

Interviewer Interface of the CAPI system of Statistics Finland

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1. Introduction

The CAPI system of Statistics Finland (SF) was technically outlined already in the First Blaise Users Conference (see [1]) although the field interviewers had no computers then and the CAPI organisation did not exist yet. The reported experimental system proved be useful shortly after the conference when it was decided to equip the interviewers with laptops. The telecommunication part of the CAPI system was basically implemented according to those plans. However, in the first plans the rest of the interviewer's workstation software, i.e. the user interface¹, was only vaguely outlined.

An inherent requirement for a CAPI information system is that it is reliable, that is the data must not be in danger under any circumstances. Besides the data security, the user interface should also be functionally and ergonomically well designed. An error in the design of information systems in previous years has been that the end user has been considered as something of minor importance. Such an attitude is in many respects inconsiderate. In making the user interface for the CAPI system in SF it was clearly outlined that the interface should give support to the end users' work. As we all agree, interviewers play a very important role in the data collection process and their commitment is crucial. If we, who work in the survey industry, commit ourselves to the Total Quality Management (see [2]) we should be concerned about the tools and instruments interviewers have, as well as of the survey questionnaires.

In the first place, the interface that the interviewers are obliged to use daily directly affects on their motivation and performance. If they find the usage of the computer too difficult or clumsy, or in the worst case, the software does not seem reliable enough, interviewers will begin to worry about coping in the interviewing. Interviewing thus becomes tense and rigid. It affects the quality of the surveys in many ways if interviewers are forced to use new techniques that they do not like or which they cannot cope with.

Secondly, training interviewers to use an interface that is not user-friendly is very hard and expensive. A complicated structure and functionality that does not follow the process of interviewing conveniently are difficult to understand and hard to remember. After the training period the use of the interface should be transparent so that it does not draw attention from the main task, interviewing.

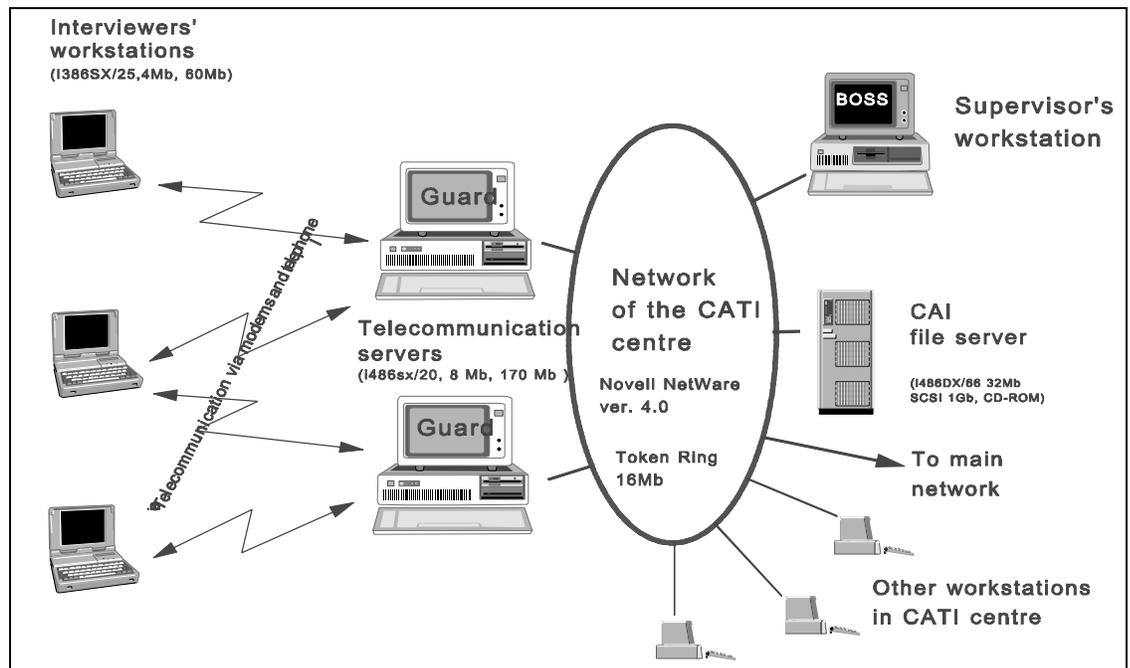
¹ Throughout this text the concept of *user interface* or the *human-computer interface* is used in a wide sense meaning the software which connects the end user to the information system.

Recently designers have become aware that the user interface affects the quality and reliability of the system in every environment. Consequently, the user interfaces have been studied for some time and at the moment there are numerous postulated principles for a user interface that are based on these studies and experience. A number of good books dealing with this subject are also available (see eg. [3] or [4]). However, the requirements for a well-designed interface arise partly from the end users', in this case interviewers', abilities. Thus, the knowledge must be applied in the local environment.

In this paper I will describe the design principles of the user interface and its functions and use.

2. The CAPI Information system

The CAPI information system in SF is composed of two computer programs communicating with each other: the interviewer's workstation software and the supervisor's software



(including the telecommunications software) at the main office of Statistics Finland. To understand some parts of the orchestrations, it is necessary to know how the system should function. The technical description of the information system is shown in figure 1.

The 150 field interviewers' workstations² are connected via external 2400 baud modems to

the telecommunications servers (called GUARDS) at the main office. So far two servers have been sufficient. (However, adding new telecommunication servers to the system is quite an easy task.) GUARDS have access to the file server via Token Ring/Netware. All survey data are stored in the file server connected to the main network via a bridge. The whole survey information system is supervised from a network workstation running a specific software called BOSS (Basic Operating Software for Supervisors).

GUARDS are dedicated only to telecommunications, that is to distributing questionnaires and to receiving data. They run 24 hours a day, enabling interviewers to send data anytime. The interviewer is the active party in the initiation of the transmission system and GUARDS wait passively for the calls made by interviewers' workstations. However, after the connection is established, the roles of the client and the server are changed: the GUARD sends data to and/or captures data from the interviewers' workstation. That is, GUARDS cannot make a contact under any circumstances by themselves, and sending files from the workstation is not actually possible. That is, the transmission of data is managed by the GUARD, not the workstation. Traffic in both directions may take place during the same session: if a post packet ready waiting for an interviewer when he or she returns data, the packet will be delivered without a separate request.

When a new survey is launched, an interviewer has to carry out some tasks before interviews can start. Interviewers are usually notified of each upcoming survey by letter. A description of the survey is included the letter, and sometimes also a paper questionnaire, as well as the names and addresses of those to be interviewed. The letter is a signal to the interviewer to fetch the questionnaire using the Get Questionnaire option (see picture 2) and then practice it with real or imaginary interviewees.

Interviewers should transmit data once or twice a week. Due to time restrictions, the case management was solved using a very simple method. All data files containing all cases interviewed so far are transmitted as such. The solution causes many problems but, on the other hand, data security is guaranteed. The design of an adequate case management would have been at least as labourious as the design of the other parts of the interface.

2. Design principles of the user interface

The entire CAPI organization had to be established in less than one year and about three months were allocated to the design and programming of the user interface. There was not thus much time to find and test sophisticated solutions. The design principle can be described as 'quick and sturdy' but the ergonomics and the functionality of the interface were not compromised.

However, the demands for a user interface originate from many different things and some of them are contradictory. The result is always some sort of a compromise between some aims. A list of the aims and principles applied in the programming is presented below.

The user interface was made into a *platform where new surveys are easy to implement*. This was important because the Department of Interview Services at SF also carries out small scale surveys for other organizations, in addition to the large scale surveys of SF. In practice that may mean that an interviewer may be involved in several (up to four or five) surveys during one month. Getting a new survey quickly to the interviewers and back again to be handed over to the customer was an essential feature required from the system.

Another aim was to achieve *easy maintainability*. A prominent feature of today's information technology is that it evolves fast and sometimes unpredictably. Therefore, the software was designed into a platform that can be changed easily for instance to meet the needs of Blaise III or changes in telecommunications. This led to a modular structure. Most features of the software may be changed separately without touching the others.

Another structural decision was to apply the *tree structure* instead of a net structure. The selection was based partly on functionality reasons and partly on the fact that the tree structure is easier to make. And, on the other hand, there is no real need for horizontal movements in a survey interface.

As mentioned earlier, the user interface should be *transparent* so that an interviewer does not notice she or he is using it. This means that using it must be easy.

One of the most determining issues in planning the interface was the observation that most of the interviewers of Statistics Finland had little or no experience in using computers. Even a typewriter was unfamiliar to one third of them. Accordingly, the major task was to develop a 'housewife proof' user interface that, on the other hand, was versatile and reliable. To meet this demand, a group of interviewers tested the software several times before it was released. Tests and training led to a few new decisions, e.g.:

- Most functions are activated by 'pressing the key'. There are no written commands and most functions are 'automatic'.
- No function keys (except F1 for help). The selection of menu functions is done by using arrow keys to highlight the desired function, and then pressing Enter opens it. Function keys were used in the first versions but their use appeared to be difficult and error-prone. So they were discarded.
- Most selections must be confirmed before execution or continuation. This arrangement contradicts the so-called principle of the easiest path, i.e. that the default option in a submenu should be the one selected most often. In the Interviewer's menu the default option is generally return to the previous menu. The confirmation of a selection was found very important in the first version of the user interface. For instance, people who are unfamiliar with the use of a computer keyboard frequently press the key for too long, which actually results in several key strokes. Without

confirmation (and default return) keys pressed too long cause unexpected situations and errors in many cases.

- A close resemblance to the Blaise interface is retained as far as possible. Although the interviewer's menu is a totally different program from Blaise, inexperienced users do not easily understand the difference. In any case, it is more ergonomical, and better in many ways that all parts look and feel the same.

Interviewers had a two day supervised training course at Statistics Finland and right after that unsupervised training in their homes for one week. The supervised training was based on a manual which was delivered at the beginning of the training. The manual 'Interviewer's ADP Manual' is about 60 pages and covers, e.g. the user interface, Blaise, and maintenance of the hardware.

Reasonable disclosure control. As mentioned earlier, an inherent requirement of a system is data security. It should also be made a prominent part of the system. Conveying the message is necessary for the sake of interviewers' comfort, so that they can be certain that data are safe at every stage of the process. On the other hand, ambitious measures to protect data would make the everyday use of the system too complicated. The implemented disclosure control is a compromise consisting of several small parts.

For instance, all data stored in the system are protected against outsiders. When the laptop is turned on the operating system will be loaded from the hard disk. Booting from a diskette requires changes in the setup of the computer. Vital options are protected by a password. In addition, the logic of the telecommunications makes breaking into the system difficult.

3. The user interface and the interviewer's menu

The functions of the user interface are divided in two menus. The most frequently used options are in the main menu, that is

- interviewing
- telecommunication
- back-up.

The Utilities menu contains most of the maintenance functions and some reserve functions, such as:

- diskette operations
- transaction logs
- change of the password or telephone catalogue
- preparing and erasing surveys.

3.1. The main menu

The main menu of the user interface, the Interviewer's Menu is shown in figure 2. At the top is the code of the interviewer ('TEST'). The options of the menu are not in logical order because in this way the probability of an incorrect choice is smaller.

Interviewing

When an interviewer turns on the laptop, the first screen will be the Interviewer's menu (see fig. 2) and the cursor is on the Interview option. The activation of the Interview option brings up a screen with a list of all active surveys. Selection of one survey opens the corresponding Blaise instrument. If the same interviewee should also answer to another survey, the change of questionnaires is possible only through the list of surveys.

Interviewers are provided with the possibility of practising with any survey anytime. The Training Interview option has proved to be indispensable. A new survey becomes more familiar by carrying out some interviews with real or imaginary subjects, and previous (concluded) interviews can be checked without the danger of accidentally changing the



markings. All training interviews will be erased after the training session.

the integrity of the received packet. If the received packet was corrupted during transmission, the workstation asks the telecommunications server to retransmit it. After the packet is safely received, the telephone connection is terminated. However, the user interface software continues in a stand alone mode, without any confirmation from the user. The next phase is to prepare a ready-to-use instrument of the source code. This phase consists of making a directory for the survey, syntax check with Blaise and compilation with the Pascal command line compiler. If there was a message attached to the packet it will be displayed on the screen after the task is completed.

When interviewers *Return data* they have to choose the survey(s) and when the contact will be made. The user interface software automatically packs all the predefined files, dials the telephone number (at the specified time) and sends the packet to the telecommunications server GUARD. GUARD checks the integrity of the received packet, and if it is OK terminates the connection. Otherwise, GUARD asks the workstation to send the packet again. When the transmission is completed and the call terminated, GUARD unpacks the received file and moves the data to the interviewer's directory in the file server.

Back-up

Interviewers are advised to make a full back-up of the surveys every time they receive a new questionnaire, and a differential backup after each day they have made interviews (except the days when they have returned data). Back-ups are made by the DOS back-up program on diskettes.

3.2 Utilities Menu

The Utilities menu (see fig. 3) contains functions mainly intended for maintenance and some reserve functions for telecommunications. It is presumed that these functions are only needed occasionally, not in everyday work.

The Store data on diskette option and Get questionnaire from diskette option are meant for situations in which telecommunications is inapplicable for some reason. At the program level they function in the same way as the telecommunications part. Preparation of a survey means syntax check and compilation of a questionnaire. This option is used in case the instrument is corrupted either during the initial preparation or later.

The Erase survey option erases a survey from the computer's disk. However, interviewers usually do not erase surveys. The cleaning of computers is undertaken by batch files which come with the packets sent by the supervisor. Batch files are ordinary DOS bats and a great variety of DOS operation can be performed with them, e.g. change the configuration of the computer.

Transactions are recorded in corresponding logs. The Send log contains the names of files and time and date when the packet was sent. The Receive log contains the same data on incoming packets. With the Display message option the interviewer can read the last message received.

5. Further development

At the moment it is apparent that the requirements set for the user interface have been met for the most part. Some minor changes need to be made in the next version. Overall, interviewers have been quite satisfied. The greatest flaw is the unsophisticated case management system. However, plans are ready for a case management system capable of dealing even with rotating panels surveys.

Naturally, the implementation of Blaise III brings some minor changes to the software. For instance, since compilation is no longer needed, both Blaise and Pascal are redundant. A foreseeable change is brought by new laptops with a colour screen. Colours make the user interface much more efficient but simultaneously colours make the design more complicated.

The need for a more versatile messaging system has been expressed. At the moment, only the supervisor may send a message to all (or a group of) interviewers and only the last message is stored in interviewers' computers. Maybe in the future there will be a person to person mail system where personal feedback in both directions is possible. However, any plans for that have not been made, so far.

Graphical User Interface and mouse

Graphical user interfaces are coming to all systems. Evidently the CAI-systems are no exceptions. I do not share the enthusiasm, however. Especially the use of the mouse is likely to be a problem. The use of the mouse for an inexperienced user even on a surface designed for that purpose is difficult because the accurate movements of hand require exercise and a steady hand. If the mouse needs to be used on an irregular surface it will not work properly. Inexperienced users have found the use of a mouse very stressing and error-prone. Some users have even developed a tennis elbow by using the mouse.

There are many different new types of pointing devices in new laptops but they are not as practical as the conventional mouse. The pen-like pointing devices may be the type which is as good as the keyboard and in some cases even better, e.g. in doorstep interviews. However, the entering of survey data does not require a mouse to become faster or more accurate or even more ergonomical.

References

- [1] Kuusela Vesa, Merisalo Antti (1992): *A Prototype System of Data Exchange for Statistics Finland's CAPI system*. In **Essays on Blaise**; Proceedings of The First International Blaise Users Meeting. Statistics Netherlands, Voorburg.
- [2] Pietilä Pentti, Niemi Hannu (1995): *Total Quality and Computer Assisted Interviewing; Frames, definitions and Tools for Planning the Total Quality System*. In this book.
- [3] Laurel, B, ed. (1990): *The Art of Human-Computer Interface Design*. Reading, Mass.: Addison-Wesley.
- [4] Schneiderman Ben (1987): *Designing the User Interface. Strategies for Effective Human-Computer Interaction*. Reading, Mass.: Addison-Wesley.