telegraph News @TelegraphNews   16 Jul
Census 2011: Explore the population changes in your area
tgr.ph/NMm0sl #telegraphic
Expand

Emily Hillier @NotJustSums   23 Jul
Useful real life data for stats lessons: @statisticsONS
#population #onsdvc #census2011 tinyurl.com/cc3gw3j
Expand

karen machin @kmachin   18 Jul
RT @christineburns: Interactive 2011 census data for age and
gender ons.gov.uk/ons/interactiv... <<interesting to see differences -
time absorber!
Expand

weareemerge @weareemerge   16 Jul
Have some fun with these Census visuals - compare boroughs
versus regions - interesting data is.gd/k5g2Rb

Christine Burns @christineburns   18 Jul
Interactive 2011 census data for age and gender
ons.gov.uk/ons/interactiv... Manchester's age distribution massively
affected by large student pop'n
Expand

Zach Wilcox @urbantweetUK   16 Jul
I do love a good population pyramid ons.gov.uk/ons/interactiv...
#census

Giuseppe Sollazzo @punto...   14d
Good job by @statisticsONS on
Census Data #visualization:
bit.ly/NsH1pG #viz #census2011
/via @iamadonut

Patrick Smith @psmith   17 Jul
Speaking of data this ONS visualistion is the best I've seen on
the census data bit.ly/LW2a04 via @FlipChartRick
Expand

malkovichmalkovich @malkomalkovich   16 Jul
Can't wait to get home and play with the interactive Census
2011 data. #statsgeek
Expand

David Wright @CHYPSCEO   16 Jul
2011 #Census comparator provides population pyramids for
2001 & 2011, for regions, local and unitary authorities
ons.gov.uk/ons/interactiv...
Expand

Cumbria Observatory @cumbriastats   16 Jul
First 2011 Census Results visualised. See how Cumbria
compares: ons.gov.uk/ons/interactiv...
Expand

Alyson Hurt @alykat   16 Jul
Interesting way to compare UK #census2011 results by gender,
region: bit.ly/P9PBwS /via @smfrogers #datavis
Expand

Jamie Carpenter @J_J_Carpenter   16 Jul
Pretty dramatic regional/local differences in population growth
revealed in today's #census data bit.ly/Q2a1dU (£) #ONScensus
Expand

Alan Beames @AlanBeames   16 Jul
ONS Region comparison charts can be found here
ons.gov.uk/ons/interactiv...
Expand

Your Family Tree mag @Y...   14d
2011 Census - Explore the
population data in your area!
fb.me/22foQRwC7

Sam Perkins @HappyEatersUK   14d
Interesting stats on our aging
population!
ons.gov.uk/ons/interactiv...

Political Planet @politicalpla...   14d
Census 2011: Explore the
population changes in your area:
Use this interactive graphic from
the Office for Natio... bit.ly/O3efwz

100 years of Census

BBC News Graphics @BBCNewsGraphics   16 Jul
Census animation: 100 years of growth bbc.in/NMAXKW
#bbcnews #census #mycensus #ons #population @statisticsONS
@2011CensusInfo
Expand

Ruth Mottram @ruth_mottram   19 Jul
Fascinating stuff MT@2011CensusInfo: Follow impact of 1918's
flu pandemic through generations from 1921 #census to 2011
bit.ly/M2tm8y
Expand

Aleks Collingwood @jrfAleks   17 Jul
Look at the changing shape of England and Wales in this great
visualisation tool produced by @ons gu.com/p/393t6/tw via
@guardian
Expand

Nick Gargan @ngargan_npia   17 Jul
Here's a whizzy interactive graphic from yesterday's census
@statisticsONS tinyurl.com/dyn6aeu #100years of #census
Expand

JamesDonaldsonBriggs @jd_b1991   17 Jul
Interactive census animation from 1911 - 2011. Lets you see
ripples in UK population from world wars and baby booms.
bbc.co.uk/news/uk-188540...
Expand

George Hill @IEGGeorge   18 Jul
Some great Data visualisation from @guardian about the 2011
UK Census bit.ly/LrhsUn
Expand

Family Tree @familytreemaguk   17 Jul
See how the population of England & Wales has grown over
100 years in this great interactive graphic @BBCNews:
bbc.in/NMAXKW #census
Expand

Emma Tomlinson @EmmieRoseT   17 Jul
This is so cool! BBC News - Census animation: 100 years of
population growth bbc.in/NMeOwc
Expand

BusinessM8 @BusinessM8   17 Jul
BBC News - Census animation: 100 years of population growth
bbc.in/NMeOwc wow! statistics in animation - actually makes sense! :)
Expand

Lucie Smith @LucieSmith   17 Jul
Despite of questions of integrity, animation of 100 years of
census data is really cool - changing shape of our society
bbc.co.uk/news/uk-188540...
Expand

Mark Frankel @markfrankel29   14d
Definitely worth a look - census
animation: 100 years of population
growth in England and Wales
#mycensus bbc.in/NMeOwc

Joe Percy @JustPlainZhaine   16 Jul
Wow, this is super cool: bbc.co.uk/news/uk-188540... (census
animation)
Expand

Mike Mounfield @MountieMike   16 Jul
Fascinating! BBC News - Census animation: 100 years of
population growth bbc.in/NMeOwc
Expand

BITC @BITC1   14d
Cool #census graph showing
population changes in last 100yrs,
like to see this going fwd 50yrs
with a global pop of 9bn
ons.gov.uk/ons/interactiv...

Geography Teacher @KEGS_Geography   16 Jul
Excellent work from BBC News - Census animation: 100 years
of population growth bbc.in/NMeOwc
Expand

Perse Geography @PerseGeography   16 Jul
First UK 2011 census data released - fascinating population
pyramid data for the past 110 years bbc.co.uk/news/uk-188540...
Expand

Samuel Arbesman @arbesman   16 Jul
Fun RT @JennyRohn: I'm enjoying this census visualization
tool bbc.in/LmaeRj letting you see how population has changed since
1911
Expand

Gateway Christian Ed @GatewayCE   16 Jul
BBC News - Census animation: 100 years of population growth
bbc.in/NMeOwc - lovely resource for history and demographics
Expand

Sanjay Mistry @Sanjay110   16 Jul
Like this - Census animation: 100 years of population growth
bbc.in/NMeOwc
Expand

Jennifer L. Rohn @JennyRohn   16 Jul
I'm enjoying this census visualization tool bbc.co.uk/news/uk-
188540... letting you see how population has changed since 1911
Expand

Gillian Ladley @gladleynet   16 Jul
The 100 year census graph is fascinating. Look at the change
in pop'n. How will we need to reorg economics and society?
bit.ly/M2tm8y
Expand

Conrad Hackett @conradhackett   16 Jul
Nice dynamic age pyramid for 1911-2011 England & Wales
census data bit.ly/LsD1IN Just released!
Expand

Gus @hashonomy_gus   16 Jul
100 years of census: England & Wales 1911-2011 [Adobe
Flash] hashonomy.com/yr2c/ #census2011 #population #gales (via
@2011CensusInfo)
Expand

Claire Bowring @nosDrB   16 Jul
As we get older bones become more fragile and more likely to
break. Census animation: 100 years of population growth
bbc.in/NMeOwc
Expand

Julia Lewis @julialewis   16 Jul
Really good bit of animation from the BBC on census: 100
years of population growth bbc.in/NMeOwc">
Expand

Nancy Kelley @jrfnancy   16 Jul
"@ILCUK: Census animation from the BBC - 100 years of
population growth bbc.in/NMeOwc"> it's great!
Expand

Stuart Flatt @stuartflatt   16 Jul
A few cool stats from the 2011 Census on the BBC website -
su.pr/4GRbxw
Expand

Fiona Reynolds @Fibigibi13   14d
"@2011CensusInfo: Check out our
interactive graphic 100 years of
#census 1911-2011 bit.ly/M2tm8y
#visualisation #ONScensus" Cool!