The CAI system of Statistics Norway

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1. Introduction

After nearly two years of planning and projecting Statistics Norway now is implementing its CAI system. The first course in the new technique for the interviewers took place in the middle of February this year. By August an interviewer staff of approximately 150 persons was operative, to relieve the old staff of cirka 250 persons. A rise in the number of working hours per year from approximately 300 to up to 800 will insure that as least as much interview work will be performed, on the whole. According to the scheme all interviewing on paper questionnaires will be abandoned from January 1 1996.

2. The technical point of view

The interviewers of the new staff are equipped with Toshiba T1910 CS laptop computers, with a 120 Mb hard disk and a color screen (passive matrix). The operating system of the computers is Windows 3.1. Each computer has an PCMCIA modem (14400 bps) for communication with the central office.

The interviewing part of the system is, so far, constituted by Blaise 2.5, which has been used by Statistics Norway since 1990. The communication part of the system is a slightly modified version of Microsoft Mail version 3.2. The modifications consist of facilities to receive interview tasks on the laptops and to return interview data. These facilities work nearly automatically, on a «push one button» basis. The regular functions of the MS Mail are not influenced by the modifications and offer very good opportunities for communication with the interviewers. The interviewers can also communicate among themselves through the mail system. It is presupposed that all regular communication with the inter-viewers shall go through MS Mail from 1996. As the telephone rates in Norway are far cheaper than the postage, this will help in paying back some of the costs for the equipment and in making the CAI system economically sustainable(!!).

One of the main concerns of the project has been to utilize standard «shelfware» programs which could be modified to suit our needs, rather than becoming dependent on solutions programmed especially for the task. The combination of Blaise and Microsoft Mail offers most of the facilities we need to be able to manage interview projects with a decentralized staff of interviewers. Interview projects are distributed to the interviewers as «special» messages in Microsoft Mail. A facility built into Microsoft Mail takes control over these messages and puts the projects in their right place, according to instructions contained in the messages. The same facility is utilized to send more respondents to an interviewer, for instance in cases of transfer of respondents between interviewers.

Every evening after completing their interviewing work, the interviewers start another in-built facility of Microsoft Mail that «snoops» around the hard disk, collects all completed interviews, compresses and encrypts these data and attaches them to a message of the special type. In one operation this facility searches all interview projects for completed data. If needed this facility can easily be instructed from our central office to collect **all** data from the Blaise systems, whether completed or not.

The facilities built into Microsoft Mail all consist of two parts, an interface to the mail system, programmed in Visual Basic, and an interface to the Blaise part, consisting of MS-DOS bat-files and DOS
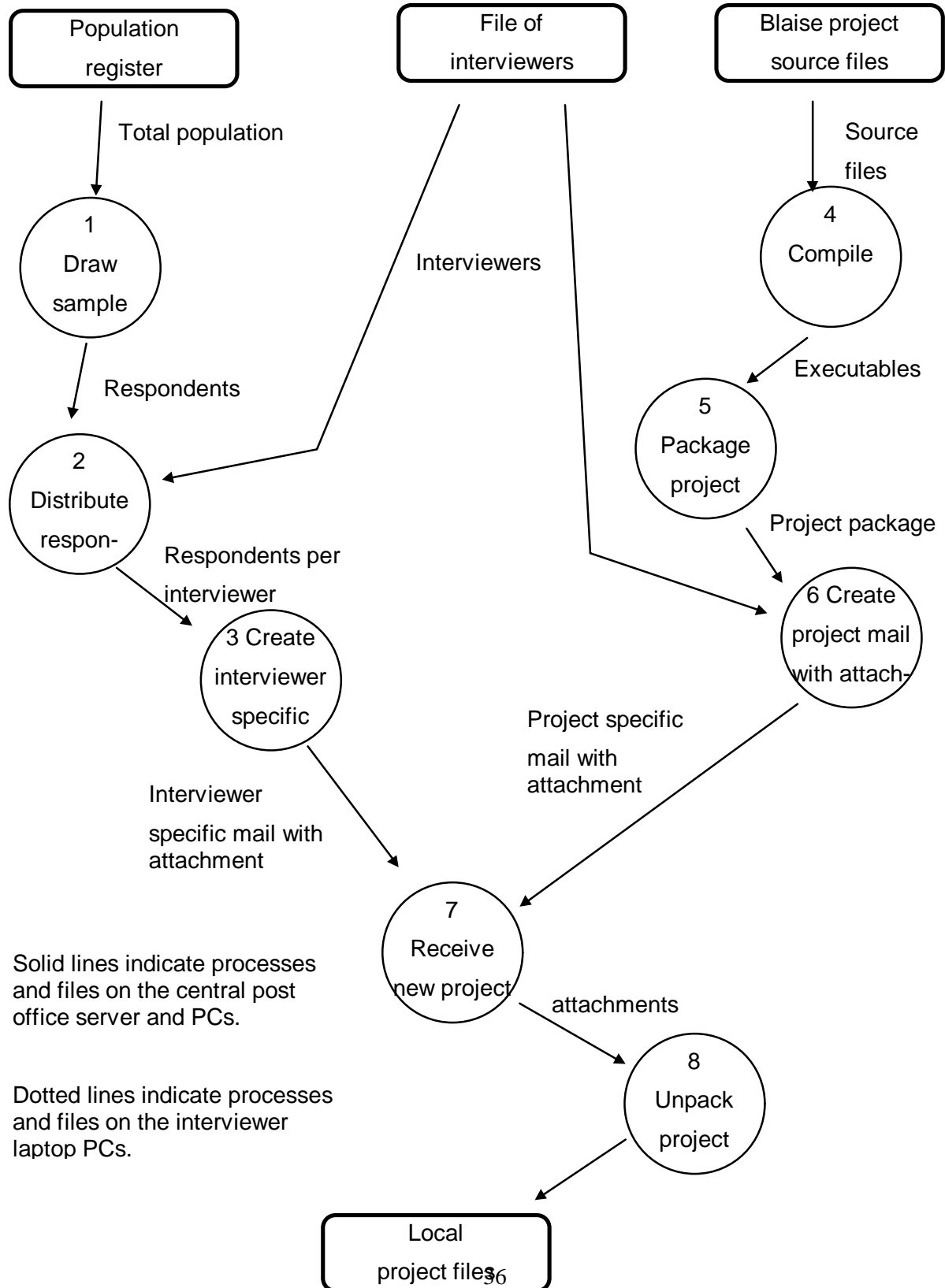
programs compiled with Turbo Pascal. As Statistics Norway for the present do not possess the necessary expertise in Visual Basic, the Visual Basic part has been bought from a firm that delivers software solutions. The interface to the Blaise part, however, has been made in-house.

The development of the decentralized part of the system has been completed according to the time schedule for project. Regrettably, this is not due to us having psychic powers as project planners. As usual in projects of this size we have used more hours than planned for ahead. To balance the schedule, it has been necessary to postpone the development of the central administration part of the system. This task will be a main concern for us next year. In the meantime we have to manage the projects in more primitive ways.

In the trainng period, from February to August this year, a number of smaller surveys has been conducted on the laptops. The main objectives have been to exercise the interviewers and test our system. The testing has pointed out to us some parts of the laptop system that should be improved. The part that mostly needs improvement, is the decentralized respondent management part. As it is now the projects are managed individually, with no synchronisation between them. In periods with more surveys being conducted at the same time, the interviewers may experience some problems with double booking appointments with the respondents of the surveys. We need to develop a system that can manage all the respondents of an interviewer in an integrated way, no matter how many surveys they belong to.

As you will have understood by now, we do not believe our system to be the perfect solution. On the other hand, one might wonder what the perfect solution should look like? Probably the mixing of MS-DOS and Windows is the greatest weakness of our system. The mixing of these two systems seriously limits the possibility for integration of the different software parts. Windows alone would offer a nicer and more uniform user interface than our present system. You may ask why we did not go for a consistent MS-DOS system. The reason is that we anticipate Windows to become the prevailing programming environment in the future, and we thought we could just as well get used to the idea already now. So you will understand that we are looking forward to a Windows version of Blaise. Then our interviewers will be prepared and ready for the task.

Dataflow from Statistics Norway to the interviewers

Population register

File of interviewers

Blaise project source files

Total population

Source files

1 Draw sample

4 Compile

Interviewers

Respondents

Executables

2 Distribute respon-

5 Package project

Respondents per interviewer

Project package

3 Create interviewer specific

6 Create project mail with attach-

Project specific mail with attachment

Interviewer specific mail with attachment

7 Receive new project

Solid lines indicate processes and files on the central post office server and PCs.

attachments

Dotted lines indicate processes and files on the interviewer laptop PCs.

8 Unpack project

Local project files

36

3. Computer assisted payroll system

The transition to computer assisted interviewing has had consequencies for certain administrative routines as well. Earlier the interviewers filled in a special paper form with the necessary information for paying their wages and rembursing their expenses. The transition to computer assisted interviewing has made it possible to simplify this process in two ways. Firstly, much of the information needed for payroll work is now coded into the interview data returned from the interviewers, for instance time spent on each interview, type of interview (telephone or personal visit). Secondly, instead of filling in the paper form the interviewers now every evening complete a tiny «interview» with themselves, where data concerning their work that day and possible expenses are specified. These data are returned to the central office in the same way as data from regular interviewing projects, and thereafter enter the payroll system of Statistics Norway.

4. Recruitment and training of the new staff

Approximately 65 percent of the interviewers have been recruited from the old «manual» interviewer staff. The old staff had a slightly skewed distribution between the sexes with 57 percent women. The new staff has roughly the same distribution with 54 percent women.

The average age in the old staff was 49 years; 48 years for the women and 51 years for the men. The same average holds for the members of the old staff that have joined the new staff. There is no tendency for the older interviewers to drop out in the confrontation with the new technique.

The average age of the newly recruited interviewers is 40 years across the sexes, i.e. about 10 years lower than the average of the old staff. There is a more pronounced difference between the sexes as well: The average age is 37 years for the women and 45 years for the men.

5. Training

To be able to use the new equipment, the interviewers were given two courses of two days each. The first course concentrated on teaching basic Windows and some communication. The second course concentrated on the modifications of the MS Mail and on interviewing with Blaise. Between the two courses there was a period of two to three weeks. In this period the interviewers were given some home-work to exercise what they had learnt and to familiarize themselves with the computers. There was a homework period after the second course as well. Shortly after this period the interviewers were assigned to interview projects.

The courses were planned and carried out as a sequence of theoretical plenary sessions and practical group sessions where the theory from the plenary sessions were practised. The duration of a typical session was 45 minutes, succeeded by a 10-15 minutes' pause. As course sites were chosen hotels in 4 different towns in Norway.

The teaching staff consisted of 6 persons, 3 main teachers who were responsible for the plenary sessions and 3 assistant teachers who supported during the practical group sessions. Four teachers (2 main + 2 assistants) were assigned to each course. The average number of participants for each course was 17. For the practical group sessions the participants were split into two groups. The plenary sessions were per-formed by two teachers, and each group was served by one main teacher and one assistant. The

atmosphere during the sessions was kept as informal as possible to encourage initiative and cooperation from the participants, and to turn the edge of possible «datafobia»

The most important part of the teaching equipment, apart from the laptops, was a video projector purchased for the occasion. With this projector it was possible to project the laptop screen, in colours, to canvas screens of 2x2 meters and bigger. The projector was of tremendous help during the plenary sessions.

6. Background and expectations

Before the courses started the participants answered a questionnaire (the **pre** questionnaire, on paper) surveying their background and expectations for the course and their future work. A similar questionnaire (the **post** questionnaire, computer assisted) was filled in when they had completed their course. As the last course before summer (the eighth) was concluded in the middle of June this year, we have not yet had time to analyze properly the data from the questionnaires. Instead we aim to present some of these data at the conference in September. In this article we include some preliminary data from the **pre** questionnaires. The tables are based on the answers from the 7 first courses, 120 persons in all.

Table 1 shows that the male interviewers were much more accustomed to computers than the female ones. While as much as 48 percent of the men used computers at least weekly, the same was true for only 39,4

Percentages	Absolute numbers	Total %	**Frequency of computer usage**					
			Never	Once a month or less	Every second week	Weekly	Daily	Missing
Total women....	68	100,0	48,5	14,7	5,9	13,2	16,2	1,5
Age groups								
20-29	7	100,0	28,6	42,9	–	28,6	–	–
30-39	18	100,0	55,6	5,6	11,1	16,7	11,1	–
40-49	17	100,0	52,9	11,8	5,9	11,8	17,6	–
50-59	20	100,0	40,0	15,0	5,0	10,0	25,0	5,0
60+	6	100,0	66,7	16,7	–	–	16,7	–
Total men......	52	100,0	19,2	15,4	13,5	11,5	36,5	3,8
Age groups								
30-39	9	100,0	11,1	–	33,3	22,2	22,2	11,1
40-49	18	100,0	11,1	16,7	11,1	16,7	44,4	–
50-59	17	100,0	29,4	29,4	11,8	5,9	23,5	–
60+	8	100,0	25,0	–	–	–	62,5	12,5

Table 1: Frequency of computer usage

38

percent of the women. Nearly half the women and one fifth of the men had never used a computer!

Table 2 shows the same fact from another angle: While not even half the women had attended a computer course, nearly three quarters of the men had done so. The men were also more acquainted with Windows

Percentages	Total	Attended a computer course		Used Windows before		
		Yes	No	Yes	No	Missing
Total women	100,0	45,6	54,4	41,2	55,9	2,9
20-29	100,0	71,4	28,6	71,4	28,6	–
30-39	100,0	44,4	55,6	61,1	33,3	5,6
40-49	100,0	47,1	52,9	35,3	64,7	–
50-59	100,0	40,0	60,0	30,0	65,0	5,0
60+	100,0	33,3	66,7	–	100,0	–
Total men	100,0	71,2	28,8	69,2	28,8	1,9
30-39	100,0	88,9	11,1	77,8	22,2	–
40-49	100,0	61,1	38,9	72,2	27,8	–
50-59	100,0	70,6	29,4	70,6	23,5	5,9
60+	100,0	75,0	25,0	50,0	50,0	–

Table 2: Attended a computer course & Used Windows before

than the women. For the latter variable there is a clear correlation with the age of the interviewers as well.

The participants of the courses were optimists - at least when they filled in the **pre** questionnaires, as table 3 shows. There is no discernible difference between the sexes for this variable, but the older participants

Percentages	Total	It is hard to learn to use a PC			
		Mostly true	Neither	Mostly false	False
Total women	100,0	2,9	19,1	58,8	19,1
20-29	100,0	-	-	71,4	28,6
30-39	100,0	-	-	72,2	27,8
40-49	100,0	-	41,2	47,1	11,8
50-59	100,0	10,0	20,0	60,0	10,0
60+	100,0	-	33,3	33,3	33,3
Total men	100,0	-	21,2	61,5	17,3
30-39	100,0	-	11,1	66,7	22,2
40-49	100,0	-	11,1	72,2	16,7
50-59	100,0	-	35,3	58,8	5,9
60+	100,0	-	25,0	37,5	37,5

Table 3: It is hard to learn to use a PC

are somewhat more reserved than the younger ones.

With regard to the question whether PCs will make the interviewer job more easy or difficult (table 4), it is interesting to note that about 40 percent of the interviewers don't take a stand on the question. We were

Percentages	Total	PCs make the job more easy or difficult				
		More easy	More dif- ficult	Neither	Don't know	Mis- sing
Total women	100,0	52,9	4,4	20,6	20,6	1,5
20-29	100,0	85,7	–	14,3	–	–
30-39	100,0	66,7	–	–	27,8	5,6
40-49	100,0	47,1	5,9	35,3	11,8	–
50-59	100,0	30,0	10,0	30,0	30,0	–
60+	100,0	66,7	–	16,7	16,7	–
Total men	100,0	51,9	5,8	36,5	5,8	–
30-39	100,0	66,7	11,1	22,2	–	–
40-49	100,0	44,4	–	50,0	5,6	–
50-59	100,0	58,8	11,8	29,4	–	–
60+	100,0	37,5	–	37,5	25,0	–

Table 4: PCs make the job more easy or difficult

may be not good enough to sell the concept in advance?

As table 5 shows the interviewers seem to have a stronger faith in the properties of computerized interview systems when it comes to securing that correct information is entered during the interviews.

Percentages	Total	More difficult to correct errors on a PC			
		Mostly true	Neither	Mostly false	False
Total women .	100,0	–	13,2	61,8	25,0
20-29	100,0	–	–	71,4	28,6
30-39	100,0	–	11,1	44,4	44,4
40-49	100,0	–	23,5	58,8	17,6
50-59	100,0	–	15,0	70,0	15,0
60+	100,0	–	–	83,3	16,7
Total men ...	100,0	1,9	19,2	38,5	40,4
30-39	100,0	11,1	11,1	22,2	55,6
40-49	100,0	–	22,2	44,4	33,3
50-59	100,0	–	17,6	47,1	35,3
60+	100,0	–	25,0	25,0	50,0

Table 5: More difficult to correct error on a PC

Professional esteem is an important issue in all professions, and not least for the interviewers. For an interviewer the respondent's attitude towards her or him may constitute the difference between an interview and a refusal. Table 6 shows that the interviewers do not feel certain in this matter. There is a

Percentages	Total	**PCs increase interviewers' reputation**					
		True	Mostly true	Neither	Mostly false	False	Mis-sing
Total women .	100,0	4,4	19,1	50,0	23,5	2,9	–
20-29	100,0	–	42,9	57,1	–	–	–
30-39	100,0	5,6	27,8	61,1	5,6	–	–
40-49	100,0	5,9	11,8	52,9	23,5	5,9	–
50-59	100,0	5,0	10,0	40,0	40,0	5,0	–
60+	100,0	–	16,7	33,3	50,0	–	–
Total men ...	100,0	5,8	26,9	46,2	15,4	3,8	1,9
30-39	100,0	11,1	33,3	44,4	11,1	–	–
40-49	100,0	11,1	38,9	33,3	16,7	–	–
50-59	100,0	–	17,6	47,1	17,6	11,8	5,9
60+	100,0	–	12,5	75,0	12,5	–	–

Table 6: PCs increase interviewers' reputation

tendency that the younger interviewers are more optimistic than the older ones, and the men are a trifle more convinced than the women.

In view of this it is no surprise that the majority of the interviewers do not feel certain as to what the attitude of the respondents will be towards being interviewed with computers (table 7). The women are, on the average, somewhat more concerned than the men, and the older ones tend to be less enthusiastic

Percentages	Total	**Expected respondent reaction to the PCs**				
		Posi-tive	Nega-tive	Neither	Don't know	Mis-sing
Total women .	100,0	22,1	8,8	27,9	38,2	2,9
20-29	100,0	42,9	–	42,9	14,3	–
30-39	100,0	33,3	11,1	11,1	44,4	–
40-49	100,0	17,6	–	35,3	47,1	–
50-59	100,0	10,0	15,0	25,0	40,0	10,0
60+	100,0	16,7	16,7	50,0	16,7	–
Total men ...	100,0	19,2	3,8	51,9	25,0	–
30-39	100,0	22,2	11,1	66,7	–	–
40-49	100,0	27,8	–	50,0	22,2	–
50-59	100,0	11,8	5,9	52,9	29,4	–
60+	100,0	12,5	–	37,5	50,0	–

Table 7: Expected respondent reaction to the PCs

than the younger ones.

The previous questions have shown that the interviewers were looking forward to learn to use and to use the computers as a tool in their work, though they were not equally convinced that the respondents would feel the same way. A major question, then, was how they summed up these loose ends to themselves before the start of the course; in other words a question about their motivation for the job. Table 8 shows

Percentages	Total	**PCs make the work more interesting**				
		True	Mostly true	Neither	Mostly false	False
Total women .	100,0	20,6	39,7	32,4	5,9	1,5
20-29	100,0	42,9	14,3	42,9	–	–
30-39	100,0	27,8	33,3	38,9	–	–
40-49	100,0	17,6	47,1	17,6	11,8	5,9
50-59	100,0	5,0	40,0	45,0	10,0	–
60+	100,0	33,3	66,7	–	–	–
Total men ...	100,0	23,1	36,5	32,7	7,7	–
30-39	100,0	11,1	55,6	33,3	–	–
40-49	100,0	27,8	38,9	22,2	11,1	–
50-59	100,0	23,5	35,3	29,4	11,8	–
60+	100,0	25,0	12,5	62,5	–	–

Table 8: PCs make the work more interesting

that about 60 percent of the interviewers expect their work to become more interesting with computers, while about one third don't think the computers will make any difference. It is a bit worrying, though, that about 10 percent of the age group 40-59, for both sexes, expect their work to become less interesting.

We want to repeat that the tables above are based on questionnaires filled in before the courses started. It will be interesting to see if the viewpoints of the interviewers have changed during the courses. We will return to this question at the conference in September.