

The usage of Blaise in an integrated application for the Births Sample Survey in CATI mode

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1. The new strategy for CATI surveys

A lot of CATI surveys are realised in Istat (Italian National Statistic Institute) and, before the experience described in this document, for all of them the same strategy was adopted: the content of the survey, made clear in the questionnaire, was designed in Istat, but the entire data capturing procedure was carried out by an external private company, selected through an administrative procedure. Even if this strategy always succeeded in concluding the data capturing phase, it often presented different problems. The main difficulties concerned the fact that private companies in charge of Istat surveys were often very experienced in telemarketing or opinion polls, but:

- had never faced in advance the development of electronic questionnaires so complicate in terms of skipping and consistency rules between variables
- had never put in practice strategies to prevent and reduce non response errors
- had not at their disposal a robust set of indicators to monitor the interviewing phase.

Consequently, the product obtained always made it possible to make the interviews, but did not often satisfy all the pre-defined requirements.

That is why a new strategy, called the '*in house strategy*', was tested for a very important survey (the Birth Sample Survey): we relied on a private company who provided the call centre, selected the interviewers and carried out the interviews, but we gave it all the software procedure to manage the data capturing phase, concerning: the calls scheduler, the electronic questionnaire and the indicators to monitor the interviewing phase.

This strategy not only guaranteed the complete correspondence between the planned requirements and the developed procedure, but also allowed a strict collaboration between the survey responsible and the CATI experts in defining the characteristics the package should have and in improving it according to the results obtained step by step during the developing phase. In addition, as the Birth Sample Survey has to be repeated every two years, it will not be necessary to face again all the planning and developing activities in case a different company is charged with this job.

Blaise is the core in this strategy as it has been used for the most important modules of the software procedure.

2. The Birth Sample Survey

A new CATI sample survey on births has been designed in Istat and it substitutes the previous exhaustive survey based on administrative sources. A sample of 50.000 mothers is selected from the universe of born alive babies, registered during a period of 12 months which precedes of at least 6 months the interviewing phase. The main purpose of the survey is to collect information regarding basic elements on living births and, for the first time in Italy, to go deep into familiar and social aspects in order to identify the determinants of fertility. The designed questionnaire comprehends four sections, regarding: *i*) the births, the delivery and the household

members, *ii*) mother's job before and after having the baby, *iii*) the baby's care and the management of daily tasks inside the family; *iv*) the house and the socio-economic context. As very long interviews were expected, it was decided to submit the complete questionnaire only to a sub-sample of mothers and a short version, comprehending only sections one and four, to the whole sample; in this way we will obtain estimates respectively at national and regional level.

Three interviewing periods have been defined along one year, according to the babies date of birth.

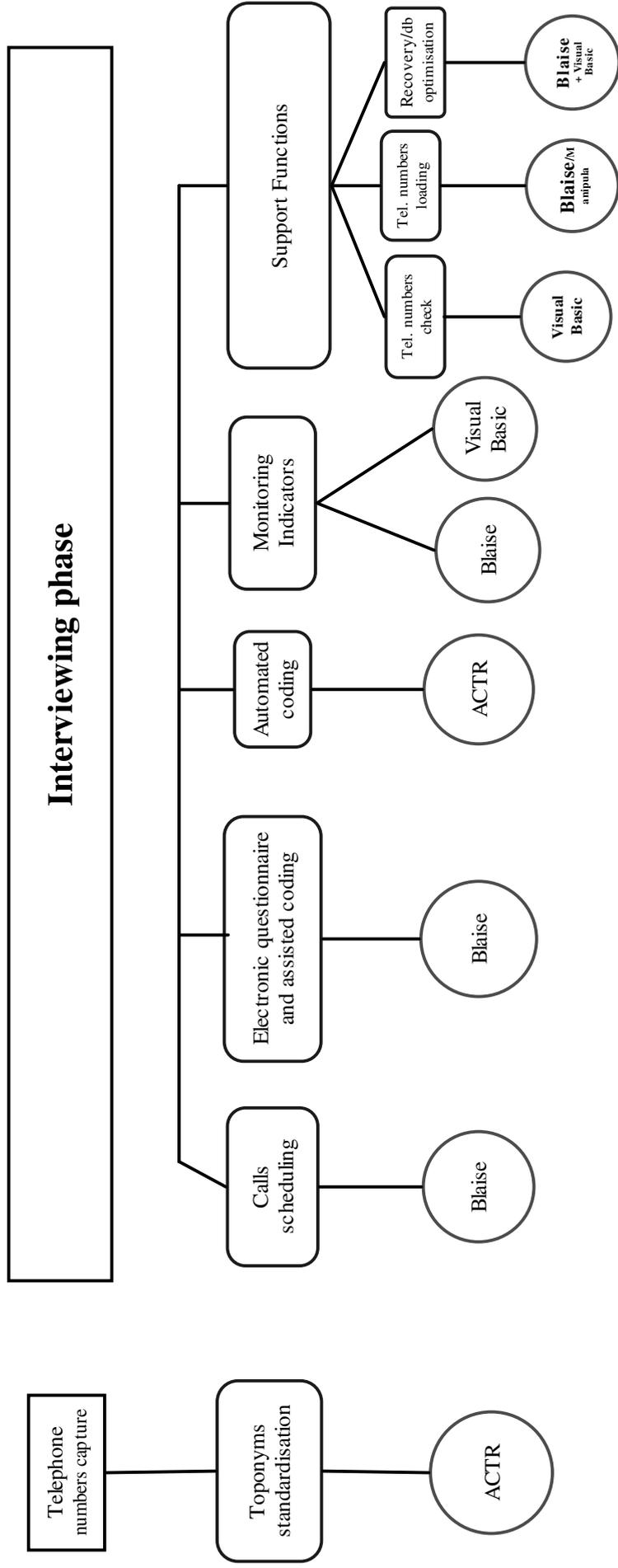
Being the first time this survey was carried on and the new strategy adopted, a pre-test was made, with the following purposes: *i*) testing the whole operating process (selection of sample units, matching with telephone numbers, training of interviewers, development of electronic questionnaire...), *ii*) testing the questionnaire, *iii*) estimating the long form interviews' length. Interviews were performed at Istat, in the CASIC (Computer Assisted Survey Information Collection) laboratory, for a four working days period, by four female interviewers chosen among internal employees.

Following the satisfying results of this test, the '*in house strategy*' was adopted for the full-fledge survey.

3. The integrated CATI application for the Birth Sample Survey

As it can be seen in Figure 1, the software application is composed of various modules for different functions, developed using different software packages.

Figure 1



In particular, the **first phase** concerns the improvement of matching between names and addresses of sample units, extracted from administrative registers, and telephone registers, in order to find telephone numbers. It must be said that the matching activity was delegated to the private company, but, as the results were not satisfactory, we thought to make the matching rate higher by standardising the toponyms¹, that were a very variable element in the address information. For this purpose, we adopted **ACTR** (**A**utomatic **C**oding by **T**ext **R**ecognition), a generalised system, developed by Statistics Canada and already used in Istat to code a certain number of variables. As a matter of fact, the main purpose of this software is the matching between the texts of variables captured through open-ended questions and the texts of an internal reference file, in order to assign a code of a predefined classification. As this matching phase is preceded by a text standardisation phase, we used this function to reconduct toponyms expressed in different ways (with synonymous or abbreviations) to the words used in telephone registers. Following this activity the matching rate grew up of 5%.

For the **interviewing phase** different software packages have been used, but **Blaise** has been adopted for the most important functions, like:

- the calls scheduling functions
- the development of electronic questionnaire
- the assisted coding
- the production of some indicators to monitor the interviewing phase
- the telephone numbers loading
- the recovery and the database indexes optimisation.

The combined usage of other software has been necessary mainly for two purposes:

- the production of a large set of indicators to monitor the interviewing phase
- the automatic coding of a complex variable.

3.1 Functions implemented with Blaise

3.1.1 Calls scheduling

For the calls management function the ‘CATI management’ of Blaise was adopted. All the potentialities were exploited, concerning:

- the random attribution of telephone numbers to interviewers
- the definition of different interviewers groups depending on the interview language (Italian or German)
- the routing back of appointments to the interviewers who took them
- the definition of *Parallel Blocks* to insert the call result during the interview (*Refuse*, *Interruption* and *Disconnected*). In these blocks we included variables, whose descriptions (in the ‘*type*’) allowed us to register the main causes of *Refuse* and *Interruption* and the kind of *Disconnected* (‘*not existent number*’, ‘*wrong number*’ and ‘*household moved to another address*’).

3.1.2 The electronic questionnaire

As already said, the electronic questionnaire is the core of the application and its quality constitutes the main reason for adopting the ‘*in house strategy*’.

¹ The toponyms represent the part of the address that specifies the type of street (i.e. street, route, road, etc.)

The *long form* version of the survey questionnaire has 212 questions, while the *short* version 79, but, after the interviewing phase, we estimated that the average number of asked questions was 110 with the *long* and 45 with the *short*.

The complexity is demonstrated by the checking plan: 195 checking rules have been defined for the *long form* and 63 for the *short*. These rules have been treated both in *soft* and *hard* mode (for instance, in the *long form* version, 101 rules are *soft* and 94 are *hard*).

A lot of other functions offered by Blaise have been used, so the questionnaire turned to be very flexible and user friendly, and the quality of captured data has been guaranteed:

- **data from an external administrative archive, concerning a certain number of variables, have been loaded in Blaise** to compare them with responses provided during the interview, in order to verify their correctness (for example: mother's and father's date of birth, parental status, etc.)
- **internal routines** have been developed in order to calculate the birth order of the sample baby and to re-compute the sample stratum of the unit according to the given answers
- the **assisted coding** function has been used for City/Municipality of birth and of residence and for Country of birth variables
- **don't know** and **refusal** attributes have been associated to the majority of variables
- **questions wording has been customised** according to already known administrative data or answers given to previous questions
- **standards in the screen management** have been defined in order to make the interviewer's job easier (for instance, different colours have been used for different purposes: **black** for texts to be read to the respondent, **green** for questionnaire sections titles and **red** for all the helping texts useful for interviewer but not to be read to the interviewed person)
- **error messages** have been identified by sequential numbers and error texts have been customised according to responses already given.

3.1.3 Telephone numbers loading

The sample units file is loaded in Blaise with **Manipula**, using the "*update*" instruction. As in this way we were not able to individuate duplicated keys, we had to make this check using a **Visual Basic** programme.

3.1.4 Utilities for recovery and database indexes optimisation

As it will be described in chapter '*Problems encountered*', after the first interviewing days it happened a lot of times that interviews were stopped due to Pc's freezing. It has been hard to overcome these problems, but one of the actions which contributed in solving them was to check daily the database status and to perform a database de-fragmentation.

This has been done by:

- running daily Hospital
- running daily Blaise to Blaise.

In order to make the management of the two procedures (Hospital and Blaise to Blaise) more user friendly, we created a **.WSH** file that execute them automatically and, after processing them, launches an e_mail message to the Istat informatics experts, concerning their normal or abnormal end.

3.2 Functions implemented with other software packages

3.2.1 Production of some indicators to monitor the interviewing phase

As far as **indicators** are concerned, we needed to keep daily under control different aspects, like:

- the productivity of interviewers
- the proceeding of contact results
- the number of sample units still at disposal and their movements from a stratum to another.

For this purpose, we prepared different tables aimed at monitoring these three main aspects of the survey:

- the productivity of interviewers
 - telephone contact results (daily and cumulative)
 - refusals causes (total and per interviewer)
 - definitive interruptions causes (total and per interviewer)
 - definitive interruptions per questionnaire section
 - interview length (total and per interviewer)
 - cumulative response and non response rates (total and per interviewer)
- the proceeding of contact results
 - last contact results distribution per type and time slice
 - last contact results distribution per type and per day of week
- the number of sample units still at disposal and their movements from a stratum to another
 - last contact results
 - number of sample units still at disposal (never contacted or already contacted)
 - no more available sample units (because the maximum number of contacts has been reached) or still available sample units classified per stratum
 - matrix of movements of interviews from a stratum to another.

The majority of these tables have been developed using **Visual Basic**, based on an Access database, which produces output Excel files, that can be easily managed by statisticians.

3.2.2 Automated coding

The other function implemented with another software is the automatic coding of Occupation. As a matter of fact, three variables were open-ended questions:

- City/Municipality of birth and of residence
- Country of birth
- Occupation

It was decided to code during the interview only the first two variables and not the third one, since its very complex classification would have dramatically increased

the interview length. Therefore the first two variables have been coded with the **Blaise coding function**, (respectively City/Municipality with the alphabetic search and Country with trigram search) while the third one has been processed at the end of the field-work in batch with **ACTR**, the already mentioned coding system.

4. The interviewing phase

4.1. The informatics architecture

As already said, according to this strategy, the interviews were performed by a private company.

The call centre devoted to this survey was composed of 57 clients (Pentium II with Windows NT) and 1 server (Pentium II, NT4 Service Pack 6 – 512 Mb Ram – 2 disks with 40 Gb each).

The physical structure of the network was the following one:

- 100 Mbit network
- Switch layer 3 Cisco
- Catalyst 3500, series XL
- Switch hub allied telesim
- Centre come FH824u
- LAN class G
- Domain server DSN

A CATI users profile Blaise application has been installed on the server PC, while all the clients had a link to the server. With this organisation, all the data were stored on the server, apart from two files, containing the classifications dictionaries used for assisted coding (*Lookup files*), which have been stored on the clients, because this solution guaranteed better performances.

4.2. The main CATI results of the survey

Interviews were made in three periods along 2002 (April – May, September – October, November - December).

In each period, almost 17,000 interviews were completed. The cumulative results are shown in Table 1, while the average number of completed interviews per hour by interviewers was 3 for the *Long* questionnaire and 5 for the *Short* version, with an average interview length of 13.4 minutes for *Long* and 6 for *Short* version.

Table 1: final contact results

Contact results	Short		Long	
	<i>nn.</i>	%	<i>nn.</i>	%
1) Concluded interviews	33838	68	16597	67
2) Disconnected	10937	22	5640	23
3) Refusals	1774	3.6	974	3.9
4) Definitively interrupted interviews	692	1.4	359	1.4
5) No more available sample units because the maximum number of contacts has been reached	2551	5.1	1327	5.3
TOTAL	49792	100	24897	100

These results are really satisfying and coherent with those obtained in other CATI surveys on households realised by Istat, apart from the too high percentage of wrong phone numbers, which depends on other elements that do not regard Blaise.

4.3 The impact of the usage of Blaise

The impact of the usage of Blaise was very positive from different points of view: that of statisticians, of developers and of the users.

As a matter of fact:

- the electronic questionnaire was really performing and the quality of captured data very high, thanks to the complex set of controls which could be inserted without making the interview too heavy
- the questionnaire was developed by programmers not already experienced in Blaise, which demonstrates that it is not so difficult to be trained in Blaise for a person who already has a programmer's experience, even if not for such a long time
- interviewers found the questionnaire very pleasant and had no problems in using a tool different from that they used in advance
- the response time after each 'enter' was very short and absolutely acceptable.

4.4 Problems encountered

A lot of problems have been encountered, but all of them were solved during the first interviewing phase.

In general, the first difficulties concerned the lack of a sufficiently structured information about the CATI management system and about the way contact results are stored: it has been necessary to perform some empirical trials in order to understand when a certain telephone number is proposed again and in which field of the Blaise database results are stored.

In particular, the main problems we faced were the following ones:

a) System freezing

During the first interviewing days it happened too frequently (more than once a day) that all the PCs (one after the other) froze. As it was not clear how it could happen, the first advice received by CBS was to change a **Windows parameter** (to put 'EnableOpLock' = 0) and to adopt the last Blaise release (4,5,3, build 692) in which a lot of possible freezing problems had been solved.

As this solution did not overcome the impasse, we followed the Westat advice to try to run a '**Blaise to Blaise procedure**' (after Hospital) in order to perform a database de-fragmentation.

Following the daily running of these two procedures (Hospital + 'Blaise to Blaise'), freezing did not happen anymore, but it is still not clear if and why it is necessary to execute daily 'Blaise to Blaise'.

Could it depend on the amount of data or on the network architecture?

In the first case it would be interesting to compare different experiences of Blaise questionnaires which produce very long records, while in the second case the characteristics of the network system on which Blaise is installed should be defined in details.

b) Creation of more history files

After the mentioned freezing, Blaise produced more than one history file, with different extensions (.bth(2), .bth(3)...). As nobody else apart from Blaise was

using the history file in those moments, we could not understand why these files have been produced.

c) Not enough flexibility in the updating of CATI parameters.

In this survey it was necessary to manage appointments in a different way depending on the time of calls.

As a matter of fact, interviews were conducted in the afternoon above all, while in the morning only appointments had to be dealt (apart from Saturday morning); therefore all the interviewers were working in the afternoon, while only a certain number of them were present in the morning. Consequently, it was considered an efficient solution for the afternoon to *route back* the appointments to the same interviewers who took them, while for the morning to '*route back to anyone*'.

What we noticed is that Blaise does not update the parameters values in the daybatch, thus managing the delivery of forms according to the previously stored set of parameters. So, to meet our needs, we had to treat the morning parameters manually using the '*treat form*' function.

d) System bugs

Some of the problems listed below were originally caused by our errors, whose consequences were unpredictable or were not pointed out by Blaise with ad hoc error messages.

- Lacking of an error message

A relevant problem was caused by the following action: as already said, we decided to run daily 'Hospital' + 'Blaise to Blaise' to solve our freezing problems. It happened that, due to an insufficient disk space, Manipula, in running the 'Blaise to Blaise' procedure, created a database containing less forms than the original one, causing the loss of a certain number of records.

We realised it only casually during the following interviewing day, and we had to immediately re-build a file containing all the missing information.

- Duplication of records in the day-batch file

In order to overcome the already mentioned not sufficient flexibility of the updating of CATI parameters, we solved manually the appointments management with the '*treat form*' module: the supervisor, after executing the *day-batch* each evening for the following morning, put value '*everyone*' in the field containing the interviewers' name to whom the appointment had to be routed back (*whomade*), after choosing the option '*call as soon as possible*'. This option was evidently wrong (we should have chosen that of appointment), but the further problem was that we observed that Blaise duplicated the form in the *day-batch file*: one concerning the original appointment and a second concerning '*call as soon as possible*'.

- Zero value in dialresult

In order to avoid the frequent wrong usage of a parallel block by interviewers, we forced the parallel block call with the following instruction:

```
if sez.Qinizio = no then catimana.caticall.regscalls[1]:= Nonresponse
```

As a consequence of this action, we obtained the attribution of a zero value to the 'dialresult' field and, as this value does not correspond to any call result, it created a certain number of problems to our application.

The Blaise technical support suggested us to use the field CALLRESULT and not REGSCALLS to execute this instruction, specifying that it is strongly recommended not to use the '*register of calls*'.

So, even if we made a mistake as we did not get sufficient information in advance, we wonder if it were useful to display a 'warning' saying that the field is not to be updated.

- Errors in assigning values to fields

If a mistake is made when assigning a value to a field, using (=) instead of (:=), each row of the program which follows this instruction is considered as the text of an error message.

This could be avoided by checking that an error message has always to be delimited by inverted comma.

e) PCs synchronization

We had some problems since sometimes not all the client pc's were synchronized.

In details, the problems we encountered were:

- a wrong delivery of forms
- a wrong sequence of dial results per phone number: concluded dial results (*Interview* or *Refusal*) were registered before not-concluded dial results (i.e. *Busy*, *Appointment*, etc.)
- 'Start time' of some phone contacts was postponed with respect to the relative 'End time'.

As all of the PCs read the same database on the server, we think it would be useful to perform the synchronization automatically.

In addition, when using the history file and the database to produce some reports, we observed that the contact time in these two files is not identical, because in the database it is 5 minutes rounded.

f) Access violation

During the data entry activity it sometimes appeared a message declaring an 'access violation', in different points of the interview. It has been possible neither to understand the reason of this message, nor to verify a cause common to all the moments this message has appeared.

g) Lack of information about the telephone contact during the interview

After leaving the "Make dial" screen and entering the data entry-program, Blaise does not provide any information about the contacted form. As a consequence, we created a .dll in DELPHI, able to make the display on the screen of the telephone number and the name of the contacted household, necessary to re-contact it when the line goes off.

h) Lack of synthetic information about interview length

If an interview is completed in more than one contact (for instance it is started, interrupted but not definitively and completed in a subsequent appointment), it is necessary to sum up the length of each contact if we want to know the total length of the interview. We think it would be useful, after the last definitive contact result, to store in an additional field the complete interview length

5. Consideration on the adoption of Blaise

Following this very important experience, reflections have been made in Istat on the feasibility of this new strategy and, above all, on the adoption of Blaise for a lot of CATI surveys planned in Istat.

The conclusion which has been drawn is very positive. The main items which made us think that it is worth going on are those already described in paragraph 4.3. In addition, we presume that all the mentioned problems faced during the first interviewing phase provided us with such an experience to prevent us from unpredictable situations in the future.

Consequently Istat decided to change its Blaise contract: we owned a simple licence for a certain number of developers and users and turned to a 'Corporate licence', so to be able to provide software for other surveys which could adopt this strategy, without having to face administrative and economic problems.

6. References

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