

# Questionnaires

## What does this technique do?

The questionnaire provides a structured way of gathering information. It allows for the same question to be asked in the same way to a number of informants. This enables statistical analysis of the data to be used, which allows a large amount of information to be summarised in a convenient form. A questionnaire can be constructed to investigate user experience with a product, their need of a new product, identification of how well they do with the technology they use etc. A typical questionnaire consists of a limited number of questions with pre-defined answer categories, focused in on the topic of interest. It can also consist of some more open questions where the informants need to write in answers in their own words. Questionnaires are usually distributed to a sample of the target population and the responses are collected and then summarised using statistical analysis. Such a questionnaire can also be used in an interview situation (See section about interviews) where an interviewer reads the questions and fill in the answers on behalf of the subject.

## When to use it

Questionnaires are often used when there are a potentially large number of users of a product, and a developer wants to obtain information from as large a sample of these as possible. Questionnaires can be a cost effective way of obtaining background information, as the use of postal questionnaires is much less resource intensive than conducting large numbers of personal interviews, and is particularly useful when

### SPECIAL CONSIDERATIONS:

- Mental impairment ▶
- Hearing impairment ▶
- Blind/visually impaired ▶
- Motor impaired ▶
- People with communication problems ▶

- ▶ See Sources of Further Information

Questionnaires are a cost effective means when large amounts of data need to be collected.

informants live a distance from each other. Postal questionnaires can be used to collect a wide range of information, including background information about the person themselves, and their opinions regarding existing equipment and future design options. One advantage of questionnaires is that the informant can spend all the time they want in filling out the form, allowing them to make up their mind without any external pressure. For some disabled informants this might ensure responses that would not get out in an interview or group discussion.

Postal questionnaires which do not require the respondent to identify themselves may also make it easier for the respondent to answer personal or potentially embarrassing questions, due to the anonymity which such techniques may provide compared with other methods.

Questionnaires can vary in the degree to which they are structured, and for postal use structured questionnaires are likely to be of most value. Structured questionnaires are useful for obtaining simple factual information, rather than complex opinions however, as respondents are forced to make simple answers to questions or to choose from limited sets of options. More open questions can be used to some extent in postal questionnaires, but as there is no opportunity to discuss the question and answers with respondents, their use in these cases is limited. Less structured questionnaires are more appropriate for use as part of personal interviews, where any ambiguity in question and answer can be resolved. In addition less structured questionnaires are more appropriate for addressing issues which are inherently complex e.g. the requirements that a person may have for products in the future.

## Who can use it

This technique puts certain demands on the investigator. He or she needs knowledge about how to design a questionnaire, and how to analyse and interpret the information obtained. Questionnaire design is a skilled activity as careful wording of questions is required in order to make the document simple to understand, and to ensure that questions are not biased in any way. The investigator also needs to be aware of the pitfalls and problems involved with the interpretation of questionnaire results, as it is common for the response rates to postal questionnaires to be low i.e. in the region of 30% of those sent out being returned, and those responding may be atypical of the population under study. For all of these reasons it is therefore recommended that an unskilled user contacts experts to guide this type of data gathering. Experts on questionnaires are found at universities and at research institutes. For an introduction to questionnaires Judd et al (1991) "Research Methods in Social Relations" can be recommended. If such expertise is not available, the following provide some hints and ideas that might help in constructing questionnaires.

## Who are the informants

Potential or actual end users of a product are typically used as informants. Since questionnaires are often used with a large number of informants user organisations can be valuable sources to identify contacts. Where it is not possible to send questionnaires to all possible users, every attempt should be made to identify a representative sample of the user population. One method is to select participants on a random basis, but alternative methods also exist e.g. selecting participants so that they cover the full range of possible user attributes. For example a sample might be constructed so that it contains approximately equal numbers of men and women, or that it contains a reasonable proportion of young and elderly. No hard and fast rules can be applied in this area, as for different sets of questions different factors are likely to be important. It is a good idea to ask yourself what factors are likely to influence the way that people will respond to the questions you intend to give them, and to construct the sample accordingly. Constructing an appropriate sample also often requires that statistical material about the user population is available. This can normally be obtained by contact with governmental authorities or offices that collect information about the population in a country.

Helpers or providers might also have experience that could be collected by questionnaires to supplement that obtained from elderly or disabled people themselves.

Users and helpers are the typical informants.

## Special considerations

### General

Questionnaires should always be used with care as they are open to misinterpretation, both with recipients not understanding the questions, and with those analysing the results not understanding the responses. It can be very difficult to design questionnaires which are unambiguous, and questionnaires should therefore always be tested out on representatives from the user population to avoid these problems. For a variety of reasons people with disabilities may also have lower educational attainment, and may have more difficulties with reading and writing than a general population, which makes such piloting even more essential.

In addition postal questionnaires are open to additional sources of bias, as it is difficult to control who actually fills in the questionnaire under these circumstances. This can be a particular problem when trying to obtain information from disabled people who are being cared for by others, as there is no way to ensure that the person we want to answer the

Remember that the respondent has to be able to read and write in order to fill in the questionnaires.

questions actually does fill in the form. The result can be a joint effort on the part of the person and carer, or even worse the views of the carer.

Another and even more serious problem is that often nothing is known about the informants that do not return the questionnaire. In investigations with populations of elderly and disabled it is common for the reply rate to be below 50%. In this case it is a possibility that information from users that are of interest to your problem is left out, and that even worse the people who did respond are atypical of the target population in some way. However bearing these problems in mind there are ways to minimise such difficulties.

One solution is to chase up non replies, either by personal communication or by sending out duplicate copies of the questionnaire. Long questionnaires increase the risk of respondents not sending them back and for this reason all postal questionnaires should be short and to the point. Dillman (1978) has reported that in dealing with an able population a questionnaire of more than 12 pages seriously reduces the likelihood of a response. We would anticipate this would be even more of a problem when questionnaires are used in the AT sector, and such questionnaires should therefore be short and easy to use.

### Mental impairment

It is not recommended to send out postal questionnaires to mentally impaired users. Often such a survey can take more effort than actually interviewing the mentally impaired (see Interviews)

### Hearing impairment

Since the questionnaires are in written form hearing impairment by itself is not a problem. However it should be noted that many people with hearing disabilities from birth have problems with reading and writing. For this user group an interview with an interpreter should be done instead of a postal or self completion questionnaire if there are suspicions about problems with reading and writing.

### Blind and visually impaired

To send a questionnaire to a blind person means two choices to ensure response. Either using a tactile based language such as Braille or Moon, or trusting that the visually impaired person can get help to fill in the form. In the latter case some problems can occur as a third party is present who may influence the data capture. However if the blind person does not know a tactile language this may be the only option available. It should also be remembered that it is only the minority of blind and visually impaired people who can fluently use Braille or Moon,

and that it should therefore not be assumed that blind people will be able to communicate in this way. There is little published advice on how to design such questionnaires for visually impaired people. One suggestion could be to number the questions and ask the informant to send back a letter with numbered answers.

For informants with reduced vision it can be a good help to use enlarged fonts in the questionnaires, and 16 point font is recommended as a working minimum. To avoid a large amount of paper for each questionnaire a short number of questions should be used. It also helps to use a clear and simple layout that is intuitive to understand for the informant.

### Motor impaired

For people with motor impairments that make writing difficult, a helper can assist filling in the form, and may also even read out the questionnaire. Having such an intermediary may affect the responses recorded, with the helper's interpretation of questions and answers colouring the data capture process. If this is done it is suggested that the informants are allowed to read the questions themselves, and that the helpers role is minimised to assisting in filling in the answers. If the informants can use a computer, an alternative may be to provide them with a computer version of the questionnaire that allows them to fill in the answers themselves using their own communication aids.

### People with communication problems

In some cases (where the problem is speech) the written questionnaire is a perfect instrument. If on the other hand the communication problem includes language deficiencies (as for people with reading or writing disabilities) a written questionnaire is not a good option. The best solution in such cases would be to fill in the forms as an interview and to use trained interviewers to collect the information. In some cases an interpreter or helper may be used in addition to interpret the informants responses. In those cases other data capture methods should also be considered e.g. direct observation or user trials.

## Procedure

### Constructing the questionnaire

#### *Content area*

The purpose of the study will dictate certain central areas. For example if the study is to determine how well a product is accepted in the population, question on that specific issue would be included. Examples of important or related topics are;

- ◆ the respondent's personal attitudes toward that particular type of product
- ◆ the likelihood of usage
- ◆ his or her general possibility to use something like the product in question

It is a good idea to consult experts in the area of interest to know what issues to address, but the questionnaire developer should concentrate on limiting questions to those areas which are essential and try to keep such questionnaires as short as possible.

There is usually a need to gather some background information including:

- ◆ age
- ◆ gender
- ◆ severity of disability
- ◆ experience with product

The choice of background information included in the questionnaire depends on how the data will be used. It is especially important collect relevant background information if the purpose of the questionnaire is to identify differences between user groups.

In principle intimate or provoking questions should be avoided if not absolutely necessary for the results. Questions of a personal nature can be particularly upsetting for elderly and disabled people, and therefore need to be introduced very carefully. It is particularly important not to begin a questionnaire with highly personal questions, as the respondent may reject subsequent questions as a result. Also having answered a number of other questions, more personal questions are likely to be seen in context and be less likely to cause offence. Again careful piloting of questionnaires is particularly important, as it may be discovered that it is not possible to ask certain types of questions in such settings. Intimate or personal questions should be avoided in postal questionnaires, as elderly or disabled people may become upset by such topics being introduced in an impersonal way.

In order to assist the respondent questions can also be grouped by topic area, with the purposes of each set of questions described in an introduction to that section. This helps the respondent focus on the context behind particular questions, and makes misunderstandings less likely.

## Writing the questions

There are several types of questions which can be used. Some of the most common types are described in the following.

- **Multiple Choice Items**  
This type of questions provide two or more specific responses from which respondents have to choose. Such scales can be easily analysed, but it is important that the full range of significant alternatives are investigated in pilot work. Small changes in wording may also lead to misunderstandings.
- **Rating Scales**  
These are scales that can be used to obtain an indication of both the nature and magnitude of the informants opinions. Normally a rating scale has between 5 and 7 alternatives with the end points of the scale representing the two extremes of opinion possible. For example a respondent may be asked to rate their agreement with a particular statement ranging from strongly agree to strongly disagree. Such scales are intended to have approximately equal intervals between the different points on the scale, which allows statistical analysis to be used. In practice such scales can be difficult to interpret as often large numbers of subjects are needed in order to demonstrate a significant difference between responses of groups of subjects.
- **Paired Comparisons**  
This can be regarded as a special type of rating method, where informants have to decide which of a number of specific design alternatives are most appropriate, by series of comparisons of the items as pairs. This technique can provide highly reliable ratings, but may be a considerable effort for informants when a large number of alternatives are to be compared. In addition paired comparisons by themselves do not give a good indication of absolute levels of feeling, but rather just assist in ranking items on some criteria.
- **Ranking**  
Ranking requires that informants order items according to some specific criteria e.g. preference. This can be a simple way of identifying which option is preferred from a number of design options, but is somewhat limited as by itself does not give any indication of the absolute level of feeling. If this type of question is used it is not recommended to use more than ten alternatives.

- **Open Ended questions**

This requires the informants to write their own answer or comment on the question. The approach is particularly likely to be used in an exploratory study, and can be used in order to identify the range of responses that should be used in multiple choice questions. The approach requires more effort both from the informants in order to write the answers, and from the analyst to interpret and systematise them. However such open ended questions can be a rich source of information, providing the respondents are motivated enough to fill in the questions fully. It is common for open-ended questions to be left blank in postal questionnaires, and another problem can result in not being able to read the respondent's writing

In the design of a questionnaire it is important to decide what content areas are central to the study and to decide what questions should be asked and how they will be presented. Where a large number of respondents is anticipated then questions with a limited number of responses are the most appropriate as they are easier to collate and

An example of a scale based questionnaire to measure subjective judgements about an interface.

Has it been pleasant or unpleasant to work with the product?	Unpleasant	①	②	③	④	⑤	⑥	⑦	Pleasant
How efficient was the product to use?	Inefficient	①	②	③	④	⑤	⑥	⑦	Efficient
How well did the product support the tasks you wanted to achieve?	Little support	①	②	③	④	⑤	⑥	⑦	Good support
To what degree did you feel that you were in control working with the product?	No control	①	②	③	④	⑤	⑥	⑦	Control
Was it easy or hard to learn the product?	Hard	①	②	③	④	⑤	⑥	⑦	Easy
How much physical effort is needed to operate the product?	Little effort	①	②	③	④	⑤	⑥	⑦	Much effort
How much mental effort did you experience using the product?	Little effort	①	②	③	④	⑤	⑥	⑦	Much effort

interpret. However, open ended questions can provide a richer source of information, and should at least be used in pilot studies in order to assist in the process of identifying what alternatives should be provided in any fixed response categories. Before a draft questionnaire is tested out it is good advice to write open ended questions, and then convert them to questions with a fixed set of alternative responses after initial pilot tests have been conducted. Once completed this draft questionnaire should also be piloted again.

In addition to considering in detail the wording of such questionnaires it is also essential to consider in detail how the results of the study will be analysed. It is a very common problem in behavioural science for investigations to be carried out without sufficient thought given to how the material produced will be analysed. This issue also applies to the use of other techniques e.g. user trials.

A central issue in questionnaire design lies in ensuring that all respondents interpret the questions in the way that an investigator intended. Some guidance on the wording of the questions that would apply to any questionnaire is:

- ❖ Use familiar words (for the user) in short simple sentences
- ❖ Avoid using negatives where possible, and phrase questions in a positive form. e.g. "Are you unhappy?" is better than "Are you not happy?"
- ❖ Avoid the use of technical terms and acronyms, unless the investigator can be certain that they are fully understood by all of the respondents
- ❖ Cater as far as possible for all possible responses e.g. in questions with a limited number of options it can be useful to have an "other" category.
- ❖ Avoid sensitive issues unless absolutely necessary for the study
- ❖ Ensure anonymity, and that the informant understand that the information will be treated confidentially
- ❖ Avoid asking leading or biased questions which may imply a correct answer
- ❖ Ensure that the purpose behind asking the questions is fully understood, particularly if questions are of a sensitive nature.

Even if a lot of effort is put into the construction of the questionnaire, it is possible that there might be some questionnaire items which could give difficulties. Therefore, it is important to test out the draft on a sample of the respondents before the questionnaire is distributed.

It is important to test a draft version before the final questionnaire is distributed.

### Testing of the draft or pilot questionnaire

The draft questionnaire should be circulated to experts and consultants for comments and suggestions. It is important to allow more than one person to provide feedback on this first draft. Thereafter it is revised and tested again.

A proper pre-test or piloting involves actual users from the target population, and should be completed with interviews to identify possible misunderstandings or other problems with the questionnaire. The interviewer should go through the questionnaire topic by topic and ask informants about their overall reactions, what difficulties they had, how the questions were interpreted, what relevant issues were not tapped by the questionnaire, and what the informants thoughts were when not being able to respond to a question. It is important that as much criticism as possible is identified at this stage, and the importance of such piloting can not be overestimated. In many cases the possibility to obtain good data stands and falls with a good pre-test or piloting procedure.

### Revision and final questionnaire

The results from the pre-test should be used as feedback to the revision of the final questionnaire. Need for additional questions should be notified and questions written, some topics may be dropped, questions rewritten and scales changed. If the changes are major, a new piloting exercise should be performed. It is frustrating and costly to discover that changes introduced new problems after administration of the complete study. After implementation of the changes, the final questionnaire is ready to be distributed.

In this phase a letter following the questionnaire should be prepared. This letter should contain information about:

- ❖ how the informant was identified
- ❖ who is responsible for the investigation
- ❖ the purpose of the investigation
- ❖ insurance of anonymity
- ❖ what the information will be used for
- ❖ a contact name and telephone number for further information

### Administration

With postal administration the questionnaire is sent out to all the informants. Monitoring of the completed questionnaires as they come in is essential to detect problems as soon as they appear and get out corrections if necessary. The administration procedure should also include standard procedures for chasing up non responses e.g. making personal contact or sending out reminders to maximise the response rate.

With postal questionnaires this should have been facilitated by stamp addressed return envelopes having been distributed along with the original questionnaire.

## Data collection and analysis

Finally data can be collected and analysed. In some cases no statistical analysis of the returned information is needed, but often at least some summary statistics are required e.g. simple counts of responses, which are then used as a basis for drawing conclusions. The techniques of descriptive statistics can be used, which include measures of mean or average responses and measures of variation within a sample, and if required more sophisticated forms of analysis can also be used. The techniques of inferential statistics can be particularly useful in assisting in the interpretation of findings, by comparing the finds obtained from a survey with those which would be expected on the basis of chance alone. A great deal of care is needed in interpreting such data, and deciding on the appropriate form of statistical analysis to use, and this can be made even more difficult when there has been a low response rate. It is very common for mistakes to be made in this area, and consulting a person with some experience of statistical analysis can help avoiding making erroneous conclusions based on a poor understanding of the material returned. Do not be afraid to ask for advice, many experts also make mistakes in this area!

## Sources of Further Information ◀ ◀ ◀ ◀ ◀ ◀ ◀ ◀ ◀

Buhler and Schmidt (1993) report how they investigated disabled users' experiences with wheelchairs using standard questionnaires, which were used in order to identify the needs and wishes of their clients. The process they went through in developing the questionnaire included discussions with medical staff and therapists, and piloting of the questionnaire with a sample of long term wheelchair users.

BUHLER, C. & SCHMIDT, M. 1993, User involvement in evaluation and assessment of assistive technology. ECART 2. Proceedings of the European conference on the advancement of rehabilitation technology, 26 - 28 May 1993, The Swedish Handicap Institute Stockholm, Sweden Section 30.1 3pp

JUDD, C. M., SMITH, E. R. & KIDDER, L.H. 1991, Research Methods in Social Relations, Holt, Rinehart and Winston, Fort Worth, Texas: 1991. ISBN 0-03-032977-9

MOSER, C.A. & KALTON, G. 1977, Survey Methods in Social Investigation, Heinemann Educational Books, London.

**Example**

A questionnaire consisting of a subjective rating scale, developed at SINTEF REHAB has been used in an attempt to compare three products intended to make computers available for users with visual impairments (In the example the real product name is not presented). The products use synthetic voice to provide the user with a sound interface and are called screen readers. The table shows the results from a pilot study where 20 blind users were used as informants. They were interviewed about their experience with the products and the rating scale was used as interview guide.

	Product A	Product B	Product C
Affective experience	.70	.70	.50
Efficiency	.70	.70	.30
Support	.50	.50	.30
Control	.70	.80	.30
Learning	.70	.80	.50
Total	.60	.70	.40

*Subjective rating of the products. The scores are transformed to a number between 0 and 1 where .5 is a middle point. 0 means that the product is rated as low on this item, and 1 means that the product is rated high on this item.*

The results suggests that the products are perceived differently. Product B is rated better than Product A on controllability and ease of learning, while Product C is rated dramatically lower on efficiency, support, and control. These results can be used to make choices between products, or to suggest design improvements.