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ON LINE DATA COLLECTION

Using the internet to collect census data in the United Kingdom - the experience of the rehearsal in Scotland

Note by the General Register Office for Scotland, United Kingdom

I. INTRODUCTION

1. Statisticians and IT professionals worked closely during the iterative design of the online census questionnaires and recognised from the outset that, whilst an online census questionnaire uses the same questions as paper, it is not always desirable nor possible for the two types of questionnaire to be absolutely identical due to intrinsic differences in the formats.

2. The online questionnaire completed by respondents in Scotland's Census Rehearsal adhered to this principle and applied rules-based validation and other intelligent features at the time of completion in an attempt to optimise the user experience and potentially improve data quality.

3. For those that completed online, the feedback we have indicates that the overall experience of completing online is positive. There is also a perception amongst this group that the questionnaire is quicker, simpler and easier to complete online than on paper.

4. Evidence also clearly indicates that following design principles which apply to the paper questionnaire but which are not appropriate for an online environment can have a detrimental impact on user experience and quality of response.

5. Questionnaires and questions should be designed with a conceptual framework for both paper and online media in mind from an early stage to avoid potential differences.

II. BACKGROUND I: CENSUS-TAKING IN THE UNITED KINGDOM

6. The 2011 Census in the United Kingdom is the responsibility of three census offices:

(a) The Office for National Statistics (ONS) for England and Wales (with some input, in relation to Wales, from the Welsh Assembly Government);

(b) The General Register Office for Scotland (GROS);

(c) The Northern Ireland Statistics and Research Agency (NISRA), for Northern Ireland.

7. The 2011 Census is being planned on a harmonised basis, with common core question content, common "downstream processing" procedures, and a consistent approach to output arrangements designed to allow both Eurostat requirements, and the requirements of users in the United Kingdom, for data relating to the United Kingdom as a whole to be met.

8. Although most of the census questionnaire content will be common across the UK there will be a number of variations in the questions included, reflecting the different needs of users in each area. A further difference concerns the arrangements for data capture, with different contractors being engaged by, on the one hand, ONS and NISRA, and on the other, GROS, for data capture, including internet data capture which is planned to be adopted as an option across the United Kingdom for the first time in 2011.

9. One further difference, linked to these different contractual arrangements, is that the 2009 census rehearsals in Scotland and in England and Wales are taking place at different times – in March in Scotland and in October in England and Wales. This paper reports on the first census-related internet data collection in the United Kingdom which took place in Scotland in March 2009.

III. BACKGROUND II: REHEARSAL OF CENSUS INTERNET COLLECTION IN SCOTLAND

10. In March 2009 respondents in west Edinburgh and the islands of Lewis and Harris were the first in the UK to be offered the chance to complete census questionnaires online during Scotland's Census Rehearsal.

11. All households in the rehearsal areas which were listed on an address database prior to 29 March 2009 had a paper questionnaire delivered to their address with a unique 12 digit Internet

Questionnaire Access Code and instructions on how to complete online pre-printed on the front page.

12. Experts in question design and web usability collaborated to design a system interface and questionnaire which met statistical requirements and followed the paper design model wherever possible, but they were not constrained by it where there was good reason to take an alternative approach. GROS found that for nearly every question, the addition of rules-based intelligence, which took the internet questions beyond being simple response fields, was justified.

13. The addition of even the most basic form intelligence to the internet questionnaire sets it apart from the paper counterpart. For example, an automatic response can be built into the internet version when a field is left blank or an invalid response entered, but this is not possible with the paper questionnaire.

14. This development can be justified by the fact that, as the rehearsal demonstrated, users expect a good experience on the web. If they don't get it then they won't stay on any site for long. It is important to bear in mind that, whilst first and foremost from the perspective of statistical agencies respondents are looking at a census questionnaire, the perception for respondents is that this is just another web application and as a result they expect it to behave like other similar web applications. In other words, they expect it to be smart and help them along the way to achieve their task. For a census questionnaire this means response validation, response re-use, error and information messages, and automatic routing where appropriate.

IV. KEY DESIGN FEATURES

15. GROS created an online census questionnaire which mirrored the paper questionnaire wherever possible, for example being consistent in the order which the response options were displayed. The questionnaire fully conformed to usability and accessibility standards and implemented a series of intelligent design features as listed below:

(a) Appropriate elements.
Radio buttons were used where only one answer was expected, tick boxes were used where multiple options could be selected. Some matrix questions were redesigned to make optimal use of the space available on-screen;

(b) Questions and guidance phrased differently.
For example, language such as "tick" on paper is changed to "select" online;

(c) Tailored error warning messages.
If a question is not answered or an invalid or illogical response is entered then the user is informed of the error and, if appropriate, what steps they need to take to enter a valid response;

(d) "Hard" validations.
This is where the question requires a valid answer in a specific format otherwise an error message is displayed and the respondent told to check the answer. This

also applies to an invalid combination of answers where there are multiple options. The respondent is not able to continue until a valid answer is entered;

(e) 'Soft' validations.
This is where, in the first instance, if a valid answer in a specific format is not entered then an error message is displayed and the respondent is told to check the answer. The respondent can however continue to the next question with an invalid answer or without completing a response;

(f) Pre-population of fields.
Responses to previous questions or other data are used to ease respondent burden and aid completion;

(g) Automatic routing and messages.
The individual questionnaire set is determined automatically based on previous responses and messages are displayed to inform the respondent that this has taken place.

16. Some relevant examples follow.

17. Question example 1: Number of usual residents.
Hard Validation. A valid numerical answer is required in order to create the size and structure of the remainder of the questionnaire, e.g. relationship matrix, number of instances of individual question sets. Respondent cannot proceed to next question (names of usual residents) without a valid answer.

18. Question example 2: Names of usual residents question.
Hard validation. An alpha character answer is required for each response. Information is used to pre-populate the rest of the questionnaire where a name is required and also used as a reference guide throughout individual questions, e.g. "These are questions for Person 2 – John Smith." The respondent cannot proceed without entering a valid answer.

19. Question example 3: Date of birth question.
Hard validation. Identified as a key variable and respondents are very likely to know the answer. An error message is displayed if the question is not completed in a valid numeric dd/mm/yyyy format. Illogical or unbelievable responses, such as 14/14/1960 or 1/1/1850, would be rejected. Respondent cannot proceed without entering a valid answer.

20. Question example 4: Usual address one year ago.
Soft validation. An initial error message is displayed if there is an invalid response, but the respondent can continue with an invalid response if they wish. This decision is based on the fact that this is not a key variable and respondents are less likely to know the answer. There is a risk of the respondent entering false data or even giving up altogether if an answer is enforced as mandatory in order to get to the next question. (For this question one of the response options is the address to which the questionnaire was sent. On the internet capture system this information is pre-populated as the Internet Questionnaire Access Code is linked to a single address on the address database.)

A. Design example 1: Use of questionnaire intelligence to automatically route

21. The vast majority of feedback from the rehearsal on the use of questionnaire intelligence has been positive, and the main body of negative feedback relates to requests for the system to make even greater use of intelligence to ease the respondent burden.

22. Questionnaire routing was employed to skip irrelevant questions, for example the question on type of landlord was only presented to those who had declared themselves as tenants in the previous question. There was a clear expectation that this design feature could be applied to skip questions which, based on the answer given to date of birth, appeared to be irrelevant for children,. This was usually with particular reference to the marital status question for children under 16, but also applied to other questions. Two such comments were:

(a) "Why ask about marital status of a child? Surely the answer can be taken as known if age is less than 16!"

(b) "There would seem to be additional logic that could be built into the questionnaire. For example, why ask if a 2 year old child is married, or a school-child, or goes to their place of work every day?

23. These issues also arise with the paper questionnaire, but in the case of internet collection there is a clear expectation that since logic is used elsewhere then it should extended to these instances. GROS are however aware of (a) the risk of introducing modal bias, and (b) the implications of a valid but erroneous answer leading to the wrong routing being applied and by extension an incomplete or incorrect question set being asked. Following the rehearsal this approach will be reviewed.

B. Design example 2: Recreating the format of the paper write-in boxes

24. The initial intention was to stick rigidly to the same structure as on paper for response options, with exceptions only if it was completely unfeasible, for example with some matrix questions. This approach was also taken regarding the size of text response areas. Having considered the implications and requirements for a consistent dataset with the paper questionnaires and also the creation of synthetic questionnaire images for archive purposes, it was agreed that the size of the response areas of each question should be the same online as it is on paper, and that these should be displayed in the same way.

25. For a number of questions, this meant that three separate text boxes were used with character limits of 17 per box. On paper, there also is an implied space at the end of a line prior to the next box underneath, but this was not evident online. So, whilst this approach mirrored exactly the paper questionnaires for the reasons mentioned above, it proved to be a significant design error. Examples of some feedback:

(a) "Why were the text field only 17 characters long? Incredibly annoying and confusing when entering longer names, addresses etc."

(b) "Why are you still making the online survey use the silly 17 character lines?"

(c) "The 3 line text entry boxes limited to 17 characters per line are confusing. Should words be typed across line boundaries?"

26. The last respondent above was indeed correct, it was indeed the requirement that words should be typed in each of the three boxes as is the case on paper. So whilst the text field for that question was in reality 51 characters long, users generally perceived the three boxes to be separate fields and effectively reduced the response field to 1/3 of what it was on paper. There is likely to be a resultant negative impact on data quality and the design of these questions will have to be reconsidered for the 2011 Census.

C. Other points to note

(a) The proportion of online questionnaires received in the rehearsal as part of the overall response rate was around 11 per cent;

(b) Each online questionnaire access code was linked to a single address on the database and printed on a single paper questionnaire. No replacement or additional codes were issued;

(c) Respondents could log-out and return to their questionnaire at a later date with all their answers submitted up to this point retained and stored securely;

(d) Average completion times (15 Household and 38 Individual questions):

Households with 1 member: 15m 30s
Households with 2 members: 26m 35s
Households with 3 members: 31m 23s
Households with 4 members: 34m 26s
Households with 5 members: 39m 31s
Households with 6 members: 46m 23s

(e) Full versions of the online questionnaire were available in both English and Scottish Gaelic. The online questionnaire made it logistically possible to make a Gaelic language questionnaire available to households across the country.(The paper questionnaire was only available in English);

(f) The site conforms to web accessibility standards and was designed to be compatible with assistive technologies throughout;

(g) Video clips of questions translated into British Sign Language (BSL) were available to stream or download;

(h) The use of the official government top level domain www.scotlandscensus.gov.uk instilled a degree of confidence in users;

(i) For many users the online option is viewed as secure and alleviates concerns over postal security;

(j) The respondent could follow a link to an anonymous feedback facility on completion of the questionnaire. Over 25 per cent of online respondents left specific comments on the design, operation and content of the internet questionnaires and these have formed part of our evaluation;

(k) Several iterations of usability testing were carried out prior to the questionnaires going live and qualitative research was carried out following the end of the rehearsal period.

V. CONCLUSIONS

27. In offering the respondents the option to complete a census questionnaire, the expectations of the public who want to do it online should be met. Conforming to usability standards goes a long way to ensuring accessibility for all web users, but beyond that a level of intelligence and sophistication is expected to ease respondent burden and provide a good user experience.

28. Iterative analysis and design, development, testing and evaluation is crucial to the success of the online questionnaire and particular design assumptions which apply to paper questionnaires must be tested to ensure that they are valid for the internet version.

29. Whilst it is too early for GROS to draw firm conclusions on any impact of our approach on data quality or response rates, it is clear from our research that the positive experience of many internet questionnaire respondents during the 2009 rehearsal could be a reason to promote this channel strongly for Scotland's Census in 2011.

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