

Online form development

Background

To provide greater flexibility and convenience for respondents in completing their census forms, Statistics New Zealand developed an online census option for the 2006 Census of Population and Dwellings.

One of the primary influences in the design of these online forms was an attempt to minimise mode effects so that there would be no major differences between the data collected from online respondents and paper respondents. The forms development team aimed to make the task of filling in forms online as similar as possible to the task required on paper, while also taking advantage of the main benefits that the online mode had to offer.

A second and equally important objective for the development was to ensure that forms were easy, simple and intuitive to use. Usability testing was therefore seen as a key component of the development cycle, as a way to ensure that designers developed a 'user-oriented web questionnaire'.

Development objectives/plan

To help inform the development of an online option for the 2006 Census, the forms development team began by designing and building a working prototype system in-house so that design choices could be fully assessed and improvements introduced through an iterative process of usability testing and revision.

Development of this prototype system began in September 2002 in preparation for the field testing programme.

Most early design choices were based on general principles for designing internet questionnaires, drawn together from a review of the literature; work done by other agencies overseas; and Statistics New Zealand's own standard guidelines for electronic questionnaire development.

Usability testing results

During the second phase of the project the team entered into usability testing. This testing phase provided the opportunity for designers to refine and further enhance original designs in order to maximise usability.

Usability testing is qualitative, observational research that helps identify problems with design. This methodology involves observing and debriefing users actually engaged in using and interacting with the system and borrows techniques from 'cognitive testing', such as concurrent probing, retrospective probing and asking respondents to think aloud. The usability testing is an iterative process using a relatively small sample of users, where designers can evaluate and make revisions to the system after just a few tests before testing again. This iterative process of testing early and often makes the user the central focus and helps ensure that all major problems are identified and corrected.

For this development information was collected about the ease and accuracy with which users, from a wide range of backgrounds and with various levels of computer literacy, were able to understand instructions, fill in the census forms and carry out specific tasks. This allowed developers to compare several alternatives in presenting

information on the screen and to identify the optimal design for the greatest number of users. In particular, testers looked to see how well users were able to navigate through the system, enter data correctly and access help and additional information when required.

In total there were 60 tests conducted between February and July 2004. Of those, 44 usability tests were conducted using the English version of the forms and another 16 used the Māori versions. Respondents were of varied age, sex and ethnicity with varying degrees of computer competence ranging from novices to regular users.

Key features of the online design and findings from testing are discussed below.

Logging in

An essential task in enabling users to successfully fill in a census form online was to complete a two step login process to meet requirements for a secure log-on and authentication process. To log in on census night users need to enter an 11 digit ID number from the print form delivered to their household and a 12 digit Personal Identification Number from a sealed envelope accompanying the forms. Because of the critical nature of this process, testing focused heavily on the usability of this page.

During usability testing few users experienced problems logging in. Although simple keying errors were relatively common, none of the users tested during the development required more than three attempts to log in and most were successful on their first or second attempt.

Look and feel of print forms

In order to create an immediate visual connection between print forms and the online forms, colours and fonts were selected to replicate the look and feel of the print forms. Visual guides were used in a consistent way with the print version, with questions presented in bounded regions so that users would have no difficulty identifying individual questions and knowing where each item started and finished. Question numbers were displayed in the top left hand corner of each question in reverse print and these reverse print numbers were repeated for instructions where users needed to refer back to previous questions.

The comments received during usability testing confirmed that users immediately recognised the forms as similar to the print versions.

Single scrolling page

Online forms were presented as a single scrollable page to provide a context that was most like the print forms in allowing users to easily move backward and forward within the questionnaire. The scroll bar also provided a means for users to gauge their progress through the form. To optimise usability each individual question was viewable on a single screen without scrolling.

Testing during the usability phase showed that most users were competent in using the scrollbar to navigate through the forms and many were observed returning to previous questions to re-read and check an earlier understanding.

However, during testing a small number of users accidentally scrolled past questions without providing an answer. Although these users almost always detected their error, this was noted as a distinct drawback of the scrolling format.

Response formats

In line with Internet conventions, radio buttons were used for single-response questions and check boxes were used for questions which allowed more than one response. However, for rare questions where respondents could 'object to answer', a mixed format was used so that respondents could provide information while also registering their objection.

Although drop-down boxes were another response format available to designers, these boxes were used rarely as respondents required a greater level of Internet competence to use these successfully. Because respondents were also more inclined to select options immediately visible at the top of a drop-down list, this option was further restricted to those questions with a small number of answer alternatives.

This decision to limit the use of drop-down boxes was reinforced during usability testing, when it was noted that respondents who had a scrolling mouse could sometimes alter their answer inadvertently for questions which used this format.

Online help

Access to online help information was provided through 'Help' buttons placed to the lower-right of each question frame. This position was chosen because of its proximity to the scroll bar, where it would be visible to the user if needed yet unobtrusive if users did not require help.

The positioning of help buttons appeared to be successful and during testing most users were observed accessing and reading help information on at least one occasion.

Automated routing

The original online form design used a dynamic approach to question routing where inapplicable questions 'disappeared' from the screen when certain answers were selected. However, when this approach was tested for usability, results showed that users were sometimes alarmed by the sudden change to the display and often felt 'lost' or 'displaced' within the form. Users noticed the sudden movement on screen, but did not seem to understand how or why this change had happened. This gave users a sense that they had little control over the form, and many felt uncertain about continuing, sometimes assuming that something had 'gone wrong'.

To solve this problem, designers introduced a 'greying out' approach to all routing questions, other than two key exit points in the questionnaire (for respondents aged under 15 years and overseas visitors).

This 'greying out' design meant that inapplicable questions were retained on the screen, however the background colour of those questions was changed to grey and fields were disabled as a way of signalling to users that the questions did not require an answer. A brief explanation of the greying out functionality was also included among key instructions appearing at the top of the forms.

A further enhancement to the 'greying out' functionality in later iterations was the introduction of statements which appeared at the top of greyed out questions, informing users that they did not need to answer the question due to a previous answer. These statements included a reference to the question which had triggered the response so that users had the opportunity to check their navigation and return to self-correct an earlier answer if mistakes were made.

train
 drove a private car, truck or van
 drove a company car, truck or van
 passenger in a car, truck, van or company bus
 motor bike
 bicycle
 walked or jogged
 other, for example *taxi, ferry, plane*.
 Enter the main way you travelled to work:

Help

Based on your response to question **32** you do not need to answer questions **43** to **45**.

43 Did you look for paid work in the last 4 weeks?

yes
 no

44 Select as many boxes as you need to show all the ways you looked for paid work in the last 4 weeks.

looked at job advertisements
 wrote, phoned or applied in person to an employer
 contacted Work and Income to look for a job
 contacted friends or relatives for help in finding a job
 contacted career advisers or vocational guidance officers
 other method(s), for example:

- contacted other employment agency
- placed an advertisement about a job
- took steps to set up own business

Usability testing to evaluate this functionality showed that the design was relatively intuitive to users, who were quick to understand that they should scroll past greyed out questions. In addition, several users who inadvertently made mistakes during usability testing detected their error and went back to correct their answer.

Māori/English design

To replicate the Māori/English print forms, a design feature was used for the Māori language online forms where users could ‘hover over’ a button with their mouse to see an English translation. The advantage of this design was that users were able to see both languages on screen at the same time to compare questions and check their comprehension of difficult words or bureaucratic terms.

The buttons to evoke the ‘hover over’ translations were positioned prominently where users would be likely to see them, in the top left-hand corner of each question frame.

Reo Ingarihi

7 E puritia ana e koe, e tētahi atu rānei e noho ana i konei, tēnei whare hei taonga nō tētahi rōpū kaitiaki ā-whānau?

āe
 kāore
 aua

Hei āwhina

Reo Ingarihi

8 Nōu ake, nō kāore rānei) **8** Do you, or anyone else who lives here, own or partly own this dwelling (with or without a mortgage)? te whai mōkete,

āe
 kāore

Help **Hei āwhina**

Reo Ingarihi

9 Mehemea ehara nō tētahi i konei, nō wai kē te whare nei?

nō tētahi atu tangata, nō tētahi rōpū kaitiaki motuhake, nō tētahi whakahaere pakihi rānei
 nō tētahi Mana ā-rohe, tētahi Kaunihera ā-tāone rānei
 nō Te Kaporeihana Whare o Aotearoa
 nō tētahi atu kaporeihana karauna, hinonga karauna rānei, nō tētahi tari kāwanatanga, manatū kāwanatanga rānei
 aua

Reo Ingarihi

10 E utu reti ana **koutou e noho ana i konei**, mō te whare nei ki te tangata nōna te whare (ki tana māngai

Usability testing helped confirm that users were able to find the translations easily. Typically, users discovered the button almost immediately once forms had loaded. Having located and understood the way that the 'hover over' worked, most users then referred to translations frequently and follow-up comments confirmed that they found them useful.

Checks and edits

Automatic edits and cross-checks were programmed into the online forms to validate key data. However, this functionality was used sparingly to ensure that respondents would not be deterred from completing and submitting their forms. Checks were therefore restricted to critical routing points and non-response of key items, such as name, sex, date of birth and ethnicity.

Manual checking was encouraged by including a summary table, displaying respondents' answers to core questions at the end of each form. Respondents were asked to check these answers before submitting their forms.

In usability testing respondents were observed reading and checking their answers, as requested. When required, respondents were able to go back to the correct question within the form to correct their answers.

Confirmation Screen

Two final screens were designed for the internet forms. As an equivalent to the written signature required on a print form, the first screen informed the respondent that by clicking on the 'submit' button they were agreeing that their information was true and correct. The second screen appeared after submission and confirmed that information had been sent while also providing a receipt number for reference purposes.

Both of these screens seemed to work effectively in usability testing, although only some respondents said that they would take the time to record the receipt number.

Field test results

Field test: March 2003

Testing in March was limited to an early version of the online form, with very basic formatting. Test results were not used to evaluate forms design.

Field test: November 2003

This was the first test to provide feedback on the online forms design. Data showed that item non-response for respondents completing the online forms was significantly lower than item non-response on print forms.

The follow-up survey for the November test of 65 people who completed their forms online also provided the following results:

- 96 percent of respondents said it was easy to complete census forms on the Internet
- 84 percent of respondents said they had no difficulty completing the forms on the Internet
- 94 percent of respondents said they found it easy to locate the census website
- 93 percent of respondents said it was easy to find the Internet ID needed to log on
- 96 percent of respondents said it was easy to enter their Internet ID

- 96 percent of respondents it was easy to find and enter their household PIN number
- 98 percent of respondents said they thought they would choose to fill in census forms on the Internet for the 2006 Census.

Dress rehearsal: 8 March 2005

General observations from the dress rehearsal were that the online data was very clean and had much lower item non-response rates than the print forms. Response distributions also looked similar to those obtained on print and no major mode effects were identified.

Results from the dress rehearsal follow-up survey indicated that 94 percent of respondents who used the online forms found them 'easy' to use. Results further suggested that 95 percent of respondents using the online forms would use them again in 2006.

Other testing

Having defined the requirements for an online form, development of the final online system was then contracted out. Although there was internal capability to develop an online questionnaire, contractors were in the best position to develop a form which could handle the expected peaks on census night and manage the associated risks.

The final online system developed for 2006 was tested through a variety of processes including user acceptance testing, browser compatibility testing, integration testing, load testing and security testing. These tests were not part of the prototype development but were essential elements in building the final census system ready for deployment in the 2006 Census. Results from this testing are not discussed here.

Summary

In specifying the design of online forms for New Zealand's 2006 Census, the forms development team found that usability testing was key to the success of the project. The ability to see users engaged with the system and to be able to revise screen presentation and functionality as required was critical in evaluating the success of features such as log-in processes, scrolling pages, automatic routing and language presentation.

Future development

It is recommended that a similar approach be used for redevelopment in 2011.