

BLAISE IN SOCIAL SURVEYS AT THE NETHERLANDS CENTRAL BUREAU OF STATISTICS

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1. History of computer-assisted interviewing at the CBS

The history of computer-assisted interviewing at the CBS dates back to 1981. At that time the CBS was considering the introduction of telephone interviewing, not at least because of the tantalizing promises of computer assistance which had shown up in various operational CATI-systems already. Around the middle of 1982, a ready-made package (ACRS, developed by M/A/R/C/ company) was installed and experiments were started to look into the feasibility of telephone interviewing. From 1984 computer-assisted interviewing has been in regular use at the CBS for telephone surveys with persons and households. With various revisions and adaptations the ACRS-package was used until 1990 when it was replaced by the CATI-machine of Blaise together with a closely connected, home-made management system for call scheduling, appointments and supervisory tasks. An accompanying change was the transition from a mini-computer (HP3000) to PC's in a local area network.

The first experiment with handheld computers took place in May 1984. The data collected were prices of commodities which had to be observed in shops. Around Christmas 1984 a comparative survey was carried out to study the acceptance of computer-assisted personal interviewing (CAPI) by interviewers and respondents in a real face-to-face situation. Both experiments turned out to be a success. A major obstacle for more general applicability at that time, however, was that suitable and cost-efficient handheld computers could contain only one questionnaire whereas loading another questionnaire was cumbersome and could not be accomplished by the interviewers themselves. They had to be sent back to the CBS first.

It so happened, however, that in 1985 a project was started to build a continuous Labour Force Survey. The number of interviews needed for this survey would comprise the larger part of all interviews with private persons at the CBS (each month, 10,000 addresses to assign to interviewers and data from about 10,000 persons). Besides, timeliness was one of the main objectives. If any survey, this one seemed to make the application of handhelds worth trying. After the software specialists successfully succeeded to fit the rather extensive questionnaire in the computer a pilot study was carried out in March 1986 (van Bastelaer et al, 1988). A nice feature of the QUEST-program used then was that it kept record of the way the interviewer moved through the questionnaire and also recorded important information about how data were corrected. The problem how to get the data at the CBS (and get memory capacity available for fresh data) was solved by using modems for transmission by phone (the interviewer's handheld automatically phoning the host-computer at a pre-programmed time during the night). The test case showed no severe impediments for further implementation, except that the large-scale survey had to start on 1 January 1987 already. The main problem therefore became one of logistics, training and organization. In the meantime the original NEC CP/M-machine was replaced by the faster Epson PX-4 (also CP/M) with more memory capacity. New facilities were added to the home-made interviewing program and concurrently the questionnaire itself was significantly improved. Exclusively for the Labour Force Survey and with only minor adaptations, the whole CAPI-system was in full operation for five years, from 1987 till 1992 when it was replaced by the Blaise system. After some time the monthly sample became 12,000 addresses which were assigned to about 300 interviewers, each with their own Epson.

The third development which has had a tremendous impact on the collection and processing of data from social surveys at the CBS has been the implementation of the Blaise system. Blaise came in for the first time in 1987 when most surveys used paper-and-pencil questionnaires (except for the Labour Force Survey and some three CATI-surveys). Mainly as a result of an extensive data editing research project (Bethlehem, 1987) the CADI-machine of Blaise was introduced then to get rid of the time-consuming preparations of paper forms for data entry and to break

through the subsequent cycle of computer checking and manual correction (for which paper forms often had to be consulted again). Instead, data entry and data editing of a paper form should be combined as much as possible in the hands of one specialist with the help of an intelligent data entry and error checking program. To this end CADI was used extensively from 1987. But then, after some two years, the (additional) provisions for the interviewing machine of Blaise were ready and a rapid shift occurred to computer-assisted interviewing. Indispensable to this development was the availability of a MS-DOS machine which could serve multi-survey purposes. Particularly the handling of different questionnaires by the interviewer, going from one address to another for different surveys, should not be too difficult. Once a suitable handheld with a disk drive for the exchange of questionnaires had been found (Toshiba T1000), three CAPI-surveys could already be conducted with Blaise in 1989 (apart from the Labour Force Survey which till 1992 used what was called QUEST, after the name of the questionnaire-interpreter).

Later on it was decided that from 1992 all interviewing for social surveys at the CBS, including panel surveys, should be carried out with either the CAPI- or the CATI-machine of Blaise. For special purposes, of course, paper questionnaires could still be used. With some minor exception (the small Housing Costs Survey) and with the Household Expenditure Survey still being in a process of conversion, this goal has almost been attained. From 1992 also, all CAPI-interviewers have been using the Toshiba T1000 SE with one disk drive and 384 KB RAM in addition to the common 640 KB work space.

2. Blaise-applications in the Department for Social Surveys

Within the CBS all data collection with persons and households has been centralized in one special department, i.e. the Department for Social Surveys. Here the fieldwork is prepared and organized, including the construction of the questionnaire and its conversion to Blaise. The interviewing is carried out by some 500 part-timers (for the most part housewives), nearly all of whom have their own handheld, and another 30 for telephone interviewing from the CBS-office at Heerlen. Besides pilot

surveys, monthly samples contain 20,000 elements on an average, mainly addresses which have to be contacted. If only clear differences between questionnaires are taken as a criterion, the samples are spread over about 12 distinct kinds of surveys annually, not including specific screening actions with only a few questions. From the same viewpoint there have been 11 regular surveys which were predominantly CAPI or CATI until now and 4 which are going to be so in the short term (see table 1). In the more distant future other surveys are likely to come in, probably a Time Budget Survey and perhaps even a large Housing Survey with a sample size of nearly 100,000 (part of which could be handled using CBS-handhelds).

*Table 1. Regular social surveys at the CBS with CAPI/CATI (Blaise) (including in preparation for 1993, indicated by ***)*

Name of Survey	Panel survey	Gross sample in 1992, resp 1991 (*) or 1993 (**)	Predominantly	
			CAPI	CATI
1. Labour Force Survey		132,000	x	
2. Unemployed Labour Force Panel	x	12,000 (**)		x
3. Household Expenditure Survey	x	6,600 (**)	x	
4. Social Economic Panel	x	5,900	x	
5. Housing Costs Survey		1,100 (**)	x	
6. Consumer Sentiments Survey		22,500		x
7. Passenger Car Panel	x	6,720		x
8. National Travel Survey		18,600		x
9. Recreational Survey	x	25,200 (*)		x
10. Parliamentary Election Survey 1)	x	5,500	x	
11. School Career Surveys	x	7,250		x
12. Life Situation Survey		15,000	x	
13. Victimization Survey		6,000	x	
14. Health Survey		7,200	x	
15. Fertility Survey		20,000 (**)	x	

1) Conducted in 1989 with CAPI (Blaise) and now depending on whether there will be elections.

In the paper-and-pencil era the Department for Social Surveys also had to put a lot of labour intensive work into post-processing the collected data, both to make them machine-readable and to deliver 'clean' individ-

ual data records to the subject-matter departments. Now, it still has to take care of the quality of the collected data. But a far-reaching change has taken place as to the way in which and the stage at which the cleaning up is accomplished. If collected via CAPI/CATI data are already key-entered by the interviewer and so one can use computer files with the original data, thereby avoiding any discrepancy between what was registered by the interviewer and what is in the computer. Furthermore, a properly working interviewing machine will follow the routing instructions and only allow codes that are specified in the Blaise-questionnaire. The interviewer simply cannot violate these specifications and cause incomplete data in this respect. Apart from distortions by technical or operating failures the collected data will be 'syntactically' correct.

Whether they will make sense depends on other things too, particularly on the conceptual model for the specific subjects inquired, the design of the questionnaire, and the instruction and training of the interviewers. Perhaps the most important consequence of relatively clean data thanks to the Blaise-machine itself was that, because the bulk of clerical editing could get rid of, the idea was taking root to put data editing in the field all together, while at the same time reducing its necessity. Thus, attention was being focused on the interviewing situation and the questionnaire to a much larger extent and in a more systematic way than was usual when inconsistencies were dealt with in an extra round of data editing anyway.

Lacking a second chance, remaining inconsistencies within the range offered by the machine have been tackled since then by structuring the questionnaire so as to prevent errors from happening and by building both 'hard' and 'soft' checks at crucial points or where errors are likely to be made.

Moreover, there has been a growing awareness of the often inherent relation between the concepts and definitions which are used for a particular subject and the troublesome outcomes encountered. In the Labour Force Survey, for instance, there was considerable dissatisfaction with questions which were rather bluntly derived from administrative definitions, using terms which, although they sounded familiar, appeared to be rather fuzzy at the edges for many respondents, e.g. about status in

employment. Also, an attempt to cover by retrospection the entire labour history since one year before the month of the interview failed in practice, being too demanding in many cases. These kind of experiences became the starting-point for a drastically revised questionnaire (in use now since January 1992). Many subject matters were removed or brought back to what really counted. At the same time the remaining concepts were elaborated in a much larger amount of simpler, more self-evident questions. The result was a very complex structure which really put Blaise to the test and would have been quite impossible using paper forms. But it has served to make the task of the interviewer (and the respondent) easier. Resources, like instructions, intermediate support and fieldwork monitoring can now be more effectively used for strategic issues, such as understanding the main structure of the questionnaire and considering the decisive factors at major branchings. This also greatly contributes to data quality.

Yet, in spite of all precautions data from the field will continue showing up inconsistencies, although less frequently and with less damaging effects. Again, an error detection program could be build to select 'dirty' records for interactive editing. But now it is more doubtful whether the extra information will outweigh the usually high costs, particularly if applied as a standard procedure within the social survey department. The fieldwork branch could add real information by going back to the interviewer or respondent but doing so on a large scale is hardly feasible in practice. Knowledge about the acting of interviewers and respondents can also be important for the interpretation of systematic errors. But as solutions can (also badly) affect the statistical outcomes it was decided that the subject matter specialists should control the adjustments of already collected data, also considering the use of alternative and statistically more sophisticated methods (e.g. those working on an aggregate level). Therefore data editing, if any, of data collected via CAPI/CATI should as a rule no longer take place in the social survey department. This, in fact, stresses the priority of the field and the questionnaire. As such, data checking for evaluative purposes is becoming more and more important, both to improve the questionnaires

and to enhance the interviewers' performances. Besides, the mere savings as a result of drastically reducing the editing staff in the department make the use of laptops cost-effective.

Part of interactive data processing will remain at the Department for Social Surveys. It concerns special coding of some major socio-economic background variables. At present these are education, occupation and firm. When collecting information about these variables it is obligatory to use strictly prescribed question blocks (in Blaise), either a long or a short version. Because of the complex classification schemes and the predominant use of open questions coding demands specialized knowledge. To concentrate this knowledge and to further standardization of surveys from different departments coding specialists are working within the social survey department. The coding tasks are so specific that tailor-made programs are used. The resulting codes are usually written in the Blaise data files.

Now that paper forms are mainly applied in an additional way, for self-report booklets etcetera, the large-scale use of CADI has clearly diminished within the social survey department. Yet, apart from the (additional) paper forms, most CAPI- and CATI-surveys occasionally use CADI for limited tasks such as interactive coding of text answers, extra checks on data collected via CAPI or CATI, and afterwards repairing (the effects of) misspecifications in the questionnaire. Another application of CADI, mostly in other departments, can be found when a survey has different questionnaires and one wants to check on relations between them. Then the respective data files are often merged and after specifying a new structure CADI-facilities are used to accomplish this.

3. The embedding of Blaise in the fieldwork organization

To attain an efficient use of laptops Blaise-CAPI was first applied in two surveys for which fieldwork was carried out continuously. Most developmental efforts were aimed at building a functioning questionnaire. The operating task of the interviewer was thought to be simple. So there was no need for a master plan. The only thing the interviewer had to do

before starting interviewing was to put the diskette in the disk drive and turn the laptop on, respectively turn it off after the last interview data were written to the diskette. Once the diskette came back there was some data manipulation, mostly by the programmer of the questionnaire, in order to prepare traditional data processing. In this manner Blaise-CAPI became rapidly implemented. Questionnaire design benefitted from this approach. Specialist knowledge of CAPI was quickly acquired, though with only a few persons. That the questionnaire program was open for manifold uses and reliable enough for further production was also confirmed. For all design problems a satisfactory solution could be found and no really serious errors were detected, not in Blaise itself nor in its application. But, this way of implementing Blaise-CAPI also laid bare the plain facts about what almost certainly would go wrong when more than about three surveys had to be dealt with. It came out that managing a multi-survey system was quite a step ahead of what had already been realized in the Labour Force Survey. First of all, even with only one diskette for each survey the interviewers seemed to have operating problems. Diskettes were taken out as they were written on. Interview data got lost as laptops were turned off before they were written to diskette (being no problem with the Epson where many were more familiar with, nor with the newer T1000 SE having a resume mode). Fortunately, total failures did not happen too often. Because all data from an interviewer and consequently nearly always from a particular area were on the diskette a backup should have been made anyhow. Especially worth noticing was that the actual cause of quite a lot of problems was panic after something unusual had come up. All these things indicated an obvious lack of control over the operating task. This again had its effects on their clerical work, which, apart from the questionnaire, had not been altered. Sample addresses were still on paper, as were the fieldwork reports. The latter comprised a visit account and a sample account (there was a strict sampling scheme in case more households were found at an address). It turned out that interviewers were tending to become less accurate in writing (on forms) and entering (in the questionnaire) case identification numbers or filling in the accounting forms. This caused a lot of matching problems and, because of

too many incomplete data, made the forms almost useless. Every project team tried to take its measures. But as these were hardly co-ordinated they embarrassed the interviewer, often making things even worse.

The description given is somewhat over-dramatic. For a lot of improvements could have been made by some co-ordinating measures and just tightening the reins. But it did work out that way and actually gave the impetus to what became the core of the CAPI management system. To take no further risks, as this was only the beginning, it was decided that interviewers should have their own computer-assisted management system, if possible. It should be a real help to the interviewers, enabling them to do what they had to do in an easy, smooth way and at a convenient moment, while concurrently checking on the completeness and consistency of their accounting reports. To familiarize and not scare them the latter should be left as much as possible as they were already. Of course, the address information should be in the laptop.

The result was a completely menu-driven system which was named LIPS (Laptop Information system for Personal Surveys). It was used for the first time in September 1990 and has been in full-scale use for all CAPI-surveys since January 1992. Following the routine procedure of a (female) interviewer visiting an address (which she has on paper also), she first selects from a menu on the screen the appropriate survey (after switching on the laptop, checking date and time and possibly being asked by LIPS to make a backup). She then selects the address from a list which can be sorted in different ways. Next she has to give some information about the address. In case there are sub-addresses (more specifically mail delivery points) she has to draw about half of these up to a maximum of three according to strict rules. At each address or sub-address she has to take all households, again up to a maximum of three. So a single sample address may be splitted up into nine sub-elements, which are represented on the screen as the elements of a 3x3 matrix. When she wants to interview a particular household she moves the pointer to the corresponding cell and enters 'i'. LIPS asks her to confirm her choice and after checking whether the correct questionnaire diskette is in the disk drive will start the Blaise-CAPI program. The (sub-)address identification number is automatically passed on to the questionnaire and that is it.

After finishing interviewing she finds herself in LIPS again and enters 'v' to make her visit report. The system date and time are used as defaults and if she reports a response result LIPS will check whether a questionnaire was actually started (this and the questionnaire key are the only Blaise data LIPS knows about).

A well working system for data transmission is also essential, of course. Reducing peaks in work-loads and effectively monitoring fieldwork progress and interviewer performance require a steady flow of data. For interviewer-dependent data, transmission by telephone best suits the needs. As with the Labour Force Survey the laptop takes the initiative, but if there are any data to be sent to the interviewer the same session is used for this purpose. Of course, there can now be sent data for different surveys simultaneously (up to 15). The relatively huge programs for running the questionnaire are sent on diskette. They are on diskette in LIPS also and as they are same for all interviewers can easily be sent in the same way as the explanatory letter that usually accompanies a new questionnaire. Here, the relevant data are the data that can vary between interviewers.

To keep things manageable, also for the interviewer, this kind of information should not be too fragmentarily transmitted. Therefore all of the information pertaining to a particular address is packaged. When an interviewer decides to send an address back, all of it is put ready for sending, but LIPS will check on the completeness of the required address information. If something is missing the address can only be transmitted after being explicitly marked by the interviewer and in that case it will get special attention at the CBS. The same applies to an address that was not used at all. By giving it a different mark it can be quickly selected for re-assignment.

Thus, LIPS is a real case management system. It nicely fits in with the centralized case management system in the interview administration section at the CBS. The task of the latter is to assign sample cases to interviewers and to keep track of the progress made with respect to the handling of cases, mainly by keeping count of the results in reports about finished cases. These tasks have also been highly automated in a system

called IAS (Interview Administration System). The assignments are first carried out automatically and then mostly manually adjusted. Thanks to LIPS and also the transmission by telephone the administration of cases has been greatly simplified. Cases can be easily traced and they can be ascribed a clear status, even though LIPS is the domain of the interviewer. Closely connected to IAS is also an automated Interview Declaration System (IDS).

Finally, SPIL should be mentioned, being the System to Perform data-Interchange with Laptops (why not with LIPS ?). It arranges everything that is necessary to transmit data to the field, such as making interviewer packages and compressing the data. It also distributes the received data from the field, putting them in the right form. Normally the administrative data go to IAS and the statistical data to CACS for special coding (see section 2).

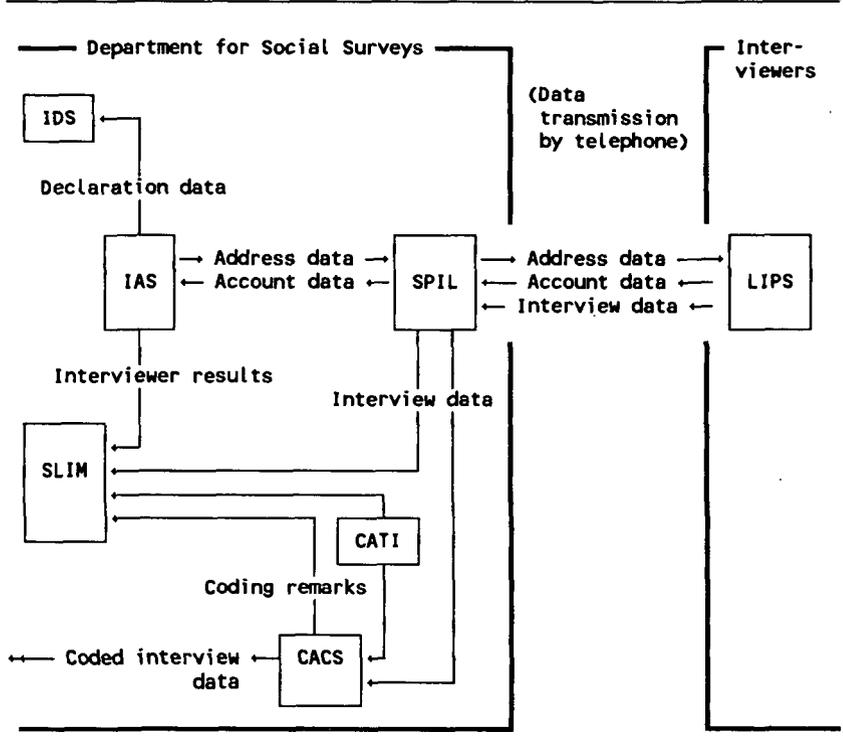
There is a lot more to tell about SPIL, LIPS and features of the data transmission. But these are described elsewhere (Hofman et al, 1991a). Being far from simple, the building of the systems required a great deal of effort, a tour de force indeed, but the result has been highly rewarding. Looking back, one could say that the start of the CAPI implementation was not so unhappy after all, at least not in its consequences.

The price that had to be paid was extensive interviewer instruction, training and support. The interviewer not only had to learn how to deal with LIPS and with data communication, but also had to understand the place of LIPS in the survey organization, being mainly a prolongation of the case management system. The most difficult part was the handling of the different diskettes. The interviewer should grasp basic notions like the difference between the questionnaire and the answer data, or between internal and external memory. An intensive instruction of three days was necessary. Besides, fake addresses and a normal questionnaire have been used to exercise in LIPS.

More on a meta-level and still developing is the System for Laptop Interview Monitoring or SLIM (Dutch for 'clever'). It is being built and

partially used already to serve the fieldwork supervisors. It should become a general system for quality control as far as the fieldwork is concerned.

Figure 1. Automated systems for data collection and data processing



The main problems during the implementation of the Blaise-CATI system arose from not being familiar with the many options for call management that are offered by the system. Because of the freedom for the user it is easy to create huge planning problems (too few or too many interviewers in a shift). By learning how to tune the option parameters the problems gradually disappeared. Interesting about the system is that both the call management data and the appointment data are made part of the Blaise-

questionnaire. It turned out that this integration in Blaise had many advantages because all Blaise tools for data manipulation could be used (see Hofman et al, 1991b). The system is relatively simple, flexible and efficient.

Literature

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