

Blaise Internet Services put to the test: Web-surveying the construction industry

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1. Introduction

The rapid growth of the Internet offers great possibilities in the field of data-collection, as it is easier, faster, and cheaper to send questionnaires to respondents, and to communicate with respondents via the Internet than using 'conventional' methods.

Statistics Netherlands began experimenting with data-collection via the Internet on a small scale. One experiment, for example, used a mixed-mode design comprising both an ASCII-questionnaire sent by e-mail and a paper version. Despite the fact that a lot of respondents commented on the rather antiquated layout of the ASCII-questionnaire, the results of this experiment were very promising.

Meanwhile the Blaise developers had been working on Blaise Internet Services (Blaise IS), a set of tools to carry out web surveys. The Statistical Department of the Construction Industry was prepared to participate in an experiment with Blaise IS and transformed their survey for the construction industry (sent each month to a panel of companies) into an electronic questionnaire. The method used was 'mixed mode' because respondents could choose between either continuing receiving the paper questionnaire or receiving the electronic version of the questionnaire.

The first part of this paper describes the methodology and the results of the experiment. The second part of the paper will be a more general discussion concerning Web-based interviewing and the use of Blaise IS.

2. Method

All respondents are approached by e-mail. The advantage of e-mail is that it is fast, cheap and that e-mails can be personalised. One can send the respondent information and requests anytime it is thought to be necessary and the respondent can react to the e-mail whenever he wants. E-mail offers a pro-active way of communication with the respondent.

In the experiment respondents could choose between two ways to complete the questionnaire: the off-line mode or the on-line mode. Respondents who indicated they were not able to 'surf' the Internet were sent an e-mail with an ASCII-questionnaire.

In off-line (or scroll-based) mode the respondent opens an HTML-file which comes as an attachment to the e-mail, completes the questionnaire, and presses the submit button. When the submit button is pressed, the browser connects to the Internet address of the Blaise IS server and, after having asked for a username and a password, transmits the data to the database at the Blaise IS server. In off-line mode the respondent can complete the questionnaire without worrying about the cost of being connected to the Internet, but this mode has the disadvantage that the respondent can only see one single HTML-page in his browser. It is not possible, for example, to route through questions or to perform consistency checks (although range checks can be done). Therefore, in off-line mode, the questionnaire must be simple, short, and straightforward.

In on-line (or screen-based) mode the respondent establishes a continuous connection with the Blaise IS server via the Internet. In the content of the e-mail the respondent has received an Internet address (URL) with the location of the questionnaire. The respondent clicks on the hyperlink representing the URL, fills in a username and password, and subsequently the questions are presented on the screen.

In on-line mode questionnaires can be more elaborate than in off-line mode, because it is possible to build in checks and routings.

The third way is to send the respondent an e-mail with an ASCII-questionnaire enclosed in the body text of the e-mail. The respondent answers the questions in the e-mail by filling in 'x' between the brackets of the answer-alternatives. When the e-mail is sent back, the answers to the questions are filtered out automatically using a Manipula-setup. This mode can be used by anyone who has access to e-mail-facilities. No sophisticated programs are required, and the cost of being connected to the Internet is low. The questionnaire is also very easy to design.

¹ The views expressed in this paper are those of the authors and do not necessarily reflect the policies of Statistics Netherlands.

Table 1. Advantages and disadvantages of the used methods

	Off-line	On-line	ASCII
Costs Respondents	++	--	++
Routing	-	++	--
Checks	+	++	--
Layout	+/-	+	--
'Surfing' obligatory?	Yes	Yes	No

The e-mail-addresses of the respondents² were collected and those were used to send the respondents their individualised e-mails. The e-mail-addresses were entered in a database by data-typists and were visually checked for errors by project members. In case of doubt the respondents were called to check whether their e-mail-addresses were registered correctly.

The e-mails that were sent to the respondents who could surf consisted of:

- An introductory note,
- The respondent's identification-number,
- The Internet address of the on-line questionnaire as a hyperlink,
- An attachment with the HTML file for the off-line questionnaire, containing four questions, and some additional questions about the experiment itself,
- An attachment with the results of the latest survey, and
- A section discussing problems with both modes.

The e-mails that were sent to the respondents who could not surf consisted only of the ASCII-questionnaire as part of the body text of the e-mail.

Sending individualised e-mails in large numbers.

It would be very time-consuming (and therefore inefficient) to manually write and send all e-mails to the respondents. There are some mail merge programs (e.g. Word), but none of them is really capable of making individualised e-mails *with attachments*. At Statistics Netherlands we came up with a system to do just that. With this system multiple attachments can be enclosed and the body text of the e-mail itself can be individualised (i.e. a unique identification-number). It is even possible to send individualised attachments. This last feature can be ideal for HTML-files containing a hidden field with the identification-number.

Registration and handling of problems

One of the goals of the experiment was to investigate problems that arise with this mode of surveying. Both the respondent and researchers can experience problems with sending, receiving, reading and filling in the questionnaires. To keep count of possible problems a special problem-database was created. This database served two purposes. The first purpose was to record all problems encountered so that in a next phase those problems could be anticipated. The second purpose was to keep track of the respondents that had not been able to send in their data because of the problems they encountered.

Confirmation of receipt

Once all the questions were received by the Blaise IS-server, an HTML-page with a confirmation of receipt was sent to the browser of the respondent. It is also possible to automatically generate a web page with an outline of the answers of the respondent. In this phase we chose to only send the confirmation of receipt and to thank the respondent for his co-operation. In the near future we will include respondent-specific information with the receipt-confirmation.

Processing incoming data

As mentioned before, once the respondent presses the submit button, the data is transmitted to the Blaise IS server and stored in the corresponding Blaise-database. For this experiment there were two databases on the server: one for the on-line-mode and one for the off-line-mode.

The identification-number that respondents had to fill in was used as primary key. At a specific point in time (e.g. at midnight) the databases were emptied and the content was sent to the project group by e-mail. The databases were then extracted from the e-mail and transformed into the desired format. The statistical data were sent to the Statistical Department and the administration-database (receipt-date, off-line or on-line etc.) was updated.

² All respondents were participants in an already existing panel. The respondents were invited to take part in the experiment using a form which was enclosed in the paper questionnaire. Questions asked were for willingness to participate, their e-mail address, and their ability to surf the Internet. The respondents were then excluded from the normal (paper) process. The responsibility for the response behaviour of those respondents was passed on to the project group.

One of the problems that can happen with the on-line-mode was that if an error occurs during the answering of the questions (for example if the respondent closes the questionnaire unintentionally), the field in the database with the primary key already has been filled. If the respondent then tries to resume answering the questionnaire, he receives the message 'key already exists'. In the problem section in the body text of the e-mail the respondent was told what to do in such a situation.

The Blaise IS server also recorded extra information like browsers and operating systems used by the respondents. Unfortunately it was not possible to link this data directly to a respondent.

Reminder

One of the advantages of e-mail is that it is very easy and cheap to send messages to the respondents. This is also true for the dispatch of reminders. The survey administration-database kept track of the responses, and with the mail merge programme it is relatively easy to send e-mails to selections of respondents based on information stored in that database. With the statistical department a date for sending the reminders was set (similar to the date the Statistical Department began sending their reminders).

Of course it is possible that the respondent is not able to return his answers because of technical problems. We can not expect the respondent to take the trouble of reporting those problems himself. The project group decided not to send a second e-mail-reminder, but to actually call the respondent to see whether he was experiencing problems with sending the data. In this way we had an extra source of information regarding the used method.

3. Results

3.1. Response

Response to recruitment

The sample-size of the panel of the construction-industry is 1500. 642 respondents replied to the recruitment letter of which 188 were willing and able to participate in the experiment. 149 of the 188 respondents were able to surf the Internet and 39 could only participate with the experiment via e-mail. Some 3% of the respondents who did react were able to participate but were not willing to do so. Those respondents and a small number of companies who did not send back the recruitment letter were called back and asked for the reasons why they did not want to participate. Reasons for not participating were mainly unfamiliarity with the Internet and the fact that the internet-PC was not the workplace-PC (making participating more laborious for the respondent). Other reasons were that respondents preferred the paper version because it is more 'visible' or 'tangible' and because e-mail-facilities were not available.

Processing of the e-mail-addresses

The e-mail-addresses were manually entered into a database. From earlier experiences we learned that this process is error prone. For this reason all e-mail-addresses were visually checked for mistakes by some experienced people. This resulted in some 40 corrected e-mail-addresses. However, one cannot make sure that all e-mail addresses are correct. Two weeks before the actual sending of the questionnaire an announcement letter was sent to all respondents by e-mail. Of those e-mails 24 were returned as a 'bad delivery'. Fortunately one can tell by the nature of the 'bad delivery' what part of the address is wrong. Either the person in front of the '@'-sign is not known (resulting in an error-message from the mail-provider) or the mail-provider is spelled wrong (e.g. hotmal.com), resulting in an error-message from the mail server from which you sent the e-mail messages in the first place.

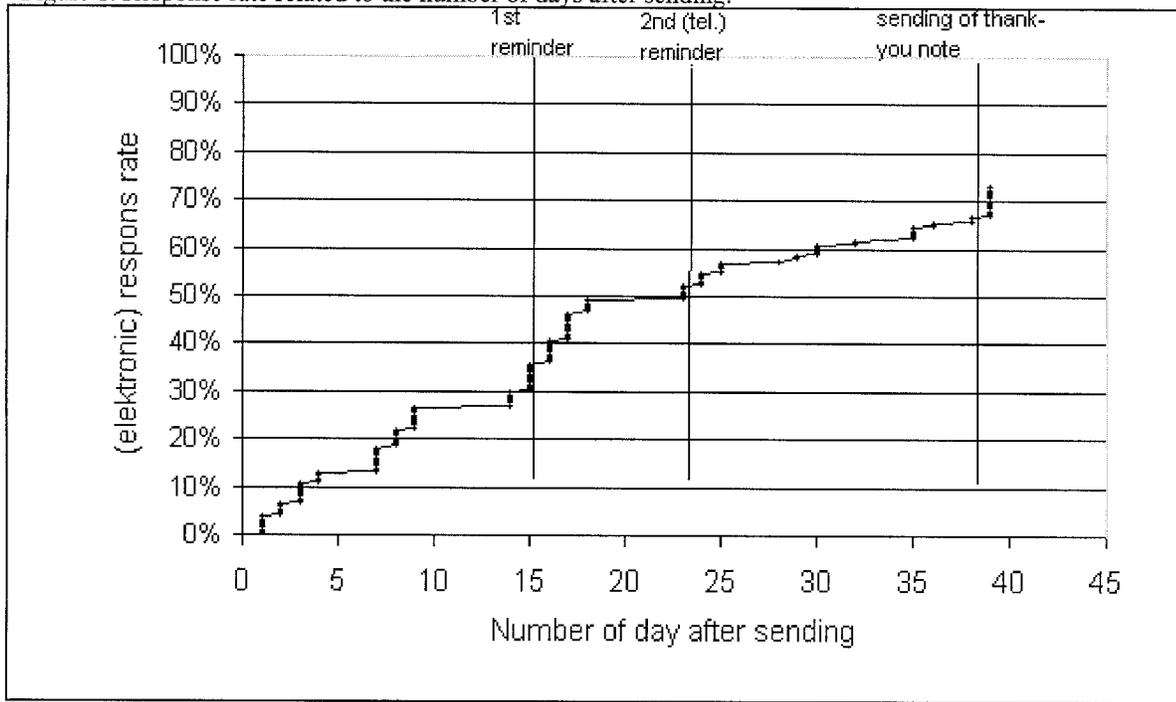
Despite of that, the correction of the e-mail-addresses took a lot of time; error-messages had to be read, suggestions for corrections had to be made and tried out and in some cases respondents had to be called. When respondents were called, they were asked to send an e-mail to the mailbox used by the project group, so that no more mistakes were possible.

In the end 2 of the 188 respondents could not be reached by e-mail. Those respondents were sent a paper version of the questionnaire.

Response in time

The e-mails were sent to the respondents the May the 3rd. At the end of June 137 of the 186 respondents had completed the questionnaire. This response (74%) is higher than the response to the paper version at the same point in time (70%). The rate at which the electronic questionnaires were returned during those two months varied over time (figure 1). Ten days after the e-mails were sent, the response came to a standstill. After the reminder was sent (15 days after the first e-mail) the response rate climbed, but again came to a standstill after 20 days. The 25th day the reminders by telephone began, which caused a slight increase in the response. The third event that caused a climb in response was the 'thank-you' e-mail, which was sent to all participants.

Figure 1. Response rate related to the number of days after sending.



EMBED

Response per mode

As mentioned before, the e-mails were sent to the respondents in three different ways. The first way was the ASCII-version for those respondents who were not able to surf the Internet and therefore only could participate in this way. The second way was the e-mail in which the address of the on-line questionnaire was presented first and the attachment for the off-line questionnaire second, the third way being that the off-line-mode was presented first and the on-line-mode second. The group of respondents that was able to surf the Internet was split into two groups and those groups were then sent the second and third version, respectively.

Upon receiving the completed questionnaire it was possible to detect what kind of mode (off-line/ on-line) the respondent had used. We expected that the group who had received the first version (on-line before off-line) would tend to use the on-line version and vice versa. The results, however, indicated that there was no effect from the order in which the modes were presented. About the same number of respondents who had received the on-line version first used the on-line-mode as the respondents who had received the e-mail with the off-line-mode presented first. A small number of people who had trouble sending in the off-line or on-line-mode (for example because they had indicated by mistake that they could surf the Internet) were sent the ASCII-version of the questionnaire.

3.2. Browsers and operating systems.

The Blaise IS server is capable of recording what kind of operating system and browser the respondents are using. This information can be very important for the further development of the Blaise IS software. It also gives an indication whether developers can aim at users with a more sophisticated browser (for instance capable of handling Java) or still have to take into account the users of older versions of browsers.

It turned out that most respondents (70%) use MS Internet Explorer 4.0. The remaining respondents (30%) are accounted for by the Internet Explorer versions 3 and 5 and Netscape versions 3 and 4.

Regarding the operating systems the domination of Microsoft is also clear. 93% of the respondents (or to be more precise 93% of the 'hits') use either Windows 95/98 or NT. 6% of the respondents use 'other' operating systems (e.g. Mac, Linux). 1% of the users still rely on Windows 3.x.

3.3. Experiences of respondents

The first additional question asked in the questionnaire concerned the time needed to complete the questionnaire. The second was the number of people needed. The third and most important question was whether the respondent had any suggestions regarding the method used.

The time needed to complete the questionnaire turned out not to differ from the time needed to complete the paper version. The average time needed for answering the four questions was nine minutes for both the paper and the electronic version. It is possible however that it takes some time for the respondents to get used to this new electronic mode (there were even some respondents who indicated this) and that in the future this mode will be faster compared to the paper mode.

There was also not much difference in the time needed to complete the questionnaire between the three electronic modes used. People who used the on-line version were the fastest (8.8 minutes) and those who used the off-line-mode were slowest (9.1 minutes). Whether this had to do with the fact that being off-line is cheaper compared to being on-line is unknown.

The average number of people needed to fill in the electronic questionnaire was 1,32. This does not differ much from the number of staff needed for the 'paper' mode (1,30).

3.4. Suggestions from respondents

The question for suggestions resulted in highly usable suggestions from the respondents. The suggestions differed between the modes used.

The ASCII-questionnaire

The ASCII-form resulted, as expected, in reactions concerning the layout of the questionnaire. Respondents were somewhat concerned that they could easily 'edit' the body text of the questionnaire. Also people first had to press the 'reply' button before they could enter their answers which led to some confusion.

The on-line questionnaire

The on-line questionnaire also led to several suggestions. First of all respondents expected a 'form-like' layout of the questionnaire. The on-line version presents one question on each HTML-page that is sent by the Blaise IS server. Respondents expected that the electronic questionnaires would resemble the well-known order-forms that can be found throughout the Internet or some imitation of the paper questionnaire. Respondents also indicated that it took more time to complete a questionnaire in this mode compared to the paper mode. The average time needed to complete the on-line questionnaire did not support this reaction, but it is conceivable that pressing the 'submit' button and waiting for the next screen with the next question may appear to be very time-consuming.

Another remark concerned the lack of an option to make a hard copy of the questions and the answers that were filled in by the respondents. Because of the one-question-a-page approach the respondents do not have an overview of the answers given and apparently that is what they want.

Finally respondents complained about the fact that they did not know what the relevant period was for the questionnaire.

The off-line questionnaire

The suggestions regarding the off-line questionnaire mainly concerned some operational problems. Similar to the on-line questionnaire respondents could not see the month they had to report about. A very small number of respondents (3) had problems connecting to the Blaise IS server, and one respondent reported that his browser had security problems while connecting to the Blaise IS server.

Finally some people wanted to save their answers, which is not possible with the current browsers.

3.5. Problems of and with respondents

Not only the questionnaires resulted in reactions of respondents. Respondents with questions or reactions regarding the method used, sometimes contacted members of the project group by telephone.

During the phase in which respondents were called to remind them they had to return their answers they were also asked whether the respondent had experienced problems with the use of the electronic questionnaires. Those remarks were systematically registered and assessed by the members of the project group and were very useful.

The first day after sending the e-mails, respondents contacted us saying that they could not log on to the Blaise IS-server for both the off-line as well as the on-line-mode. Respondents received an 'authorisation failure' on their screen and did not get access to the Blaise IS server. Respondents were also pretty sure they had used the correct password. It became apparent that the username and password on the Blaise IS server are case-sensitive. The respondents had received their username and password in capitals and the server only accepted lowercase letters. In the reminder we informed the respondents who had not sent in the answers yet, that the username and password had to be typed in lowercase.

A small number (8) of respondents did send their off-line (HTML-) questionnaire back to us via e-mail. A problem that can occur is that when people send in an HTML-file containing fields by e-mail, they think that the fields that they send are filled with their answers. Unfortunately this is not the case. Anything a respondent enters in a field of an HTML-file is lost when it is saved or when it is sent by e-mail. So an e-mail is received from a respondent with an empty HTML-questionnaire.

It is not exactly known why HTML-files are sent in by e-mail. Basically, when a respondent hits the 'submit' button, the browser looks for the Blaise IS server and when it is found the answers are put into the database of the server. There is no intervention of or interference with any e-mail facilities. The reason of the problem might be that respondents who indicated they could 'surf the Internet' in reality were only able to send or receive e-mails. When the (Internet) browser fails to connect to the Internet the respondent may decide to send in the HTML-file using e-mail. However, the respondents we called indicated that they had not done such a thing. So the reason for this problem is not exactly known.

The name of the contact person of the company was not mentioned in the e-mail. The reason for this was that the name was not mentioned in the paper questionnaire either and not all names in the database were in a very usable format. Not mentioning the name of the contact person resulted in problems. Some e-mail-addresses are very general (although not more general as a 'real-life address'). Addresses like info@kocakola are probably read by more than one person and not all of them are qualified or willing to fill in a CBS-questionnaire. Some e-mails were returned with the question for which person this e-mail was intended. When respondents were called to remind them of the questionnaire some of them with a more general e-mail address (like info@... or sales@...) even indicated that they had never seen the e-mail.

Some respondents indicated that they had had some technical problems. Those problems mainly concerned either their Internet service provider or their own internet-infrastructure. It is obvious that a growing number of people is actively switching its uses of Internet (from a passive to a more active role) and one can not escape the fact that sending the e-mails can take place during such a transition period.

One of the main reasons why people were late in sending the answers to the questions was that the data that were asked were not yet known. The questions concerned the month of April and were of a specific nature. The questionnaires were sent May 3rd and the reminder May 17th. Respondents indicated that they did not have not the relevant data available on such a short notice. In the future it may be possible to send respondents a reminder on the date they have the requested information available (which can be based for example on response-dates from the last two months).

Telephone contact with non-respondents showed that a small number of people considered the method to be too laborious. They indicated that they wanted to receive the paper version again and that they had no interest in this way of electronic data-collection. Another reason for respondents to switch back to the paper version was that their computer-infrastructure was not ready for this way of completing questionnaires yet. In total some 13 respondents indicated that they wanted to receive a paper version of the questionnaire again instead of an electronic one.

Electronic non-response vs. paper non-response

As mentioned earlier the response of the electronic questionnaire was slightly higher compared to the paper version. There was some concern, however, that this group consisted of respondents that had a lower percentage of non-response anyway because they were intrinsically more motivated. After all, they had signed up for the experiment. Fortunately the response-percentages from the past did not indicate this. In the past this group had a response-rate after two months of 73%. This is even slightly lower than the 74% the electronic method yielded.

Operational problems

It turned out that there were very few operational problems at Statistics Netherlands. Most of the work concerned the correction of the e-mail-addresses. The processing of the incoming data also took some time, but there were no real problems while processing the data. The whole process can easily be automated after which the magical 'one press on the button' will do the job.

4. Conclusions and recommendations

This experiment aimed at four aspects of electronic data-collection with the use of Blaise IS and e-mail. Those four aspects were getting the survey to the respondent, experiences of the respondents with the web survey, response-behaviour and the handling of the incoming electronic data.

Generally speaking one can say that electronic data-collection with the use of e-mail and Blaise IS works very well. With e-mail the respondent can receive the questionnaire in a pro-active way. Respondents do not have many or serious problems with the electronic questionnaires, the response is somewhat higher and faster and the data can easily be processed (with 'one click on a button') into the database of the Statistical Department.

Nevertheless some problems became apparent and some aspects of the methodology used certainly could be improved. These aspects and problems will be assessed here and some recommendations will be made.

Getting the survey to the respondent

Originally the e-mail-addresses as entered into the system were incorrect in one-third of the cases. Entering and improving e-mail-addresses is very laborious. This can be averted by asking the respondents (on a paper questionnaire) to send an e-mail to the researchers, who then directly import this e-mail-address into the survey administration database.

The e-mail is not always delivered to the right person. E-mail-addresses such as 'info@...' or 'sales@...' are not really suitable for getting the right e-mail to the correct person. In such cases it is advisable to merge the name of the contact person into the e-mail.

Experiences of the respondents with the electronic questionnaires

Some people made comments on the layout of the ASCII-questionnaire (as expected). People who received the ASCII-questionnaire are not able to surf the Internet, so there are limits to what can be displayed on the screen of the respondent. In the future those respondents may be sent a more sophisticated questionnaire via e-mail.

Respondents made comments on the layout of the on-line questionnaire. They expected a form-like questionnaire and because of the one-question-a-page approach it also may look like it is time-consuming.

Users of the off-line questionnaire had no comments regarding the layout. The off-line questionnaire had some operational problems however. Some of the questionnaires were sent back via e-mail, resulting in lost answers. Respondents had to be called to request for another attempt (using the on-line or ASCII-mode).

Some respondents considered the method used more laborious than the paper version. Probably this is related to the fact that not all respondents are accustomed with the use of the Internet. Especially with the smaller companies in the construction industry it is not very likely that the respondent spends a complete day behind a computer-screen. Those respondents have to get more used to the use of electronic questionnaires. Some respondents do not have an 'internet-PC' readily available on their desk and will have to go to another desk in the office, probably have to locate the person that is capable of operating the internet-PC and subsequently look for the relevant data. In such cases remarks regarding the time used are not surprising.

Response behaviour of respondents

The more contact-moments with the respondent, the higher the response. The response rose after each e-mail that was sent to the respondent. Even the message that the server would be shut down (after three months) resulted in response. Of course one does not want to saturate the respondent with e-mails, but a well-planned reminder strategy can result in higher response rates. Frequent reminders are advisable because e-mails have a tendency to 'sink down' from the screen (because more e-mails are received by the respondent and the e-mail-program can only display a limited number of e-mails).

In the reminder sent via e-mail no HTML-questionnaire or on-line-address was included. If the respondent has accidentally deleted his e-mail, he is not able to send in the answers to the questionnaire. Sending a reminder with questionnaire offers one opportunity less for non-response.

Processing the incoming data

Data from the ASCII-questionnaires had to be entered manually into a Blaise-database. From earlier experiments we know that this can be done automatically.

Technically speaking it is possible to process the data of the on-line- and off-line questionnaire with 'a single click on the button'. Both administrative and statistical data can be automatically updated. This offers great opportunities for fast and efficient data processing. No serious problems occurred regarding the integration of paper and electronic data. Administrative data for the paper and electronic mode could also be tuned very well.

To summarise, with a growing number of respondents using the Internet, data-collection via the Internet is becoming more interesting every month. Electronic data collection via the Internet offers the possibility of faster and more efficient communication with the respondent, as compared to the more traditional methods. A mixed-mode approach seems to be the best way to start collecting data via the Internet.

With Blaise IS it is possible to convert existing questionnaires into Internet questionnaires. Sending those questionnaires via e-mail as an attachment or as an internet-address offers a pro-active and relatively easy way to collect data via the Internet. Respondents do not encounter serious problems with the method used, although the on-line- and ASCII-questionnaire do not live up to the expectations of respondents, who apparently want a 'real electronic form'. Some improvements regarding addressing of the respondents can also be made. Response can be improved by sending more or better-timed reminders. The incoming data can easily be processed into the database of the Statistical Department, making a more efficient statistical process feasible.

In short, data-collection via the Internet, using Blaise IS and e-mail works very well.

5. Designing Web-based questionnaires

Blaise IS is a useful tool to contribute to the aim of Statistics Netherlands: a transition of paper questionnaires to self-administered electronic forms. With this first pilot we have tested the technical possibilities of Blaise IS only. Little attention was paid to the layout of the generated HTML pages and the usability. Although there is a lot of knowledge about the design principles of paper questionnaires and questionnaires for CASI (Computer Assisted Self Interviewing), these principles do not apply to CAWI (Computer Assisted Web Interviewing) automatically. In fact, there are few scientifically developed and validated design principles for Web-based questionnaires (Tedesco, Zuckerberg and Nichols)³.

In future developments of Blaise IS we have to pay much more attention to the layout of the generated HTML pages and the usability. In this second part of the paper we want to address some design and usability issues we encountered while carrying out the pilot survey:

- Presentation of a Web questionnaire.
- Navigation through the electronic form.
- The logic of the electronic form.
- Electronic form versus Internet application.

In the following discussion we define a Web survey to be a survey which is filled in with the help of an Internet browser and which uses the World Wide Web to transmit the collected data to the statistical organisation.

Presentation of a Web questionnaire

There are basically two different ways to present a Web survey:

- A so called 'scroll-based' form: one (HTML) page which contains the complete questionnaire; Blaise IS implements this presentation with the HTML Generator. See figure 2 for an example of a scroll-based presentation.
- A so called 'screen-based' form: sections of the questionnaire (one or more questions) are presented on the screen in a number of sequential windows; Blaise IS implements this presentation in its on-line mode (but one question per screen only). See figure 3 for an example of a screen-based presentation.

Figure 2. SEQARABICExample of a scroll-based presentation.

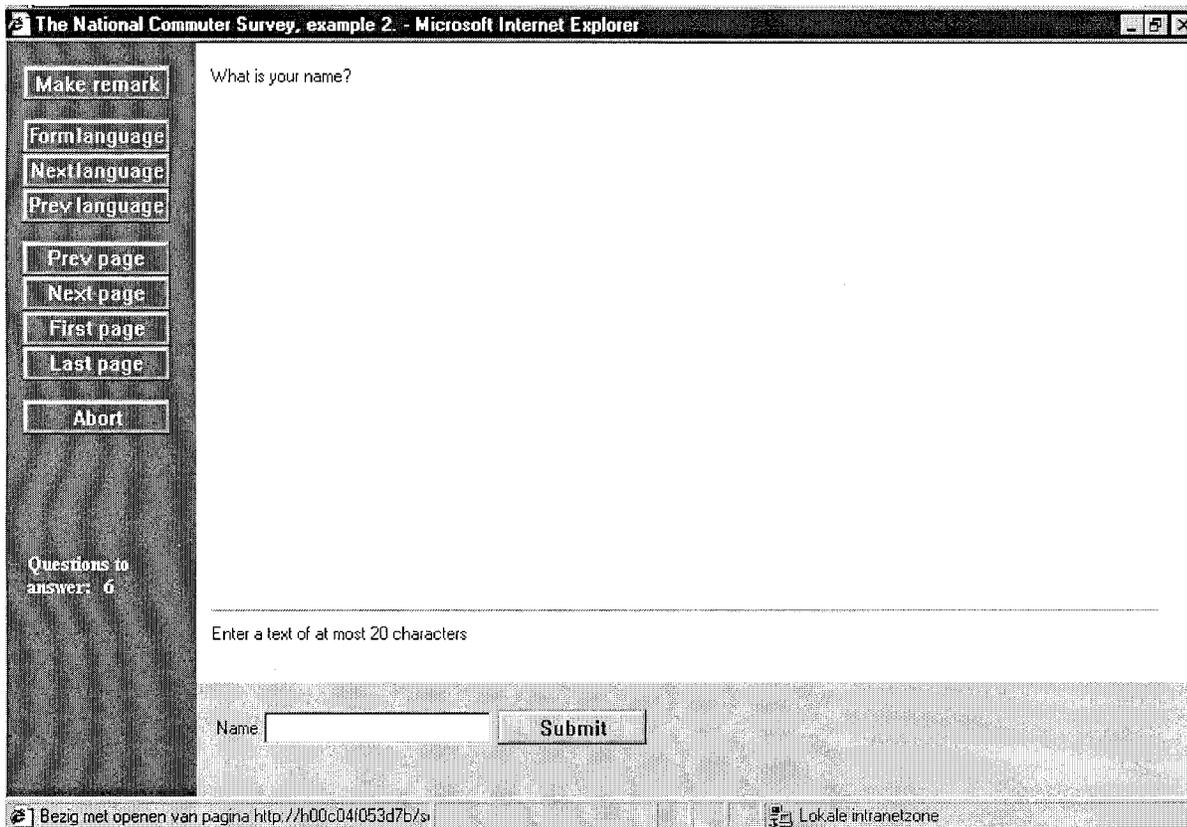
The screenshot shows a Microsoft Internet Explorer window titled "The National Commuter Survey, example 2. - Microsoft Internet Explorer". The address bar shows the path "J:\DATA1\DEVELOP\ConQuest\BCLUB Demo\Commute2.htm". The browser's menu bar includes "Bestand", "Bewerken", "Beeld", "Ga naar", "Favorieten", and "Help". The toolbar contains various navigation icons. The main content area displays the survey title "The National Commuter Survey, example 2." followed by six questions:

- 1 What is your name?
- 2 In which town do you live?
- 3 Are you male or female?
 1. Male
 2. Female
- 4 What is your marital status?
 1. Never married
 2. Married
 3. Divorced
 4. Widowed
- 5 How many children have you given birth to?
- 6 What is your age?

The status bar at the bottom indicates "Gereed" and "Lokale intranetzone".

³ Heather Tedesco, Andrew L. Zuckerberg and Elizabeth Nichols (1999), "Designing Surveys for the Next Millenium: Web-based Questionnaire Design Issues", ASC International Conference 1999

Figure 3. SEQARABICExample of screen-based presentation.



Navigation through the electronic form

Navigation through a scroll-based form is only possible by scrolling through the page. A respondent can use a pointing device or the TAB-key to navigate to a question. Respondents should not be advised to use the TAB-key, because handling of the TAB-key differs for each browser and the cursor will move to hyperlinks and images also. If a questionnaire becomes large, not all of the questions are visible. In that case a respondent might get lost in the form. However, we think that if the number of questions is not too large a respondent is able to find his way in the questionnaire.

Navigation through a screen-based form is only possible with some kind of menu to access the subsequent screens with questions. Navigation within the screen should be no problem, but navigation to a next or previous screen can be a problem, especially if the respondent does not understand the function of the menu.

If we do not take into account the possibility of automatic routing it seems that using a scroll-based form should be given preference to the screen-based form. Nevertheless, if the questionnaire becomes too large navigation is difficult in both presentations. Further research is necessary to find a measurement (e.g. the number of questions) for the optimal size of a Web questionnaire.

Blaise IS supports both presentations, but the screen-based presentation supports one question per screen only. Several respondents in the pilot addressed this lack of more questions per page in the online version. It is obvious we have to pay more attention to this fact. We will return to this subject in the next paragraph.

The logic of the electronic form

We distinguish three levels of logic in an electronic form:

- The form tests the validity of the response type (alphabetic, numeric, etc) and checks whether the given answers are inside the valid domain of the questions.
- The form includes a validation mechanism to check the consistency of the form and reject inconsistent answers and it incorporates auto-filled and auto-calculated fields.
- The form contains a skip pattern where progress through the questionnaire depends on the response to previous questions, the so-called routing.

Response type and domain checks.

We think every electronic form should at least contain a domain check of the given answers. Because of the chosen technology to realise a Web questionnaire it is always possible to implement a response type and domain check using Javascript. Blaise IS meets this requirement.

Consistency checks and routing.

Applying consistency checks is highly desirable and a skip and branching pattern is an essential part of a CASI system. Strictly speaking we want the full functionality of ordinary CAI tools. But, implementing a checking and routing mechanism is very complex and the result can be a large piece of software. To use it in Web-based questionnaires it must be transparent for all computer platforms. With the current state of the technology, Java seems to be the only programming environment that meets this requirement. Whether the checking and routing mechanism resides on the server or will be transmitted to the respondent as a Java applet will in this case not be a topic for discussion anymore.

The checking and routing mechanism of Blaise IS is based on the Wintel implementation of the Blaise Data Entry Program (DEP). Consequently, it can only be executed at the server side or by installing an ordinary Blaise DEP that is enhanced with a World Wide Web transmission module at the respondent's computer when this computer is running at least Microsoft Windows 95.

Utilising routing in a scroll-based form has to be discussed. We think it is not preferable because a respondent might get lost in the form if the focus on the form changes frequently and the leaps are large. This problem can be avoided in a screen-based presentation by choosing an intelligent layout, which corresponds to the skip and branching pattern. Further usability testing must make out our proposition.

To discuss the usage of consistency checks we have to distinguish between static and dynamic checking. In our opinion dynamic checking should not be used with scroll-based forms. Again a respondent might get confused or annoyed if error messages pop up frequently while filling out the form. Furthermore a respondent might get lost in the form if correcting the errors results in jumping to a lot of fields to correct the inconsistencies. Before finishing the form the static check should be invoked automatically. However, the designer of the questionnaire should take into account that very complex consistency checks might confuse the respondent. Dynamic checking should be no problem in the screen-based presentation because this resembles almost an ordinary data entry program, which has proven its usability in practice.

Electronic form versus Internet application

When we introduce Web-based questionnaires we have to think about the backgrounds of the respondents we have in view. Are they familiar with CASI applications or did they use paper forms until now? In the latter case we think introducing Web-based questionnaires by electronic forms is preferable. Presenting a scroll-based form resembles the paper form as much as possible. When introducing Web-based applications we should proceed with caution. The presentation of a Web-based CASI application will be screen-based. A well-designed menu is necessary and the application should respond instantaneously to user actions with for example dialogs. In other words the Web-based application should not differ from an ordinary CASI application.

The Blaise IS HTML Generator generates HTML files which are electronic forms. Apart from the layout that leaves room for improvements, we think the nature of the HTML forms is sufficient to present short, not too complex, questionnaires. The on-line mode of the current Blaise IS version is only the first step in the evolution to the final goal: A Web-based application, which is a fully-fledged CASI tool.

Recapitulation

When designing Web-based questionnaires we have to consider that they can be navigated easily by end-users. Especially in the case of end-users that are survey respondents with little or no experience with computers or the Internet, a self-administered Web-based questionnaire should be designed to be both easily understood and easily completed. The above mentioned issues should be taken into account. The first version of Blaise IS mainly focused on the functionality and less focused on the usability. Besides the enhancement of the functionality, the usability of the Web-based questionnaires has to be one of the guiding principles for future developments of Blaise IS. We should not fall into the trap of utilising a new technology simply because it is new or because we want to stay at the 'cutting edge'.