

A NOTE ON TRANSMITTAL OF SPECIFICATIONS AND COMMUNICATIONS BETWEEN SUBJECT-MATTER AND PROCESSING SPECIALISTS

by the Central Bureau of Statistics of Norway

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1. Organization

This note on transmittal of specifications and communications between subject-matter and processing specialists in a statistical bureau is prepared with particular reference to the procedures being used in the Norwegian Central Bureau of Statistics in connection with the 1970 Population Census.

The Norwegian Bureau is relatively small with a permanent central staff about 400 persons. The number of actual projects is usually about 300. A high proportion of these is normally in the stage of being planned or revised. Since the extent of the preparatory work in connection with a survey or a census is almost independent of the size of the population to be investigated, the planning and preparatory work require relatively more of the staff in a small than in larger statistical bureaus.

To satisfy the requirement to efficient planning of the projects and efficient utilization of the staff, we have found it necessary to specialize our staff by the different functions in the process of carrying out a statistical investigation, and to organize the specialists in functional groups within which we can obtain a satisfactory professional interchange of experience.

The objectives of the 1970 Population Census in Norway are:

- 1) to give a detailed description of the population structure at the census date
- 2) to be a basis for checking the coverage and content of the central population register, and
- 3) to be starting point for extended current registration of new characteristics.

A number of groups of "specialists" are concerned in the planning and discussion of the census specifications. The most important groups in this connection are listed in table 1.

Table 1. Groups concerned in planning and discussion of census specifications

Name of the group	Symbol
Director of the Bureau	D
Project committee	P
Population statistics division	F
Register division	R
Data processing systems division	S
Machine operations division	M
Printing office	H
Administration division	A

The Director approves specifications and takes the final decisions. The Project committee is composed by representatives of subject-matter and data processing specialists, and is the only group which is organized particularly for the census project at the planning stage. The Population statistics and Register divisions represent the subject-matter specialists in the census work. The Population statistics division serves also as the coordinating group for the population census activities. The next three groups represent processing specialists in the usual sense. Finally, the Administrative division takes care of the specifications of budgets, etc. These and other groups have also different operational tasks in the collection, processing and presentation stage of the census which are not discussed in this note.

## 2. Specification of a census

The specification of a census has three aspects, i.e. the specification of statistical requirements, the operational specification and the specification of the resources needed for carrying out the census.

The statistical requirements are derived from the needs and demands of the users and may be divided into several components specified by different groups as shown in table 2.

Table 2. Statistical specifications by specifying group

Specification of	Specialist group		
	P	F	R
Objectives	x		
Tables, analyses and publications		x	
Registers and files			x
Questions and list of variables		x	
Quality		x	
Time schedule		x	

The objectives of the census are discussed and formulated by the Project committee. The specification of these is in rather wide terms. The specification of the types of results wanted is the responsibility of the Population statistics division. This division drafts the framework of the tables and publications aimed at. Also special plans for analytical utilization of the census data, are specified by this subject-matter group. The second kind of results, are the registers which are planned to be derived from the census. The specification of their characteristics as well as the specification of the census data as a part of the total population data file is made by the Register office based on the different needs for data to extend the current statistics. From these wanted census results, the Population statistics division works out the list of necessary questions. Certain quality requirements, e.g. those which the editing operations are based on, are as well specified and the time schedule is derived from a network diagram by the Population statistics division.

The different operations needed for carrying out the census according to the statistical specifications and the groups responsible for their specification is shown in table 3.

Table 3. Operations by specifying group

Specification of	Specialist group			
	F	R	S	H
Collection	x	x		
Coding and manual editing	x			
Transcription to machine media			x	
Automatic editing			x	
Computation and tabulation			x	
Printing			x	x
Filing of data on machine media			x	

This table indicates that the subject-matter specialist groups also participate in the specification of certain operations, particularly those which concern collection and standardization of data. The system specialists take care of the specification of the data transcription to machine media, automatic editing, computation, tabulation and filing processes while the printing specialists and the system specialists work out together the specification for the printing operations.

The third aspect of the census specifications is the preparation of the legislative basis and the calculation of the resource requirements. The responsibilities for this are indicated by table 4.

Table 4. Legislative and resource basis by specifying group

Specification of	Specialist group					
	F	R	S	M	H	A
Legislation	x					x
Personnel	x	x	x			
Equipment			x	x	x	
Office space						x
Budget						x

The complete specification of census is a large and extensive team work of a number of participating specialist groups. In a statistical bureau organized like the Norwegian, the census project is, however, only one among many tasks these groups are working on. This creates a relatively larger communication problem than we would have had if we could afford to select a team of specialists and organize them all in a census office with the census as their only responsibility.

### 3. Communication of specifications

The different specifications of a census are transmitted along a number of communication channels between the specialist groups. We may distinguish between two types of channels, two-ways and one-way communication channels. The two-ways channels are used for transmitting a specification for discussion, comments, supplementation, etc. to another group. The one-way channels are used for transmitting approved specifications for information or instruction to other groups. The communication media transmitted are office memoranda. In the two-ways channel situation the memoranda are frequently discussed in subsequent meetings between the groups.

In the following tables the channels used for transmittal of specifications are represented by communication chains which always start with the specifying groups and which contain links,  $\longleftrightarrow$  and  $\longrightarrow$ , to indicate two-ways and one-way channels, respectively. The system may be divided into three subsystems.

Table 5. Communication of statistical specifications

Specification of	Communication channels
Objectives	P $\longleftrightarrow$ D $\longrightarrow$ F, R
Tables, etc.	F $\longleftrightarrow$ P $\longleftrightarrow$ D $\longrightarrow$ S, H
Registers, files	R $\longleftrightarrow$ P $\longleftrightarrow$ D $\longrightarrow$ S
Questions	F $\longleftrightarrow$ R $\longleftrightarrow$ P $\longleftrightarrow$ D $\longrightarrow$ S, H
Quality	F $\longrightarrow$ S
Time schedule	F $\longleftrightarrow$ P $\longleftrightarrow$ D $\longrightarrow$ R, S, M, H, A

Table 5 shows the first subsystem and indicates that the major specifications, such as objectives, tables, registers, questions and time schedule, are discussed by the Project group and approved by the Director. After the approval the other implied groups are informed about the specifications. This system is characterized by a high proportion of two-ways traffic indicating the need for discussions of the main specifications. Of course, informal contact is frequently established in addition to the above "official" channels, and the final specification will usually be more or less known to the receiving groups.

Table 6. Communication of operational specifications

Specification of	Communication channels
Collection	F $\longleftrightarrow$ R $\longleftrightarrow$ P $\longleftrightarrow$ D $\longrightarrow$ S, H
Coding and manual editing	F $\longrightarrow$ R, S
Transcription to machine media	S $\longrightarrow$ M
Editing	S $\longrightarrow$ M
Calculation/tabulation	S $\longrightarrow$ M
Printing	H $\longleftrightarrow$ S $\longrightarrow$ M
Filing of data on machine media	S $\longrightarrow$ M

Table 6 indicates the channels of the second subsystem for communicating operational specifications. Since the operational specifications must be in accordance with the statistical specifications there is less need for discussions and a larger proportion of the communication channels is of the one-way traffic type. In this subsystem the technical groups will be more dominating than in the first one. The Director and the Project group are only communicated in connection with collection procedures because the collection operations concern the public as well as a large number of agencies outside the Bureau. The Systems division and the Printing office are informed about the collection operations because of the design of processing routines and preparation of the final questionnaire. Coding lists and instructions including manual editing are prepared by the Population statistics division, and Register and Systems divisions are informed. Data transcription, automatic editing, calculation, tabulation and filing routines are designed by the Systems division and transmitted to the Machine operations division. Printing operations are specified by the Printing office with assistance from the Systems division to solve the problems of automatic preparation of tables ready for direct reproduction and printing.

Legislation and resources require the attention of the Director. As indicated by the channels of table 7, the Director discusses all these specifications. While the Administration division is implied in neither specification nor communication in the two previous systems, it plays a central

Table 7. Communication of legislation resource specifications

Specification of	Communication channels
Legislation	F $\longleftrightarrow$ A $\longleftrightarrow$ D
Personnel	F $\longleftrightarrow$ D $\longrightarrow$ A
	R $\longleftrightarrow$ D $\longrightarrow$ A
	S $\longleftrightarrow$ D $\longrightarrow$ S, M, H, A
Equipment	M $\longleftrightarrow$ S $\longleftrightarrow$ D $\longrightarrow$ A
Office space	A $\longleftrightarrow$ D $\longrightarrow$ F, R, S, M, H
Budget	A $\longleftrightarrow$ D $\longrightarrow$ F, R, S, M, H

part of this third subsystem. It participates in the formulation of the legislative basis for the census, receives the personnel specifications and from these derives the needed office space requirements. Based on all the resource specifications, it also formulates the budgetary implications of the census.

#### 4. Standard specifications and training

There may be errors in the specifications resulting in misinterpretations. One type of errors may be caused by unprecise, inadequate, or incomplete specifications by the specifying groups. A second type of errors may occur because precise specifications are misunderstood by the receiving groups.

One way of fighting these errors is to establish standards for the formulation of the different specifications instead of leaving each specification to the individual specialist's manner of expressing himself. Certain standard rules and forms have been developed for the specification of tables, list of variables, certain operations, resource calculation and time schedules. These help the specialists to make their specifications complete and uniform.

Systematic training of the staff, particularly that part of the staff which has little or no previous training in statistical methods, is another way to keep the second type of errors within a level which can be tolerated. In the Norwegian Bureau, regular training courses are therefore given and supplemented with additional instructions for projects which are of particular importance or deserve special attention.

#### 5. Final remarks

The system of specifications and communication outlined requires probably more paper-work and communication of written information than would have been necessary in an organization with all census activities in a census office. One advantage is, however, that a rather complete documentation of the census specifications is obtained as a by-product.