Integrating Surveys with Blaise III

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1. Introduction

As in other European countries Statistics Netherlands has designed several surveys to gather information on (aspects) of living conditions. These surveys not only vary in content, but also in the sample frame used, sample size, response, interview length, number of persons to be interviewed, use of proxy respondents, type of data editing, weighing method, etc. Some of these surveys were revised in the beginning of the nineties when Statistics Netherlands introduced computer assisted interviewing (CAPI). These revisions focused both on the harmonization of questions used for demographic and socio-economic classifications and on the translation into CAPI of questionnaires that were originally developed for being asked with paper and pencil (PAPI).

Several developments brought Statistics Netherlands to go a step beyond harmonization of survey variables. These developments especially have to do with the demand for statistics on living conditions, initiatives to improve response in social surveys and further development of information technology. In the next section an overview is given of the most important reasons that lay the new design of a system of social surveys. The name of the system, POLS, refers both to the Dutch abbreviation for a Continuous set of Surveys on the Quality of Life and the Dutch word for pulse ('to keep a finger on the pulse'). The POLS-design is presented in section 3.

Sections 4 and 5 focus on the integration from a Blaise perspective and the new management system respectively. Section 6 goes into more details about the Blaise III questionnaires and includes some remarks on the system of post-processing the collected data. It is followed by a section on the problem of documenting Blaise questionnaires. The last section discusses some practical experiences of using Blaise III as a tool to integrate social surveys.

2. The integration of social surveys

At this moment Statistics Netherlands has started the redesign of its data collection on persons and households. This redesign is, because of the enormous complexity and impact, structured along some stages. In the

first stage the socio-cultural surveys are redesigned. From 1997 onwards the eight surveys in the fields of health, crime and security, political and social attitudes, the general social survey (with a special survey on the youth and the elderly), time budget and housing are being combined. However, the long term developments that steer the redesign of these surveys will also influence the redesign of other surveys inside and (as we see it) outside Statistics Netherlands in the near future: new demands, the fight against non-response and new technology to link data.

New demands

Rather than being concerned with the distribution of aggregate variables over groups of statistical units, social research frequently focuses on relations between variables at the micro-level. This focus on micro-relations has been the driving force behind the development of ever more comprehensive household surveys. These surveys aim to cover as many variables as possible, so that all social relations can be analysed for a comprehensive data set. However, there is a growing awareness of the limits to this approach. The response burden on the sample households becomes too heavy if too many variables are covered in a single survey. This burden forms a serious constraint on statistical agencies to meet all the demands. The type of statistical information needed by policy makers also seems to change. The demand is no longer directed to rather one-dimensional statistics about the well known themes of the political agenda (health, crime, income). The demand for information directed to the more complex (causal) relations between these themes has increased. This demand reflects the policy questions arising from societal developments such as poverty, social exclusion and deprivation. These societal problems often converge in problem areas, like inner cities. Especially these developments need to be monitored by statisticians to fulfil the politicians needs. To state it in 'variable language': not the univariate or bivariate distributions of variables but the multivariate relations between sets of variables is being asked for.

The fight against non-response

Non-response in household surveys is a severe problem. Compared with other countries The Netherlands are not doing very well (De Heer, 1996). Within the domain of the socio-cultural surveys response varies between 50% and 60%. This level of response probably causes serious bias that can not always be neutralized by smart methods of weighing. With respect to the four-yearly National Election Study, for example, there is a small debate in the Netherlands what the figures from this survey really tell us about political alienation when so many people do not participate. Statistics Netherlands has taken several initiatives to reduce non-response. A lot of these initiatives have to do with the way surveys are presented to the public (e.g. introduction letters), the monitoring of interviewers and the optimization of using different data collection methods. These initiatives are always taken under the restriction that the overall respondent burden should be as low as possible.

New technology to link data

Other reasons for changing the social surveys of Statistics Netherlands stem from information technology developments. As described in Van Bochhove and Everaers (1996) there are basically three methods to link micro data from different sources. The first is *exact matching*. In this case

micro data from different sources on *the same individual* are linked. The second way of linkage is *synthetic matching*. In this case micro data from different sources on *the same group* of individuals (for example age group) are linked. A third method of linking micro data is to redesign the sources in such a way that there will be a brief *joint questionnaire* for a large sample that provides succinct information on core variables from all original surveys; and more in depth questionnaires on the separate areas for smaller subsamples. This way a core micro data set is obtained directly (the equivalent of exact matching) and an in depth synthetic data set can be created by combining the in depth data from the various subsamples using the joint core as a synthetic matching key. Because the variables in the core are associated with the in depth variables of the subsamples, this approach picks up relations more easily than synthetically matched data sets that rely on just demographic variables for the matching. POLS has been based on this third method.

Restrictions on the integration of surveys in POLS

The most important restrictions that steered the design of integrating the separate social surveys within the socio-cultural domain were:

1) Minimization of the burden on respondents. This condition can be viewed from a micro and from a macro perspective. 'Micro' means that the mean interview-time within a household should not exceed 45 minutes. 'Macro' means that the total interview-time of all the modules should be reduced by POLS. This restriction has also lead to efforts to combine separate surveys from other agencies with specific POLS-modules.

2) A person-based sample frame. Statistics Netherlands now has the possibility to take samples from a file that is based on the fully automated population register in the Netherlands. This register contains information about nearly all the persons and households in the Netherlands. In the first place the fieldwork department can profit from this information to combat non-response: interviewers know beforehand who is going to be interviewed and some characteristics of the persons (sex, age, nationality) who refuse are known. But data-users can also profit from this information, because oversampling is rather easy, because some information on the non-responding persons is given and because this register will (in the future) be combined with other registers.

3) Enough cases to allow description of relatively small subgroups. This condition could only be met if all the socio-cultural surveys should join. However, the estimated net response of 36 000 households (1997) forces Statistics Netherlands to make work of the extension with other surveys to find the smallest ones of the target groups for policy makers.

4) No proxy interviewing (for persons who are older than eleven years), unless the empirical relation with other characteristics is well known. This restriction has to do with the efforts to both improve quality of the data (proxy information is in general less reliable) and to decrease the burden on respondents.

5) Flexibility in adding modules on certain topics during certain periods or in oversampling specific population groups within a separate survey.

3. The design of an integrated system of social surveys (POLS)

Shell-structure

The design of POLS is based on a shell-structure. In principle there is no limit to the number of shells, so panel studies can be included. Every shell has its own characteristics (see figure below). A survey always consists of the joint questionaire (shell 1 and shell 2) and one or more modules from shell 3. However, the order of the questions during the interview can be different, because of the interviewing process. For example, the questions on income that make part of the joint questionnaire are always asked at the end of the interview. The joint questionnaire is designed under the restriction that both telephone and face-to-face interviewing should be possible. The CATI-part will be used to reach certain types of non-respondents from the first fieldwork stage. At the end of this telephone interview the respondents are asked if they are willing to join in a face-to-face interview (to gather information being asked in shell 3).

Shell 1 : (total sample)

Joint questionnaire part 1 *: harmonized classification variables*

This part contains all the questions to be asked on every person in the sample. The questions use the harmonized classification variables, both the demographic ones (age, sex, marital status, nationality, place of birth) and the socio-economic ones (education, socio-economic position, household income). For the future it is planned to collect this information as much as possible via registrations. Apart from the future use of register information, this part of the questionnaire will only change if the concepts and definitions of the harmonized questions are changed.

Shell 2 : (total sample)

Joint questionnaire part 2 *: core questions in the socio-cultural domain*

This shell contains the core questions of the socio-cultural surveys. The reason to name it shell 2 (the interviewer off course does not see these terms) is that it is foreseen that in a later stage core variables from other surveys will be added. This shell is therefore less stable in content than shell 1. Because the questions in this shell are used for the total sample, they allow the quarterly publication of important indicators and the annual publication on a low regional level.

Joint questionnaire part 3 *: screening questions in the socio-cultural domain*

This part varies from year to year. Although the large sample allows finding a lot of special groups, including a lot of screening questions in the joint questionnaire is not possible. In 1997 the screening (of 36,000 persons) is for accidents and injuries. The information gathered will be used to ask a specific subsample to join in a follow-up study (shell 4, see below).

Joint questionnaire part 4 *: Variable questions*

To meet the fifth restriction (see above) POLS has implemented the principle that a small part of the joint questionnaire should be reserved for actual themes or themes that require a large sample. This part can vary twice a year. In 1997 it is used for questions on victimization.

Shell 3 : Socio-cultural modules (subsamples)
In this shell theme-specific questions are planned. However themes are combined in a way that more-dimensional indicators (as described above) can be calculated. This calculation will partly be based on the idea of consistent weighing (see Renssen and Nieuwenbroek, forthcoming). The contents of this shell change regularly. Data on some topics have to be collected once or twice a year during a certain period. Some other topics only need to be analysed once every three or four years. Within this shell also screening questions (on a subsample) are included to trace persons for a follow-up study. The following modules, for which non-overlapping samples are used, will be implemented in 1997. The figures between brackets refer to response and age categories.

Health (N = 10,000, age 0+)

This module uses two modes of data collection: CAPI and PAPI. The paper and pencil mode is primarily chosen because of the sensitive questions on health, for example the 'burnt out' syndrome.
The module is continuously being asked (January-December).

Justice and Environment (N = 7,500, age 12+)

Here again CAPI and PAPI are both used. The PAPI is chosen because of the questions about time use (a so called 'yesterday interview').
The module is continuously being asked.

Justice and Participation (N = 5,000, age 12+)

This module only uses CAPI. Part of the questions are identical to the last module in order to fulfil the requirement of having12,500 responses about themes like victimization, crime prevention etc.
The module is continuously being asked.

Youngsters (N = 4,000, age 12-30)

This module also only uses CAPI, but in a slightly different way. Because of the interviewed population (under 30 years) it is possible to ask the respondents to complete parts of the questionnaire on a notebook computer by themselves. The answers to these questions (about sex, drugs and crime) will be of a better quality if self-completion is chosen.
The module is scheduled three times in a decade and will be asked from March 1997 till December 1997.

Trends (N = 4,500, age 18+)

This module only uses CAPI and primarily consists of trend questions that have been asked in surveys since 1974, and questions on request of the Social and Cultural Planning Office.
The module is scheduled three times in a decade and will be asked from March 1997 till December 1997.

Accidents (N = 5,000, age 0+)

The survey on accidents is part of a new research project of Statistics Netherlands that has been formulated on request of the Ministry of Health. The other part of the data-need of this project has been formulated within the joint questionnaire (screening questions) and a follow-up study in shell 4. This module uses CAPI and PAPI. The PAPI-part is the same as de-

scribed above: a yesterday interview to measure time use. Here it is only to be used on Friday however, in order to supply additional cases for getting a uniform distribution of net responses over the days of the week.

Shell 4 : Follow-up studies (subsamples)
The possibilities both in the joint questionnaire and in the specific modules to screen target groups are used for follow-ups. This shell can also incorporate a panel survey, such as the National Election Study. In 1997 two follow-up studies are foreseen, both based on screening :

- *A health examination survey (HES) in a subsample of municipalities,*
- *CATI-interviews on accidents and injuries, of about 15 minutes.*

As the mean interview-time for the joint questionaire is fixed at 15 minutes, shell 3 may generally take another 30 minutes.

In 1997 a reduction of the total (macro) interview-time of 20% (ie 5,000 interview hours) will be achieved thanks to the introduction of POLS.

An overview of the Integrated System of Surveys (POLS) in the year 1997

(numbers refer to persons sampled from Population Register)

Basic questionnaire part 1 *N = 36,000 shell 1 CAPI/CATI*	• *Harmonized questions for demographic and socio-economic classifications (stable)*
Basic questionnaire part 2,3,4 *N = 36,000 shell 2 CAPI/CATI*	• *Core questions (stable)* • *Screening questions (var.)* • *Special themes (variable)*

Health	*Justice*		*Young*	*Trend*	*Accidents*
	Environment	*Participation*			

- *Theme-specific modules*
- *In depth questions*
- *Screening questions*

(modules can change from year to year)

CAPI *PAPI*	*CAPI* *PAPI*	*CAPI*	*CAPI*	*CAPI*	*CAPI*
10,000	*7,500*	*5,000*	*4,000*	*4,500*	*5,000*

shell 3

Health examination	*Accidents* *CATI*

shell 4

4. Integrating surveys from a Blaise perspective

To keep things manageable the in principle indefinite number of subject-matter questionnaires should be independent from each other as much as possible. The integration concept rests entirely on the common basic questionnaire. The latter could be duplicated in different datamodels, one for every subject-specific questionnaire. These datamodels could then be put under the umbrella of a single case management system and be handled by Maniplus as a single survey. But especially the basic questionnaire is meant to be relatively stable and independent from the variety of subject-oriented wishes and developments. And if the datamodels are to be recognizable entities linked to a particular subject, changing the basic module should leave them unchanged, if possible. Subject-matter specialists who are responsible for a particular datamodel should not be bothered with things they did not initiate and that may be irrelevant to them. Therefore it was decided to have a separate datamodel for the basic questionnaire on the integrative level next to a set of datamodels for which, as before, independent and non-overlapping samples of persons are drawn.

First, the common basic questionnaire is asked. Included are also themes that require a large sample (eg victimization or accidence rates). After finishing this datamodel a Manipula-setup takes care of writing the data that may possibly be needed in anyone of the shell 3-datamodels in a separate ‘external’ datamodel. Through a dialogue box in Maniplus the interviewer can now open the particular datamodel to which the target person was assigned. After concluding this part of the interview some questions still have to be asked about the household of the target person. Here data are collected from the person with the highest income, such as

income itself, educational and occupation. As this may involve a shift of respondent these questions, which actually belong to the basic questionnaire, are asked near the end of the interview. They are put in a separate datamodel, which is only auxiliary because the data is subsequently added by Manipula (block moving) to the files of the original datamodel. Thus, the latter will finally contain all data from the basic questionnaire. For a particular case only the data from the first model and from the applied shell 3 are sent back by telephone. So, for the actual questionnaires POLS uses a *1-n-1 structure of datamodels*. The two constants represent the datamodels for the generally applied basic questionnaire. The variable n represents the datamodels for the different shells 3 from which one is chosen per interview. Afterwards extra datamodels can be used, as they are, for follow-up studies among screened cases (i.e. shell 4).

The interviewer can always return to preceding datamodels for changing already given answers. However, as this may effect routing, checks and computations in subsequent models, Maniplus forces the interviewer to open these models again so that potential changes will be processed automatically. This could be inconvenient if occurring frequently. In practice it can be coped with by choosing the right, relatively independent modules.

5. A new management system for the interviewer

The interviewer management system on the laptop, which has been used by Statistics Netherlands since 1991 in connection with Blaise, is called LIPS. Written in Pascal, it is a dedicated system for some well-defined repeating tasks such as choosing addresses, making interviewer reports and treating sample elements. Although robust, the system is not easy to adapt or extend. Once the decision was taken to use Blaise III for POLS it was clear that a new and preferrably more flexible system was needed.

Inspired by the possibilities of Blaise III and to improve accessibility it was decided to build the new management system entirely with the tools of Blaise III. Especially Maniplus proved to be a useful tool to create an interactive environment for all kinds of action, not only starting a questionnaire but compressing a data file as well. So, the modular design of the POLS-dependent questionnaires, mentioned before, was also used for the new LIPS. Being a management system, it was designed to be as independent from a particular survey as possible. From a Maniplus-setup, called LIPS.MAN, separate Blaise-questionnaires are started to handle addresses, to make an interviewer report, or to pass control to another Maniplus-setup, called POLS.MAN, that for his part steers the survey-specific questionnaires to be used in the actual interview. In a way one could define LIPS now as only taking care of the steering of the respective Blaise-questionnaires and the presentation of the main entities: survey, address and sample element. That is how the core of the system is made resistent to changes. All survey-dependent code is put in separate components which can far more easily be adapted or replaced. Even the interviewer administration can now be geared to the demands of a particular survey or be changed for a certain period of fieldwork within a single survey. General and specific parts have been separated. Adding a new subject can simply be accomplished by writing a new questionnaire

and specifying in the setup the criteria for calling it. Besides, at any point during the interview only the setup that is in control and the particular datamodel the interviewer is using are loaded into the internal memory of the laptop-computer (which was extended from 4 Mb to 12 Mb).

The required Maniplus-setup however is not trivial. Some specialist knowledge is indispensable. Exchange of data between models has to be arranged and a lot of careful checking is needed in order to guarantee a correct and smooth proceeding of the interviewer activities. Nonetheless, the lessened complexity of the modular design clearly outweighs the complexity caused by the introduction of a separate level of control.

6. The Blaise III questionnaires

Although much effort was needed to structure and steer the different data-models, the POLS-questionnaires itself became simpler and easier to handle. Somewhat contrary to expectations there were hardly any problems when the questionnaires of the old surveys had to be converted to Blaise III at the beginning of 1996. For this purpose Blaise III proved to be remarkably stable. Most discussions were about operating the user-interface and about the layout of the screen in particular. Removing the check-paragraph in most cases helped writers to simplify their question-naires. At least, one could get rid of some persistent problems in the old Blaise pertaining to the interaction, sometimes difficult to grasp, between the routing and the check-paragraph, for instance, when variables in the routing-conditions were imputed in the check-paragraph. Generally, most writers think that specifying questionnaires has become easier. On the other hand, Blaise III offers a lot of new opportunities which have to be mastered first. The use of block parameters, for instance, to optimize a modularly designed questionnaire like the one in POLS takes time. And to fully exploit the new possibilities source codes have to be checked almost line for line. But doing so is in no way a prerequisite for using Blaise III. In POLS old and new live together. Overall, the progress is a result of gradual enhancement. Old parts are often waiting till they will be redesigned by subject-matter specialists. In the meantime some aspects are being improved already, for instance, by introducing new date functions from Blaise III. So, a lot is still to be done to fully use the new possibilities.

Perhaps because of the ample resources of Blaise III, a noticeable shift has already occurred from discussions about Blaise to the more funda-mental question of how questionnaires should be organized so that maximum advantage can be taken from the datamodels once they are specified. The goals that are at stake here include subsequent data processing and analysis, maintenance and documentation of question-naires, and comparability or exchangeability of parts between surveys. These are all paramount issues for a complex integrated design like POLS.

Subsequent data processing has been organized as a multi-stage process. The main stages are *initialization*, *execution* (checking data, construction of composite variables, weighing) and the *output* stage. An important restriction on the process can be formulated as ‘non-increasing

complexity'. The processing is organized in such a way that the data can be analysed in all stages. All stages and substages are fully automated. A user-friendly information system has been developed to select variables and micro data (from the several POLS-modules) for internal use.

7. The documentation of the datamodelling

The datamodels of Blaise III can be specified in such a way that they are almost entirely self-documenting for those who are able and willing to read Blaise. At least one should be capable of reading the block structure, not being distracted by technicalities or large pieces with checks and computations. The new date and time functions of Blaise III, by the way, greatly helped POLS to get rid of a lot of such code. Yet, even users with enough other programming experience often lack confidence when they have to use source codes for documentation purposes. We doubt if this has much to do with Blaise. That is to say, probably all computerized questionnaires of some complexity, large sized and with a lot of functionality will raise problems of documentation, not specifically Blaise.

So, one could say that Blaise-questionnaires can and should be made self-documenting for those who are used reading or writing Blaise. Lacking an (semi-)automated solution for those who cannot, POLS has its own hand-made documentation on paper.The problem with this is not so much the making of it as well the maintenance, keeping it up-to-date. Therefore a prototype of an information system has been developed that is going to be used as a tool for reading *all* the relevant POLS-documents, including both questionnaires in an end-user readible format and the 'self-documented' Blaise sources. Probably this will help to keep them well matched.

Meanwhile ideas are evolving within Statistics Netherlands for an automated aid, utilizing the metadata that is read by Cameleon from the datamodel. What is needed is a setup that selects metadata an interprets it as language codes with respect to the layout and, next, a program to represent text in a common format so that it can interactively be tailored to the user's own wishes. WordBasic commands could be used for controlling Word. But first the major users have to define the functionalities.

8. Miscellaneous Blaise

Finally, an example will be given of some typical questionnaire items in POLS and the role Blaise III plays in handling them.

- *As a consequence of chosen policy increasingly information is to be used that is already present in administrative registers (eg population, tax or social security). As data do not have to match with the respondent's own perception, imputation in interviews can raise problems. In POLS age, gender and marital status of the sampled person are obtained from the population register. By selecting a certain code the interviewer assigns the external data to the assumed target person and the corresponding variables in the household-roster will be imputed. Then the interviewer checks the imputed answers and may change them. Although a discordant 'age'*

or 'gender' is hardly acceptable, for the time being one error will be accepted. Discrepancies are counted and will be evaluated.

- *Each shell 3 should take 30 minutes per interview. The sample size can vary from shell to shell, depending on the subject-modules they contain. Added up, the non-overlapping samples for the different shells should not exceed the fixed total for POLS, which is now 36,000. Given these restrictions it is not easy to find a satisfactory combination of modules in each shell. For instance, some modules cover persons below the age of twelve but most do not. And among the first a module may need two times as many children as the other. In practice, this will result in either a surplus or a shortage of children. Also, certain kinds of events may be underrepresented. In POLS, for instance, previously existing separate modules for different kinds of accidents are combined into one general module. After screening by CAPI, the last accident with injury is selected and asked about more in depth by CATI (shell 4). In the old situation the relative rareness of some kinds of accidents was compensated by screening more sample persons. In the combined module a relatively rare kind of accident has to be overrepresented to gather the same number as before. For these and similar frictions additional sampling mechanisms can show very helpful. A child, if any, is randomly drawn in the first example if the initial target person is one of the parents (who in this case should also respond for the child). And if there are more kinds of accidents a certain kind is randomly drawn first in the second example (with weights 1 and 2 for one or more of a certain kind respectively). In Blaise the resulting random number should be fixed, of course, but the draw should be ignored if the initial conditions change (by correcting an answer). For a set of mutually exclusive combinations (Comb) of conditions to which random assignment applies, our approach looks like :*

```
IF  (Comb[1]=Yes)  OR  (Comb[2]=Yes)  OR  .....  THEN
                          {  eg  Accident1=One  and
Accident2=More                                      }
  IF    (Comb[1]=Yes)    AND    (Fix[1]=EMPTY)    THEN
    NrComb[1]:=                              RANDOM[N]+1
       Fix[1]:= 1      Fix[2]:= EMPTY   ....:= EMPTY
  ELSEIF   (Comb[2]=Yes)   AND   (Fix[2]=EMPTY)   THEN
    NrComb[2]:=                              RANDOM[N]+1
       Fix[2]:= 1      Fix[1]:= EMPTY   ....:= EMPTY
  ......
  ENDIF
ELSE
     Fix[1]:= EMPTY   Fix[2]:= EMPTY   ....:= EMPTY
ENDIF
```

- *Statistics Netherlands strongly fosters interactive coding of open answers during the interview, both for reasons of efficiency (reduced coding staff) and quality (contact with the respondent). To achieve this quite a few concepts in POLS need a many-branched, hierarchical tree of questions. Here the facility in Blaise III that leads the interviewer through a hierarchy of successive sets of alternatives has shown extremely helpful. It sometimes replaces complete modules of self-specified questions. When*

in addition the nested enumerations in the so-called classification type *are put in a type library this helps to get the questionnaire well-organized. The application for the part of the body that is mainly injured reads as follows:*

```
{1}       Head                (1)  "Head,  face"  =  (
{1.1}     Brain           (1) "Brain eg concussion",
{1.2}         Skull                    (2)   "Skull",
{1.3}         Ear                        (3)   "Ear",
.........................
{2}         NeckThroat   (2)   "Neck,   throat"   =   (
{2.1}          Vertebra             (1)   "Backbone",
{2.2}          External             (2)   "External",
.......................
{3}     Chest           (3) "Chest, upper back" = (
{3.1}   External    (1) "External (eg ribs)",
```

- *In CATI only the basic questionnaire (shell 1 and shell 2) is asked. Except for two INCLUDE-files for the introduction and the good-bye respectively, the datamodel used with CATI is the same as the one used with CAPI. Contrary to the old Blaise the arrangements for using CATI can now be made completely external to the datamodel.*

- *Although certainly not making the most of it yet, we already profited from the new features which Blaise III offers in the LAYOUT section. We generally hate needing more screens for one question. Therefore two standard data entry screens were added for optional use, one for long question texts in the upper part and one for large tables in the lower data entry part, simple but very helpful for the sorts of questions typical of POLS. It is also planned to use the interviewer's computer for the increasing number of self-reports in POLS. This will of course place far greater demands on the layout of the data entry screen.*

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