Estonian census mapping 2000

Lessons Learned

Georgian delegation Study visit at SA

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GIS Census 2000 Aims

Aims:

1. Compilation of geographic database of all dwellings

2. Production of digitized maps for enumerators

GIS for Census 2000 - Background

The program was launched in 1995

Background in 1995:

•Availability of paper maps only, with enumerator areas from previous censuses = 100% (partly in a very bad shape)

• Availability of digital Estonian Base Map 1: 50 000 digital data

•No small scale digital maps were available

•No standardized and geo - referenced National Address System

•No in house GIS expertise

• Availability of GIS expertise and professionals in Estonia

Decision: to outsource the GIS expertise and all mapping activities

GIS Census 2000 Projects outsouces activities

Projects outsourced:

- Analyse and vision “GIS and mapping for the Census 2000”
- Mapping of rural areas 1:50 000
  (Estonian Base Map 1995)
- Mapping of urban areas 1:5 000
- Compilation of household list was responsibility of local authorities. Activities were coordinated by the Statistics Estonia

Parteners

private mapping company

Estonian Map Centre

ca 225 local authorities

Project 1 - Study “GIS and mapping for the Census 2000

Aim:

familiarize the in-house staff with :

- the principles of mapping
- the trends in GIS technology
- the current state of GIS in Estonia
- the dissemination with the aid of GIS

develop the GIS strategy

overview of legal aspects (copyright/ownership/liability/privacy/protection)

Project 2 - Rural areas mapping in 1:50 000 scale

Primary source for rural maps - Estonian Base Map 1:50 000

Production of Base Map 1: 50 000

- satellite imagery (1993 – 1996)
- no field work

Quality:

- positional accuracy (5- 10m)
- no individual buildings are shown
- only built – up areas are shown
- small roads are missing
- type of the road is missing

Project 2 - Rural areas mapping in 1:50 000 scale

adding dwellings from 1989 Census paper maps

- scanning / vectorizing
- adding administrative borders

Project 3 - Mapping of urban areas in 1:5 000 scale

Primary source were city paper maps 1:2 000 – 1:5 000 (1979 – 1995)

Quality of paper maps:

- different grid systems
- out dated

Main tasks:

- digitizing the existing maps
- update (buildings/street network)

Extensive field work was carried out between 1997-1999/ GPS – prior the census

Additional data sources:

Building register:

Was used as alternative source to guarantee that all buildings are included (on maps/ GIS data files) in urban areas.

30% of registry data were in digital form

Difficulties: rural areas because of no official addresses

Benefits

Local governments

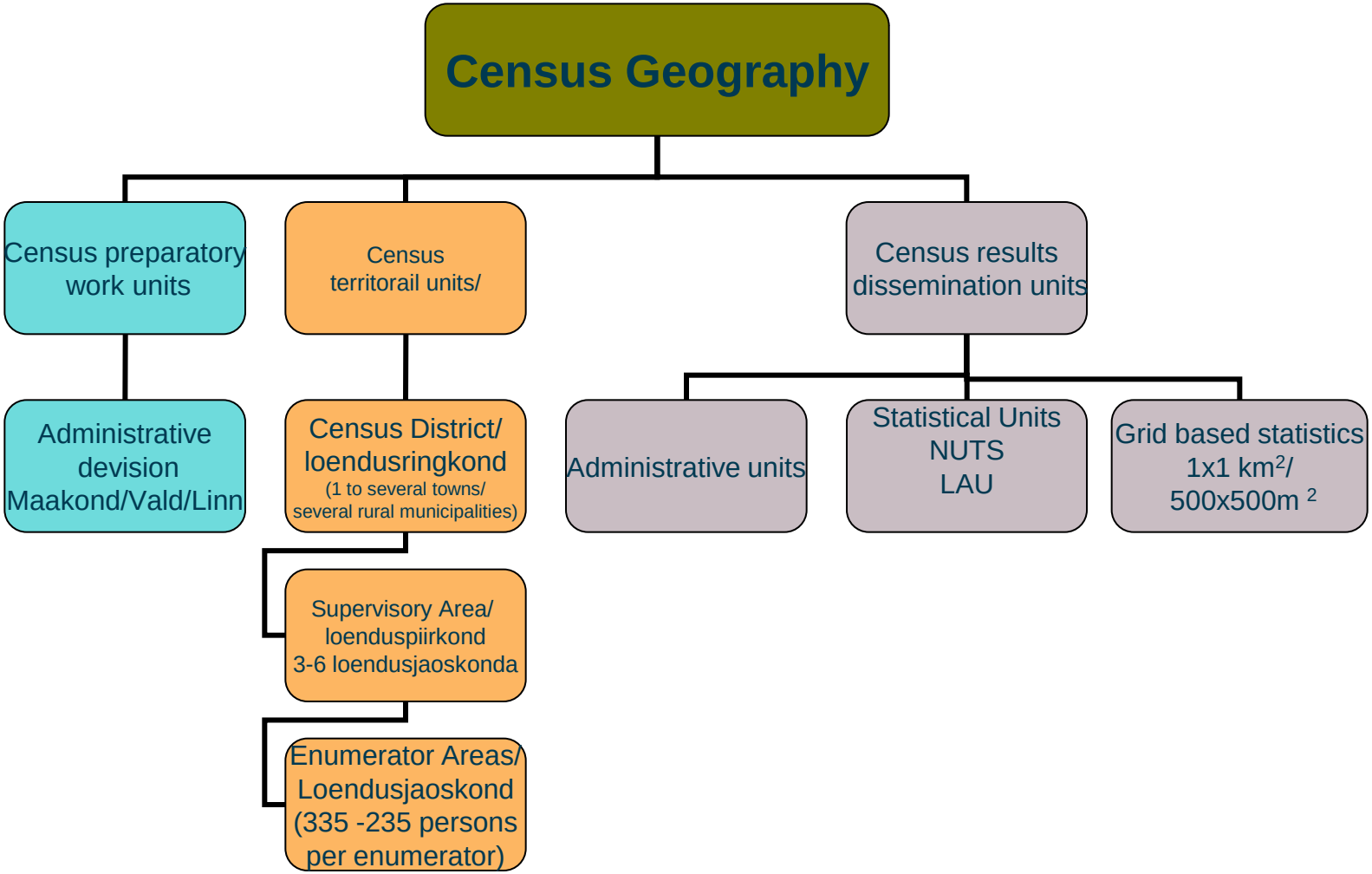
cost effective to get the digital map database

Statistical office

local know- how rise

map production

delineation of enumerator areas - digital border files


Census Geography
Census preparatory work units
Census territorail units/
Census results dissemination units
Administrative devision Maakond/Vald/Linn
Census District/ loendusringkond
(1 to several towns/ several rural municipalities)
Administrative units
Statistical Units NUTS LAU
Grid based statistics 1x1 km2/ 500x500m 2
Supervisory Area/ loenduspiirkond 3-6 loendusjaoskonda
Enumerator Areas/ Loendusjaoskond (335 -235 persons per enumerator)

Delineation of Enumerator areas

- work load for enumerator
  - in cities 335 persons
  - in small towns 285
  - Rural settlements 235 per enumerator
- Area must not consist of 2 separate areas
- Area must not contain “gaps”
- Must not overlap
- Must not cross the administraitive borders
- Enumerator areas must be exhaustive (100% of the territory)
- The boundaris should be easily identifiable on the field
- Area must take into account the “natural barriers”

Delineation of Enumerator Areas

- Semi automated creation of enumerator areas
  - Special program was created – not possible to use today
  - Delination was done by the
    - local governments
    - Statistics Estonia
- Input data
  - Digital maps

    urban 1:5 000; rural 1:50 000
  - Pre-defined work load
  - Database of population (Population register) linked with the buildings manually by local governments

Delineation of Enumerator Areas

Semi- automatic delinations:

1. program grated based on an algorithm the enumerator areas
2. verification of the automated enumerator area by the operator (hand – work)

Conclusion of Semi-automated EA delineation:

- Use of the program was best solution at that time
- adjusting input parameters allowed to test several versions
- output data were ready to use in map printing
- ca 225 local governments contributed => varying quality
- Data quality control was poor due to the time limits (gaps, holes, overlay, use of different scales etc)

Digital Map Data

The data was collected in 1997-2000

Is a stand-alone files (over 100 000) / not a part of the central database, no geo database was complied

2 separate data :1) the GIS Census spatial data
2) the Census result database

The data can be linked, based on the unique ID. Derivered from the geographical co-ordinates

Digital Map Data
MapInfo .tab / Esri .shp

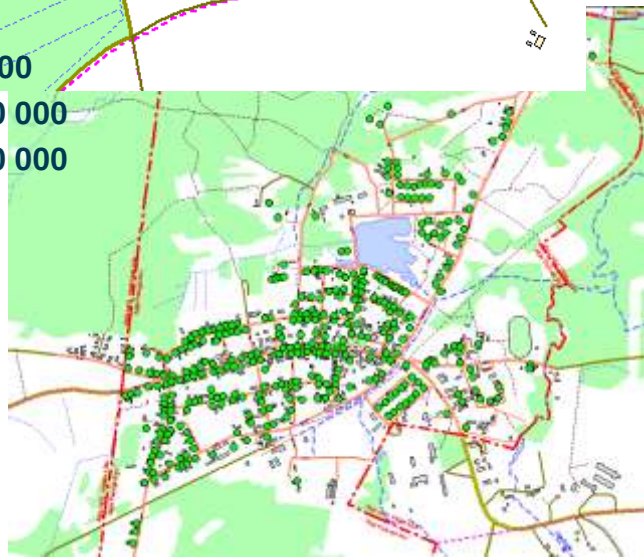
The map data contains, among others,
ca 400,000 buildings (Census objects, 01.03.2000)
Consist of :

- Map layers (spatial objects + attribute data)
  - buildings
  - street and roads
  - background information layers
    - topography, rivers, railway etc
  - population data linked with buildings
    - (based on population register, updated by the local governments)
  - Boundaries of Enumerator Areas
  - Administrative Boundaries

Paper Maps

Printed by Regio Ltd and Estonian Map Centre Ltd)
(3 months /from January – March, 2000)

	Scale in urban areas	in rural areas
Enumerator maps	**1:3 000 – 1:5 000**	**1: 5 000 – 1:50 000**
Census district maps	**1:3 000 – 1:22 000**	**1: 10 000 – 1:100 000**
Supervisor area maps	**1 :5 000 – 1:22 000**	**1: 20 000 – 1:120 000**
Wall maps of local Census offices	various scales	



LAMBERT-EST
(L-EST-92)
Lambert conformal conic projection (LCC)

Main steps for the Census mapping

1. Planning
    - Determine the scope of the mapping
    - Determine the mapping needs
    - Strategy
    - Personnel/HW/SW
    - Prepare geocoding schemas
    - Budget

Main steps for the census mapping

2. Preparation of base maps

- Inventory of existing resources
- Need for update/ any gaps?
- Mapping (field mapping/ integration of GPS measurement Results/ scanning/digitizing/remote sensing)
- Review and verification of the data
- Quality control

Main steps for the census mapping

3. Preparation for the enumerator area maps

- Delineation and coding of enumerator area
- Review and verification
- Printing and distributing the final maps

High importance

Metadata

GIS data specification

Map incl representation specification

Product description (incl data dictionary) for digital GIS Census data products

Evaluation of experience

Disadvantage

- complicated
- high costs are involved
- need for in house high level GIS expertise vs availability of GIS specialist is very limited

Evaluation of experience

Advantages:

+ digital mapping is efficient
+ higher accuracy
+ good quality maps for the enumerators / facilitate the census process / monitoring of the process
+ wider use of census results (geo- referenced grid based statistics)
+ better service for the customers (spatial statistics)
+ opportunity to implement Geostatistics / spatial analyses

Lesson learned

- was conducted as single stand - alone project (just for a census)
- no long- term strategy
- single files may cause the loss of data
- no uniform census maps for whole country
- 225 different attitudes from local authorities
- no spatial data updating was implemented
- no updating procedures for geo coded addresses
- producing gridded data was time and labour consuming
- 2011 more or less the same investments made in 2000 should be re- invested

Thank you!