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, 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

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<thead>
<tr>
<th>MAIN ACTIVITIES</th>
<th>2009</th>
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<td>1st Quarter</td>
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<td>Coordination and monitoring</td>
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<td>2 On-the-job training and technical advice</td>
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<td>5 Realization of a pilot application for GIS and census mapping</td>
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<td>6 GIS database design and implementation</td>
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<td>7 Digitalization and geocoding activities</td>
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<td>8 Census map updating and printing</td>
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<td>9 Dissemination</td>
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<td>10 Staff and training</td>
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<td>11</td>
<td>11 Equipment and consumables</td>
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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
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)

<table>
<thead>
<tr>
<th>Municipality/Commune</th>
<th>City/Village</th>
<th>Locality</th>
<th>Enumeration Area</th>
<th>Map sheet no</th>
<th>Date</th>
<th>Surveyor ID and Name</th>
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<tr>
<th>Building Serial no</th>
<th>Address</th>
<th>Administrative building no.</th>
<th>Map building code</th>
<th>Building condition</th>
<th>Type of building</th>
<th>Total no of floors</th>
<th>Basement</th>
<th>Total no of entrances</th>
<th>Total no of dwelling units</th>
<th>Remarks</th>
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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 contain 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?