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**PLANNING A CENSUS GEOGRAPHY PROGRAMME FOR
TRADITIONAL AND COMBINED CENSUSES**



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Overview

- ❑ Objectives of a census geography programme
- ❑ International standards and recommendations
- ❑ Main aspects in a census geography programme
- ❑ Some advantages in using geospatial technologies
- ❑ Main phases of implementation
- ❑ An example of a planning process
- ❑ Testing the census geography programme
- ❑ Conclusions

Objectives of a census geography programme

- **To support the census planning process (pre-enumeration phase)**
- **To support fieldwork operations (pre-enumeration and enumeration phase)**
- **To contribute to the statistical analysis (post-enumeration phase)**
- **To contribute to the dissemination of the census data (post-enumeration phase)**
- **To integrate statistical and geospatial information for data analysis, for future censuses and surveys**

Objectives of a census geography programme - support the census planning process

- **Maximizing coverage: coverage errors refer to the non inclusion or double-inclusion of units that may originate under-counting or over-counting, respectively**
- **Definition of the census geography: hierarchical subdivision of the whole territory into administrative, geographic and statistical areas, including EAs and groups of EAs under responsibility of supervisors**
- **Estimating needs of staff and materials, and logistics requirements**
- **Definition of operational zones (or census management areas) for data collection**

Objectives of a census geography programme - support fieldwork operations process

- **Maps showing buildings, streets, addresses, points of interest (landmarks), help enumerators for field orientation and to enumerate census units**
- **ID codes and eventual addresses on the EA maps are reported by enumerators on the census forms**
- **EA maps allow supervisors to monitor that the assigned area is completely covered by enumerators**
- **Possibility to develop a web-based GIS application for real-time monitoring of census coverage**

Objectives of a census geography programme – contribute to statistical analysis and dissemination

- **Spatial analysis techniques (e.g. integrating statistical and geospatial information, measure census coverage, queries, buffers, etc.)**
- **Identification of urban/rural population (e.g. degree of urbanization)**
- **Thematic mapping**
- **Static and dynamic census atlases**
- **Web-based applications**

International standards and recommendations

- **UNSD, 2009. Handbook on Geospatial Infrastructure in Support of Census Activities, New York**
- **UNSD, 2008. Principles and recommendations for Population and Housing Censuses, rev 2, new York (with a section on GIS and census mapping) and its proposed changes for the 2020 census round (location of place of residence introduced as a core topic; population grid introduced as a separate topic; improved definition of degree of urbanization and location of place of work)**
- **The United Nations initiative on Global Geospatial Information Management (UN-GGIM)**
- **In Europe, the INSPIRE directive 2007/2/EC establishing an Infrastructure for Spatial Information**

Main aspects in a census geography programme

- **Planning and testing**
- **Institutional arrangements and capacity in the country**
- **Use of geospatial technologies**
- **Base maps and map integration**
- **Census geography**
- **Consistency with census geography of previous censuses**
- **Geo-coding model and coding scheme**
- **Delineation of EAs**
- **Grid and addresses and/or registers for buildings/dwellings**
- **GIS database design**
- **GIS database management**
- **Map updating**
- **Data quality (positional and logical) and confidentiality**
- **Metadata**
- **Dissemination**

Some advantages in using geospatial technologies

- After the initial large investment, GIS reduces the cost and time required to collect, compile, update, duplicate and distribute geographic information
- The integrated use of remote sensing, GIS and GPS may improve accuracy in the boundary delineation of EAs
- With GIS, the required space to store maps is drastically reduced
- GIS allows to perform spatial queries and disseminate census results by maps
- The use of PDAs or tablets *could* speed up census operations and increase data accuracy

Main phases of implementation

- **Management and technical coordination at the NSO**
- **Definition of needs on census geography**
- **Institutional arrangements and/or outsourcing**
- **Definition of the census geography, geocoding approach, coding scheme, use of geospatial technologies, outputs**
- **Drafting a plan and a budget**
- **Realization of a test at EA and building/address levels**
- **Analysis of the results of the test**
- **Revision of the plan and budget**

An example of a planning process

- Definition of activities and tasks
- Definition of a timetable of activities
- Definition of responsibilities
- Definition of a budget by activity

MAIN ACTIVITIES		2009									
		1st Quarter			2nd Quarter			3rd Quarter			4th Q
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
1	1 Coordination and monitoring										
2	2 On-the-job training and technical advice										
3	3 Assessment on GIS and census mapping at the NSO										
10	4 Institutional/Organizational issues										
13	5 Realization of a pilot application for GIS and census mapping										
27	6 GIS database design and implementation										
34	7 Digitalization and geocoding activities										
40	8 Census map updating and printing										
44	9 Dissemination										
49	10 Staff and training										
61	11 Equipment and consumables										

Project schedule - example of a Gantt Chart

An example of a planning process - coordination, monitoring and technical assistance

- **Establishment or strengthening the Cartography and GIS Unit at the NSO**
- **Definition of roles and responsibilities**
- **Identification of National and/or International expertise**
- **Organizing study visits to NSOs in neighboring countries**
- **Acquisition of knowledge on international standards and recommendations**

An example of a planning process - assessment on GIS and census mapping at the NSO

- **Definition of needs and collection of available cartographic data**
- **Analysis of the collected cartographic data and information**
- **Analysis and definition of spatial levels (Administrative, statistical and geographic units)**
- **Assessing the use of cartography and GIS at the NSO and in the country**
- **Draft of a preparatory work plan for census mapping**

An example of a planning process - Institutional and organizational issues

- **Definition of Institutional arrangements with other National Institutions dealing with mapping (e.g. National Mapping Agencies, Private companies, Universities) contributing to the development of a National Spatial Data Infrastructure (NSDI)**
- **Setting up a technical team for census mapping activities**
- **Definition of the census geography, geocoding approach, coding scheme, use of geospatial technologies, outputs**
- **Definition of a strategy to support building capacity**

An example of a planning process - testing

- **Acquisition of cartography (orthophotos, paper maps, vector files) for the pilot area**
- **Importing and integrating administrative records, spatial levels and EA boundaries of previous censuses**
- **Development of a preliminary GIS data model**
- **Preparation of maps and forms of the pilot area**
- **Recruitment of staff and training for fieldwork activities**
- **Field operations and data collection**
- **Data entry**
- **Data analysis and evaluation**
- **Revision of the plan**
- **Preparation of a reference manual for GIS and census mapping with definitions and a glossary of terms**

An example of a planning process - testing (cont.)

Selection of the test areas with the following criteria:

- **urban, peri-urban/rural**
- **commercial/residential**
- **planned/unplanned areas**
- **single houses/multistory buildings**



An example of a planning process - testing (cont.)

Preparation of maps for fieldwork, and printing at scale 1:500-1:1000



An example of a planning process - testing (cont.)

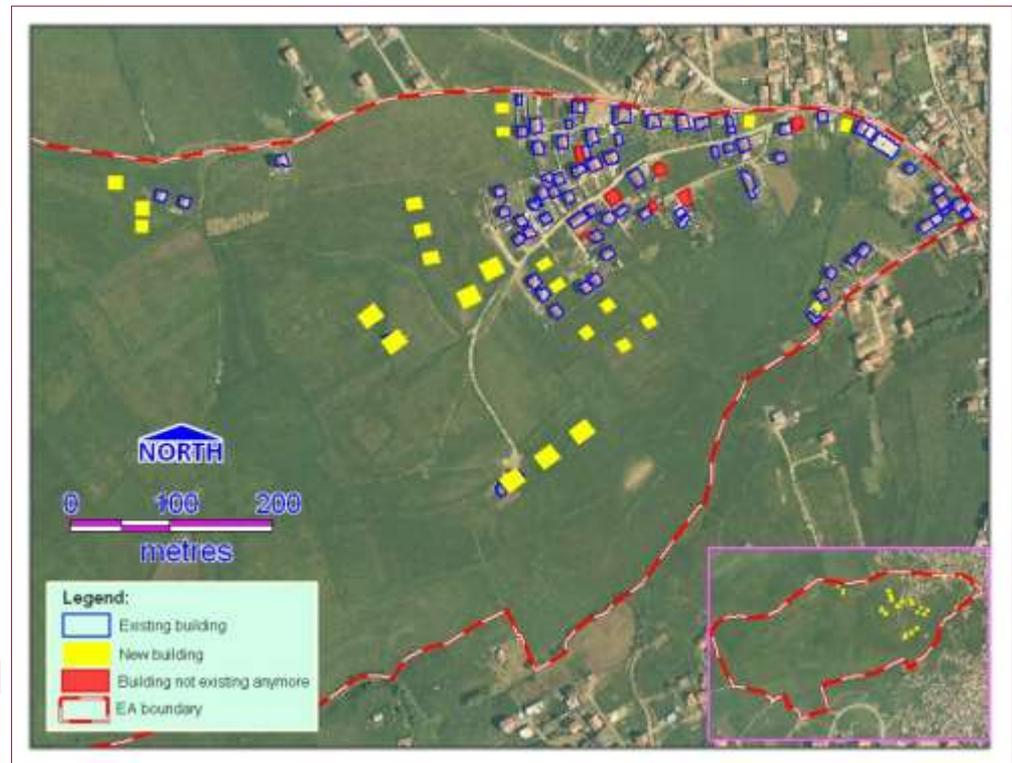
Preparation of a form to record data at building level (Listing)

Municipality/Commune												
City/Village												
Locality												
Enumeration Area												
Map sheet no _____				Date:			Surveyor ID and Name:					
Building Serial no	Address			Administrative building no.	Map building code	Building condition	Type of building	Total no of floors	Base ment	Total no. of entran ces	Total no of dwelling units	Remarks

Example of a form to record data at building level

An example of a planning process - testing (cont.)

- **Fieldwork activities**
- **Data analysis and evaluation:**
 - **Buildings are investigated to count dwellings**
 - **The EA is resized to contains approximately the same number of dwellings**
 - **Data on buildings is updated**
 - **Attribute data is updated in the GIS database**



An example of a planning process - GIS database design

- **Definition of the final GIS data model (layers, coding scheme, geocoding model)**
- **Definition and implementation of the IT infrastructure**
- **Definition of technical specifications and metadata for the GIS census database**
- **Definition of outputs and strategy to integrate statistical and geospatial information**

An example of a planning process - digitalization and geocoding activities

- **Digitalization (addresses, street names, points of interest, building boundaries, city blocks, and other relevant spatial data)**
- **Geocoding census spatial levels, EAs, addresses and buildings**
- **Fieldwork activities for buildings/dwellings listing (or through remote sensed data)**
- **Delineation and digitalization of the census EA boundaries**

An example of a planning process - census map updating and printing

- **Map updating**
- **Implementation of the data management system and updating procedures of the GIS database**
- **Preparation of census EAs and supervisory maps**
- **Map printing**

An example of a planning process - dissemination

- **Definition of the strategy for census spatial data dissemination**
- **Integration between statistical and geospatial data**
- **Spatial data analysis**
- **Preparation of a census atlas and/or a web-based GIS application**

An example of a planning process - staff and training

- **Recruitment of technical staff for fieldwork and office activities**
- **Training on GIS standards and recommendations for population censuses**
- **Training on GIS software**
- **Study visits in other Statistical Offices**
- **Training on census spatial data analysis**
- **Training on desktop mapping**

An example of a planning process - equipment and consumables

- **Acquisition of a first set of hardware (small number of computers and/or tablets, and a large format printer for the pilot application)**
- **Acquisition of a second set of hardware after the evaluation of the pilot (Server and clients, printers, data storage units, GPS units, etc.)**
- **Acquisition of GIS software**
- **Acquisition of office furniture and consumables**

Conclusions

- **Planning a census geography programme is crucial for the successful implementation of a census operation and for the integration of statistical and geospatial data**
- **Testing is a very important condition**
- **The definition of the hierarchy and relationships between administrative, geographic and statistical entities is also essential**
- **It is preferable to geocode buildings and/or addresses with points representing geographic coordinates, consistent with aerial or satellite base maps, for the development of registers and grid systems**
- **NSOs should see a census geography programme as a strategic opportunity to integrate geospatial information with statistical data**

Thank you!

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Questions, comments?