M253 Resource Sheet

Information gathering

1 Overview

The purpose of this Resource Sheet is to remind you of the wide range of approaches that you can take to the gathering of useful information about both the general problem domain of interest and also about specific aspects of the particular problem within that domain which you have been asked to investigate. It is important that you have a wide enough appreciation of the context of your proposed system and the nature of any existing systems that it may replace or need to compete with before you begin any detailed work on your own system.

2 The need for information

One of the most important aspects of successfully carrying out any project to specify and build a computer-based system is ensuring that you are working on the correct problem and that you have the correct data and information available to you, so that you can make the right decisions about the nature and functionality of your proposed system. You must understand the context of your system, be aware of the nature of the potential users of your system and of any other stakeholders, and appreciate their needs and expectations.

In order to achieve all this you will inevitably have to collect, evaluate and organise information from a variety of sources, and there are many different ways in which you may need to go about this task, depending on the nature and scope of the proposed system.

There are always constraints on the time and effort that is available for the task of gathering information, and knowing how much information to collect, and when to stop collecting, is a skill in its own right. There is always a temptation to try and organise every detail in advance, and many systems analysis texts seem to imply that you have to do this before you can even begin the specification process.

However, experience of working on projects, especially in areas that are new or unfamiliar, leads to the conclusion that getting everything 'right first time' is generally an unrealistic target. The very activity of investigating a problem and specifying an initial solution inevitably throws up new issues as it proceeds — issues that were not obvious beforehand. Potential users of the system may well find that participating in the process of creating a system specification, and considering prototype solutions, leads them to think of other aspects of the system that had not previously occurred to them.

An iterative approach, in which initial ideas are regularly revisited and revised in the light of subsequent investigation, is much more likely to succeed, provided that the

revision process is well managed and systematically documented. If you get the initial framework right then it is relatively easy to incorporate new items as they arise.

3 What sort of information are you looking for?

At the very least you need to identify the potential users of the system to be developed and to decide what the system's objectives are from the users' point of view. What features would a user expect the system to provide, and how would they expect to access these features? It is useful, in this context, to try to develop a series of typical scenarios for the way that users would expect to interact with the system, and what they would hope to get out of it.

4 Acquiring information

So where can you go to get the information you need? There are a number of possible avenues of exploration open to you and some of these are discussed below, although this is an indicative rather than an exhaustive list and there may well be others that occur to you.

4.1 Literature searches

Very few systems are so totally new and unique that there is not some record of previous attempts to solve similar problems. Much of this information will have been recorded somewhere in the literature (textbooks, journals, reports, case studies, etc). With the search facilities provided on the World Wide Web, and the relatively easy electronic access to a wide range of professional journals that you have through the Open University's electronic library facilities, this may well be a fruitful place to start any investigation. There is no point in re-inventing the wheel, and if someone else has done much of the work already and made their results available in the public domain then it is sensible to take advantage of that fact. It is unlikely that you will find anything exactly matching your current problem – but you may get some very useful general pointers to issues that you need to take into account in developing your own system.

4.2 Evaluation of existing systems

In many cases it will be possible to access existing systems of a similar nature to the one you are investigating with a view to providing a computer-based solution. Some of these will be equivalent manual, paper-based activities often with the postal and telephone systems as their main communication mechanism. You may be able to send off for brochures from people offering similar services to those you are being asked to provide electronically. From these you can then analyse the information they contain, the services they offer and the processes they involve, and can assess the degree to which they could be effectively and efficiently computerised.

You may also find that accessible electronic versions of the sort of system you are proposing to build already exist, and a Web search with a few well chosen keywords should throw up examples worth investigating and evaluating. You will probably find that each of them has been constructed from a slightly different viewpoint, or for a slightly different range of users, and that each has features you rate highly and others that you find inconvenient or even mildly irritating. In particular, there may be features of the user-interface that appeal to you, such as the ease of navigability or the way that information is presented.

4.3 Interviews

It is a good idea to identify a wide range of people who are in some way involved as potential sponsors or users of the system, or who may have had some experience of carrying out the sort of tasks that your system is being designed to provide. Then asking them for their opinions on the nature and scope of a solution to the problem that would be satisfying to them is beneficial. It widens the range of viewpoints that will eventually feed into your proposed system, whereas if you only carry out the initial investigation yourself you are relying on the limitations of your own attitudes, insights,

experience and common sense. Even if you are working as part of a development team, made up of a group who each bring their own distinct individual take on the problem to be solved, it is often the case that these individuals form a non-representative subset of the population at large. Indeed, one of the biggest problems with the development of software systems can be that the whole development team is part of an IT-aware subculture that does not understand the way the rest of the world responds to such systems, and which therefore fails to take the needs of the real 'users' on the other side of the 'digital divide' into account.

Getting the broader picture, by interviewing a well-selected cross-section of the wider population before you commit yourself to a solution to the problem, is therefore a useful activity. However, you have to bear in mind that, in the absence of a well-structured and potentially time-consuming interview, many people will readily give you a personal opinion that may not be very well thought out, and you need to take a fairly critical approach to their responses to your questions. You also need to remember that the way people you interview are related to you, the questions that you ask them, and the way in which you phrase the questions may well affect the answers that you get. Also there are inevitably issues about how representative any group of people that you choose are of the population as a whole. If you are aware of the potential biases that can creep into your data then you may be able to avoid them by careful selection of your interviewees and careful phrasing of your questions.

4.4 Questionnaires

Having done some initial investigation and interviewing, and discovered some of the major issues relating to your proposed system, you should be in a position to put down on paper some of your thoughts and queries in a reasonably structured fashion. At this point it may then be useful to attempt to validate your current position by creating and administering a questionnaire based on your findings to date.

Questionnaires can be used to get responses from a larger group of people than can be handled easily in interview situations, as they involve asking individuals to respond to a fixed set of questions set out in a fairly formalised document, often by just indicating their preferred option from a list of alternative responses to each question. The construction of good questionnaires is a skill that we cannot discuss in depth in this Resource Sheet, as it is worthy of a course in its own right. However, if you want to find out a little more about this topic, and attempt to construct your own questionnaire, you might like to follow up the relevant link(s) in the *Further resources* section at the end of this document.

Of course the same warning is needed here as was given for interviewing. How you choose your sample, and how you angle your questions and the sets of potential responses, will affect the results that you achieve.

4.5 Focus groups

The idea of getting a group of people together to discuss the problem area, preferably with some sort of 'stimulus material' relating to the topic under consideration to get the discussion going, can be productive. The face-to-face interactions between people in a group discussion often provide a mechanism for getting everyone to think a little more widely than they would have done if operating only as individuals, leading to an improved overall coverage of the problem.

4.6 Observation

If you are in the fortunate position of having access to some systems that have similar features to those you are being asked to provide, and also have a few people with the time to help you, then it can be valuable to ask them to use the systems while you watch them and observe their reactions. This is more likely to produce relevant information than interviews or questionnaires, as it is based on reactions at the time of the user's immersion in the mechanics of using the system, rather than relying on partial recall at a later date.

There are various ways in which this can be done. For example, you can restrict yourself to observing their activities and noting down what happened, so that you can discuss the session with them when they have completed it. Alternatively, you can ask them to talk through what they are doing and what they think about it as they go along, and can act as a scribe to capture their reactions during the session.

This activity is of course fairly time consuming, and there is always the danger of the 'Hawthorne effect' coming into play, whereby the very act of observation changes the behaviour of the person or phenomenon being observed.

5 Putting it all together

The approach you take to gathering information will depend on the time and resources available to you, but ultimately it is important to give yourself as wide a picture as possible of the dimensions and extent of the problem domain. You need to have collected this information before you can attempt to analyse it, and to set down your conclusions about it in a structured form as a basis for working on a solution to the problem. In particular, you need to have as much information as possible about the potential users of the system and their likely reactions to any solution that you might propose.

It is also valuable, wherever possible, to go back to a sample of potential users with the deliverables from each stage of developing your solution, and to run these past them to see whether what you have captured so far appears to them to be comprehensible, consistent, complete — and potentially comfortable to use. The earlier you catch any problems the better, and it is often easier for people not directly involved in the production process to see where things appear to be not quite right. Developers themselves are often too close to the activity to be able to step back and take an unbiased view of the results of their efforts. Bearing in mind the comments at the beginning of this document about iterative development, it is never too late to take on board any further information that will ultimately improve the quality of the final product.

6 Summary

In this Resource Sheet we have considered a range of activities that you could undertake in order to find out more about the problem area you are interested in, depending on the time and effort you can afford to put into your initial investigations. We have not attempted to cover any of the approaches in detail, although in the *Further resources* section below we provide some pointers to material that may help you investigate some of the approaches further, should you so wish.

7 Further resources

A workbook that you might find useful for thinking about questionnaire design can be found at:

http://www.tardis.ed.ac.uk/~kate/qmcweb/qcont.htm

A recent overview article on the practicalities of questionnaire design can be found at:

http://www.stcsig.org/usability/newsletter/0301-surveybloopers.html

A somewhat condensed presentation on the issues of data/information elicitation techniques can be found at:

http://www.utdallas.edu/~chung/RE/2.3.5RE.pdf