

**United Nations Expert Group Meeting on  
Contemporary Practices in Census Mapping and  
Use of Geographical Information Systems  
29 May-1 June 2007  
United Nations, New York**

**Methodological Principles of the  
2000 Population and Housing Census Mapping Process\***

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## **METHODOLOGICAL PRINCIPLES OF THE 2000 POPULATION AND HOUSING CENSUS MAPPING PROCESS**

### **Background**

The Population Census 2000 was the first census in Latvia since the regaining of its independence. The aim was to obtain full-scale, unbiased information on the number, composition, occupation, dwelling, source of income, and other census Programme indicators for each city and parish. This would serve to monitor any situation where economic situation, structure of population and demography had drastically changed particularly due to the fact that it has been 11 years since the previous census was conducted in 1989.

Preparatory work for the census was started immediately after the Cabinet of Ministers issued Regulations No. 31 "On Preparatory Work for the Regular Population Census", in compliance to which the Central Statistical Bureau was commissioned to prepare and conduct the regular census of the population. Regulation No. 165 (11 May, 1999) of the Cabinet of Ministers specified the census date indicating that all information has to be collected and compiled pursuant to the situation on 31 March, 2000.

On 16 December, 1999, the Saeima (Parliament) adopted the Law on Population Census. This law provided for a strong legal basis for the 2000 Population Census. Pursuant to the recommendations of international organisations and of the experience of other European countries, the Law envisaged that all resident population have to be recorded in the census - natural persons registered in the Residents' Register, as well as those natural persons who are not, have to be registered. The Law indicates that information characterising individuals and dwellings of the mentioned persons has to be collected and compiled in the census.

In compliance with the task set by the Cabinet of Ministers, a Government Commission was developed to administer the preparatory work for 2000 Population Census. It has greatly contributed in solving various issues in the preparation of the 2000 Population Census and has supported the Central Statistical Bureau in the organising and conducting of the most important statistical activity of 2000.

### **Data collection and processing methods**

The methodology of the census and the range of questions included were developed in compliance with the recommendations of the UN Economic Commission for Europe (ECE) and the Statistical Office of the European Communities (Eurostat), as well as the requirements set forth by state and local governments and other data users.

For data collection, several different methods were suggested that include:

- 1. Enumerators
  - ❖ Face-to-face interviews by residence
  - ❖ Distribution and collection of census questionnaires by enumerators, (help if needed for filling out questionnaires)
  - ❖ Census questionnaires sent out by post, (filled in by recipients) and collected by enumerators
- 2. Mail-out, mail-back- Census questionnaires are sent out by post, and sent back to the statistical office by mail
- 3. Combined methods
  - ❖ Administrative data + enumerators
  - ❖ Administrative data + mail-out, mail-back method

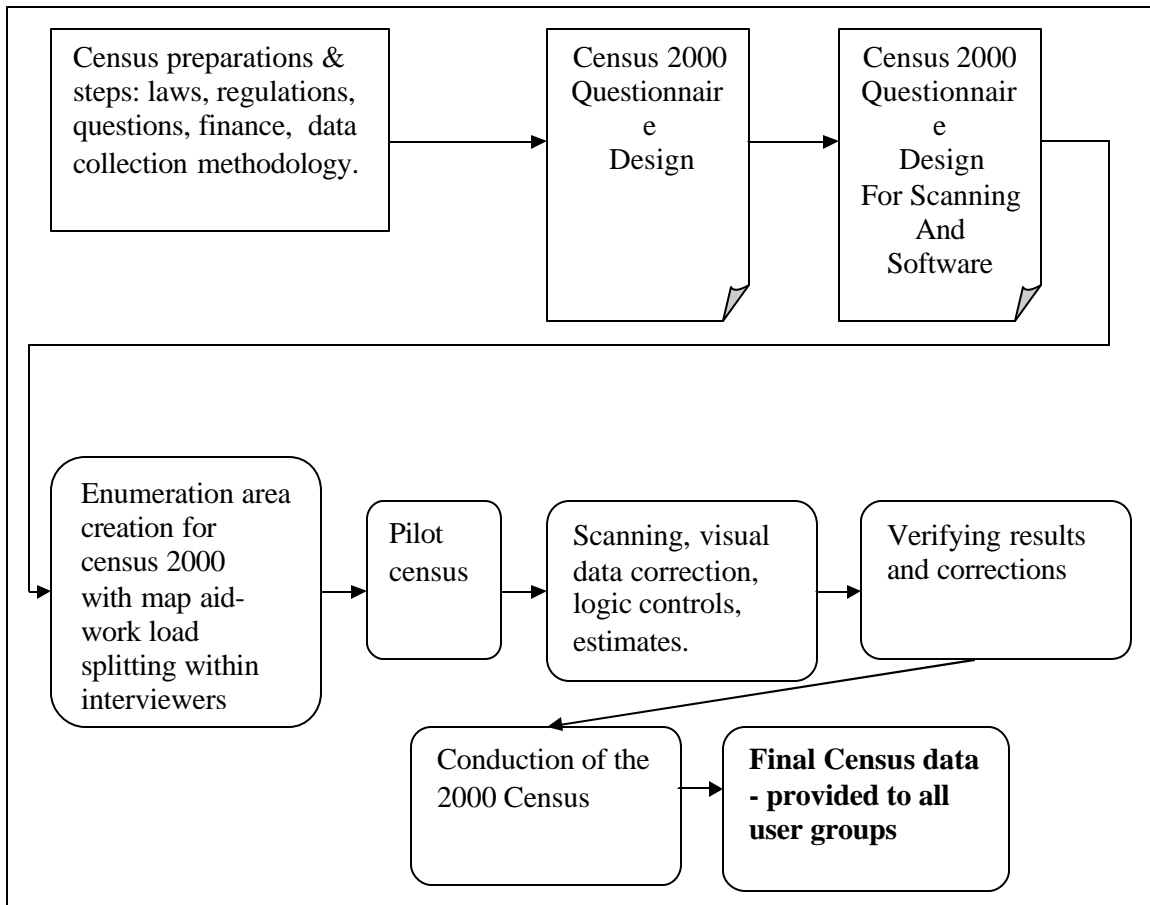
- 4. Census programme, which is fully ensured by the information stored in administrative data sources
- 5. Scanning
- 6. GIS solution for interviewers work

After the several discussions, administrative data + enumerators and the scanning process was selected.

Why not a GIS based census?

The Central Statistical Bureau was aware of the usefulness of a GIS based method, but in that time, it was not possible to realise due to the following reasons: Information Technologies were at very low level in Latvia; addresses were not assigned to coordinates and about 5% of addresses were incorrect, digital maps had unknown precision, maps from the time of the USSR remained in use, limited time to fix problems, GIS was a new development and consultants were costly; money was partly provided by the EU, putting restriction on hardware and software selection (we were recommended to choose software and hardware produced in Europe). Taking into account the amount of money for the project, the GIS-based method was not used and the scanning method was chosen.

Census 2000 work flow



Creation of the enumeration area

This part is possible through the use of GIS but mentioned above it was not possible at that time.

In our case, for the purpose of the 2000 census, we used the map of Latvia and information from administrative data sources (Population register). From the population register data a data table was created, which provided information on the number of people per address. Based on this information, the map of Latvia was split into enumeration areas. Persons involved in this splitting counted individuals from the population register by nearest street until a specified amount was reached. For example, at Riga, the limit was 700 people. The picture below is an example of the map used for the Riga census district enumerators with the different colours representing different enumeration area.



### **Testing and data collection**

In order to verify different methods of data collection, the comprehensibility of the census questions, responsiveness of the population, and to test the data processing equipment, machinery, and software used for potential census data, two pilot censuses were carried out in 2 towns in Latvia -Ligatne and Sabile. One in 1997, and one in 2 parishes in 1999 in Riga (Dobele pagasts in the district of Dobele and Leimani pagasts in the district of Jekabpils). Each of these pilot censuses involved approximately five thousand personnel.

Before the census started on 31 March, 2000, the machinery necessary for data collecting and processing was gathered and the corresponding software was purchased. It required scanners for questionnaire processing and creation and computer equipment.

Information was collected by carefully chosen, well trained enumerators, who visited individuals at their place of residence during the period of 31 March to 30 April, 2000. If for some reason the enumerator did not meet with any inhabitants for a given location, people had the possibility to visit statistical offices or the 34 additional enumeration sections in Riga to answer the census questions.

Friday, 31 March 2000, at 00.00 o'clock was a critical census moment and enumeration questionnaires were required to be completed at this time.

The Population Census 2000 recorded individuals who were registered in the Residents Register of the Republic of Latvia. Persons who for some reason were not registered in the Register, but should have been, or inhabitants of Latvia who had not changed passports for new ones before the ending time of the census with no stamp from the Department of Citizenship and Migration Affairs containing an identity code, as well as children not yet registered in the Residents' Register or individuals who had died after the critical census moment were not included.

This was Pursuant to the provisions of the Law on Population Census where individuals with no identity code and without the registration address of residence in Latvia, individuals who were registered in the Residents' Register, but reside abroad more than a year, individuals who had arrived in the country with an objective to stay in Latvia less than a year, children born after the critical census moment and individuals who had died before the critical moment were not to be recorded in the Census 2000.

Over five thousand personnel were involved at the Population Census 2000 in Latvia- 38 assistant managers of regional statistical offices, 430 enumeration supervisors, and 4260 field enumerators as well as other technically trained staff.

As part of the information pursuant to the program of the census the answers to 10 of 33 questions were obtained from the Residents' Register and from the information system of State Revenue Service. During the Census, 14 questions on each person residing in a dwelling and 9 questions characterising the dwelling were asked. Questionnaires were filled out for each person of ages 7 and over.

When used, an identity code allowed the combination and identification of information on people existing in different registers, increased the accuracy of the census data, and decreased the number of questions asked, reducing time and thus the census costs.

From 11 May to 10 June 2000, an important activity to ensure the quality of the population census was conducted. In selected territories people were repeatedly visited at their dwellings in order to check the correctness of the data of Census questionnaires. The requirement to organise a sample survey of quality for the census data is provided in the recommendations of UN ECE and Eurostat. Using mathematical methods, 1% of all census enumeration areas were selected (i.e. 42 enumeration areas) where this work was carried out.

In order to accelerate the processing of census data compared with the traditional methods (as it was done at the previous population censuses), an up-to-date data entry and processing system and software were developed thanks to the support of the Latvian and Swedish governments based on optical reading of characters technology. In order to ensure the operation of this system at the envisaged speed and with minimal errors, high demands were put on enumerators. Letters and figures in the Household questionnaires and individual questionnaires had to be written according to a specific standard.

Using high-capacity, rapid scanners, information from 820,000 Household questionnaires and over 2.1 million individuals questionnaires were entered into the computing system.

During the same period, using information technology and the corresponding software provisions, an electronic archive of images from general census documents was developed.

Everywhere in world, population censuses are highly necessary but extremely expensive. The costs of the Population Census 2000 in Latvia constituted 2.578 million lats. The census costs per capita was 1.08 lats. The net costs ( i.e. costs after subtraction of the sum of the income tax and the compulsory contributions of the social insurance from the total sum of the expenditure used) was 556 thousand lats less- 2.022 million lats total

The data processing system developed within the framework of Population Census 2000, used also for the processing of data in other statistical surveys, was secure investment with future return It will also be useful for short-term data entry and processing of other large-scale data arrays.

### Difficulties:

- The maps were not up to date, new houses and streets were not displayed.
- PC's were not sufficient enough for enumeration area creation.
- Register problems such as incorrect address information persisted (5% for Riga).
- The methodology changed very quickly until the date of census
- Lack of supervisors, one supervisor for 160 interviewers made it hard to teach interviewers in a very short time. Hard to coordinate personnel since the mobile phone was relatively new at that time.
- Substitute interviewers took time to train.
- Difficulties in respondent contact (security locks on doors).
- Difficulties in preparing the correct scanner design for questionnaire
- Young people such as students) were not residing at their declared place of residence

Quality was lost due to rapid data collection and processing of information

### Successes and achievements:

- Executed in a short period
- good results due to resources provided
- enumeration areas are still in use
- scanning process has been adopted within the farm structure survey (FSS)

We can summarize the lessons learned from the 2000 Census as follows:

- Earlier start of preparatory work;
- More contacts with the most important data users;
- More attention to delineation of enumeration districts;
- More attention to census mapping and output maps;
- Better cooperation with municipalities.

### Plans for the 2011 Census

We can now take this time to start planning for the census of 2011. Taking into account the experiences from the previous census, it was decided to not use the same technology used during the previous census of 2000 and to look into new methods. Scanning requires post-processing, logical check and data verification after optical recognition. We are now thinking of using new technologies like hand-held computers; logical checks could therefore be performed at interviewing time and data correction could be done immediately. For new enumeration areas, we should use a GIS-based solution since it provides more rapid management and recalculation at any time. Our idea is to obtain as much information and experience from countries with a census based on GIS platforms.

In Latvia, there are several companies such as JS Latvija, a Latvian map publishing company and MikroKods that provide spatial analyses using Geomedia software. State land service which populates addresses with geographical coordinates and the Office of Citizenship and Migration Affairs which generates population register data are more or less involved with GIS activities in their work. Between agencies, it seems that we all have things in common in terms of digital maps, addresses with geographical coordinates, and hardware for interviewers and staff. We have plans for acquiring GIS software, to make our census more GIS and GPS based. From our administrative sources (address register), we can obtain geographical coordinates and other information for each address, and from the population

register we can get information about individuals from the same address. From the Map publishing company, we have access to digital maps with good resolution and routing possibilities. The technologies have greatly advanced and are developing rapidly worldwide. By 2009, we expect to have a good platform of current technology acquired at a reasonable price. We think that with current possibilities and recent GIS and GPS platform options along with good knowledge and expertise in the field of census mapping, prices for hardware devices have become more accessible and we are planning to purchase them currently. Our plan is to use hand-held PCs or Pocket PCs with integrated WiFi (wireless internet) and GPS. We may face difficulties in finding interviewers because of the Hand-held PCs size and screen size. Many country interviewers are around 45-50 years old and have little experience working with PCs and the small screen size poses a visibility problem for them. We are restricted in specifying an age requirement when taking new interviewers and hope that a reduction in tablet PC will help solve this issue since they have bigger screen than the Hand-held devices.

We have had good experience collecting data with the aid of computers. For example, we are collecting LFS (Labour force survey) and EU\_SILC (European Statistics on income and living conditions) survey data and information on laptops and the data exchange is through GPRS (General Packet Radio Service; this is a technology which allows to get Internet through mobile line everywhere where mobile phone coverage is available) technology. It may be possible to use this technology for the census of 2011 and for data exchange.

A schematic for data collection using laptops is as follows .

