Integration of INSPIRE & SDMX data infrastructures for the 2021 Census

Nadezhda VLAHOVA, Fabian BACH, Ekkehard PETRI,

Eurostat (ekkehard.petri@ec.europa.eu)

Vlado CETL, Joint Research Centre

(vlado.cetl@ec.europa.eu)

Eurostat

Overview

- Introduction to INSPIRE
- The challenge – implement INSPIRE for official statistics
- The solution – reuse existing SDMX data infrastructure

INSPIRE – an introduction

EU-wide **SDI perspective** on data

Ultimate goal is to **unlock spatial data** and lay down

foundations of European SDI

INSPIRE is a **Framework Directive**

- Into force since 15th of May 2007

Detailed technical provisions are laid down in:

Implementing Rules on (INSPIRE Components)

- Metadata
- Spatial Data
- Network services
- Data and Service sharing (policy)


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(Acts adopted under the EC Treaty/Euratom Treaty whose publication is obligatory)

DIRECTIVES

DIRECTIVE 2007/2/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

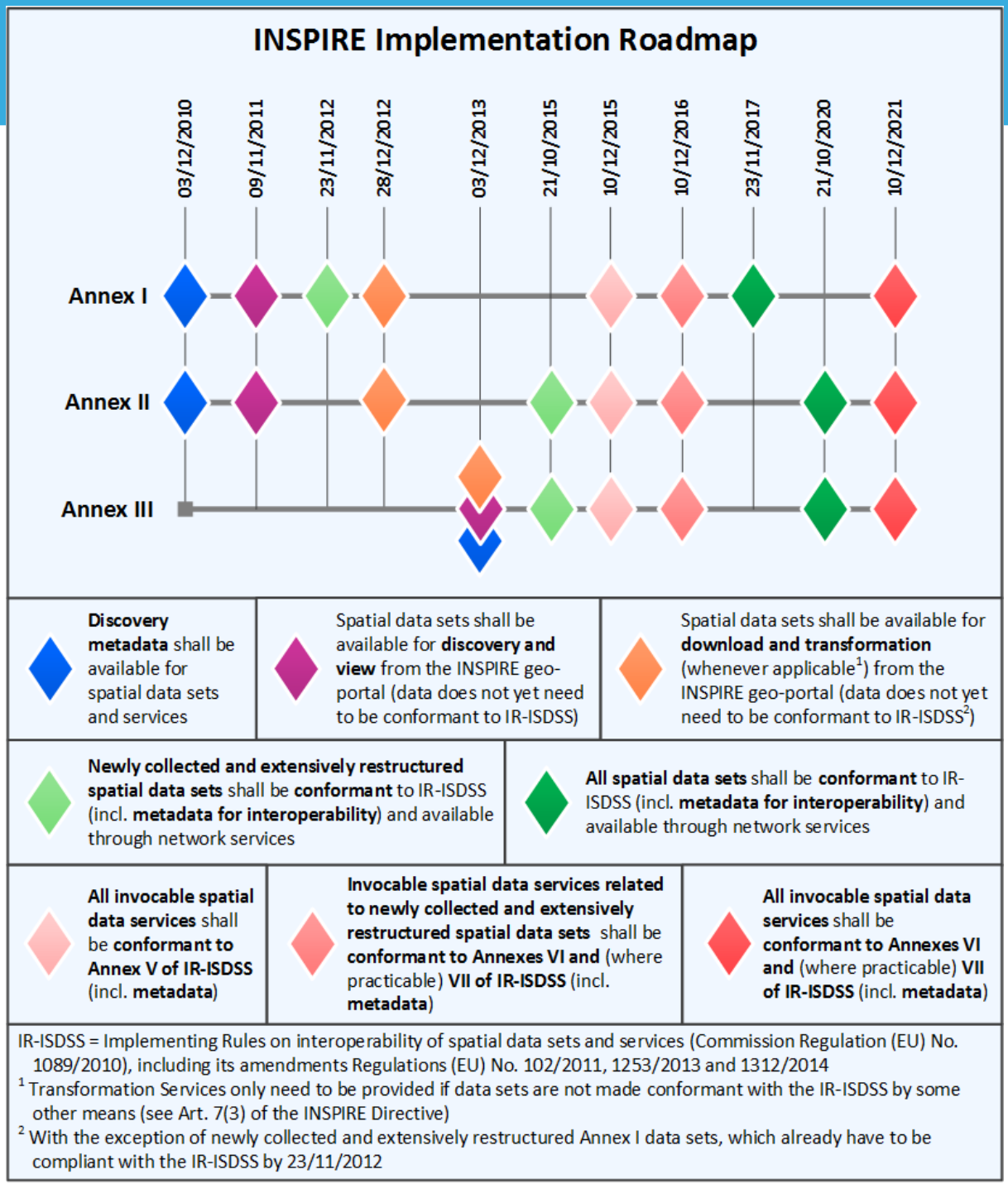
of 14 March 2007

establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)

Implementation Roadmap

INSPIRE Requirements:

- metadata
- view services
- download services
- transformation services
- data interoperability



INSPIRE Data Themes and Statistics

Annex I

- Administrative Units
- Cadastral Parcels
- Geographical grid systems
- Hydrography
- Protected Sites
- Transport Networks
- Addresses
- Coordinate reference systems
- Geographical Names

Annex II

- Geology
- Orthoimagery
- Elevation
- Land Cover

Annex III

- Atmospheric Conditions
- Bio-geographical Regions
- Buildings
- Environmental Monitoring Facilities
- Human Health and Safety
- Land Use
- Mineral Resources
- Oceanographic Geographical Features
- Population Distribution - Demography
- Production and Industrial Facilities
- Sea Regions
- Soil
- Species Distribution
- Statistical Units
- Agricultural and Aquaculture Facilities
- Area Management Restriction Regulation Zones and Reporting units
- Meteorological geographical features
- Energy Resources
- Habitats and Biotopes
- Natural Risk Zones
- Utility and Governmental Services

INSPIRE Data themes

- **Statistical Units (SU)** - Units for dissemination or use of statistical information
  - Spatial feature (Polygon, Line, Point or Grid cell) that can be used to attach statistical information
  - Statistical information is not considered as part of the statistical unit
- **Population distribution — demography (PD)** - Geographical distribution of people, including population characteristics and activity levels, aggregated by grid, region, administrative unit or other analytical unit
  - Datasets of statistical information describing how some phenomenon regarding human population is spread within some part of the 2D space

How Eurostat became involved?

- Responsible for Census regulation on population grids
- INSPIRE compliant Census Grid important pilot for integration of statistical and geospatial information
- SDMX sponsor and user
- Implements and uses tools to support SDMX data exchanges (e.g. Census Hub)

2021 Population census population grids

(planned) 1 km² grids with 13 key variables per grid square

Topic	Breakdown categories CIR-1	Breakdown categories CIR-4	Description	STAT.G.
GEO.		GEO.G.x. GEO.G.y.	(See section **Error! Reference source not found.**)	
SEX.	SEX.0. SEX.1. SEX.2.		Total population Male Female	0. 1. 2.
AGE.		AGE.G.1. AGE.G.2. AGE.G.3.	Under 15 years: equal to AGE.L.1. in CIR-1 15 to 64 years: sum of AGE.L.2.-4. in CIR-1 65 years and over: sum of AGE.L.5.-6. in CIR-1	3. 4. 5.
CAS.	CAS.L.1.1.		Employed persons (see details in section **Error! Reference source not found.**)	6.
POB.	POB.L.1. POB.L.2.1. POB.L.2.2.		Place of birth in reporting country Place of birth in other EU Member State Place of birth elsewhere	7. 8. 9.
ROY.	ROY.1. ROY.2.1. ROY.2.2.		Usual residence unchanged Move within the reporting country Move from outside the reporting country	10. 11. 12.

INSPIRE and the Census

- Census information falls under INSPIRE (Annex III)
- As a result we need INSPIRE compliant:
  - Metadata
  - Data models (information in structured format)
  - Download Service
  - View Services

Population distribution and demography

Requirements for any solution

- Meet the legal requirements
- Minimise double work and investment for countries
- Avoid creating duplicate data exchange infrastructures
- Improve the visualisation of Census data
- One stop shop for users
- No new standard – two are enough!

=> Proposed solution – INSPIRE(D) SDMX

Correspondence of INSPIRE and SDMX

Statistics

EU legal acts on statistics (incl. Census 2021)

SDMX technical standards
- standard format for data and reference metadata
- architecture for data exchange
- SDMX registry

Guidelines
- E.g. how to construct metadata descriptions

Freely available implementation tools
- SDMX Registry
- SDMX Metadata Converter

Census Hub

INSPIRE

INSPIRE implementing rules
- Data Specifications
- Metadata
- Network services

GI technical standards
- ISO 19115/19119/19139
- GML & ISO 19100 series
- OGC WFS, WMS
- Atom

Technical Guidance INSPIRE documents

A number of commercial and FOSS tools
- Geonetwork
- Deegree
- Geoserver

INSPIRE Geoportal

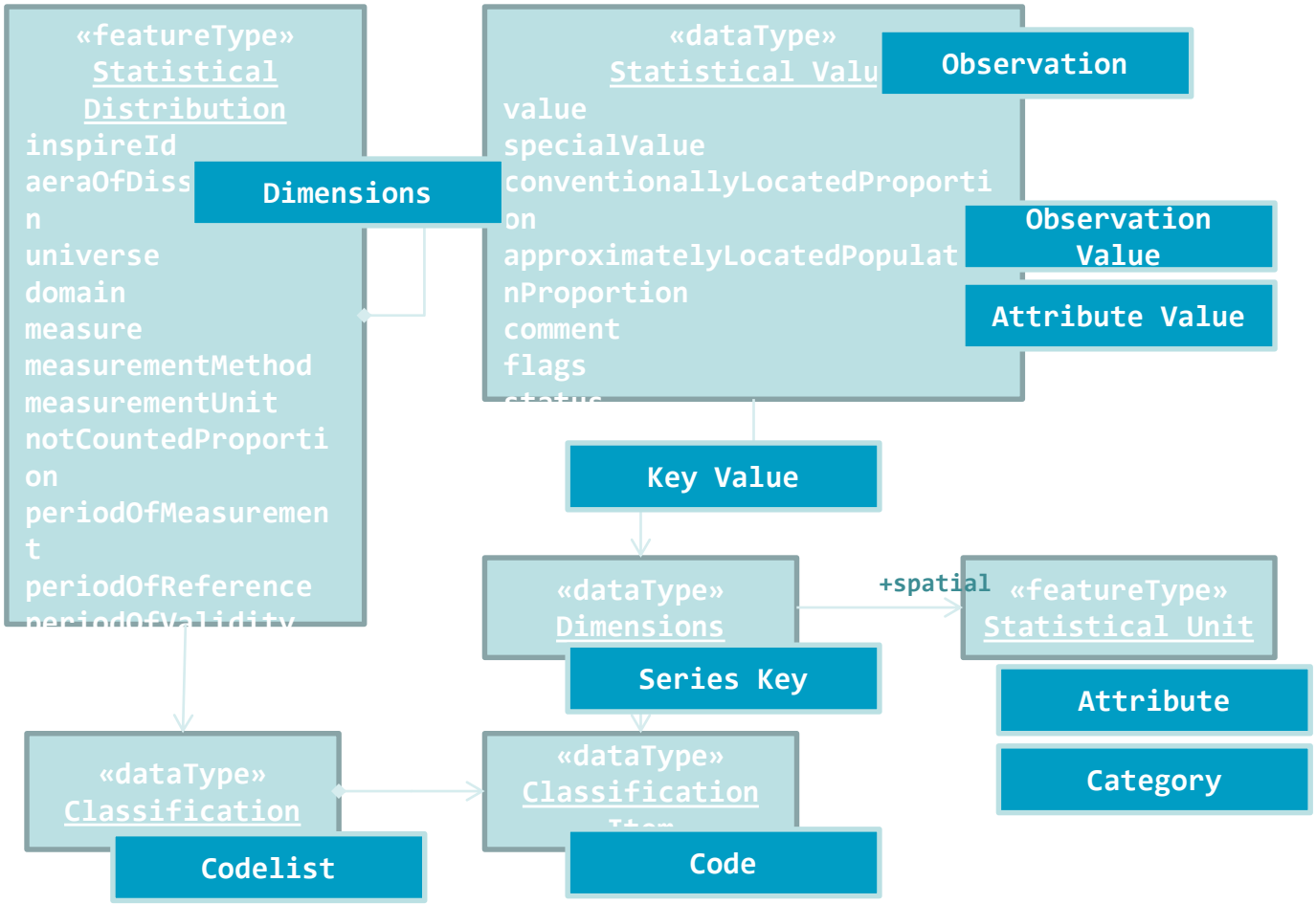
What can we reuse?

- SMDX Census Hub
  - Data sharing between NSI and Eurostat using web services
  - Data and metadata already structured
- Similar content of SDMX and INSPIRE data models (e.g. Dublin core metadata)
- INSPIRE GeoPortals
  - INSPIRE catalogue service
  - INSPIRE view services

How did we map (Meta-) Data from SDMX to INSPIRE?

- Accept different structure and encoding of the information (statistical and geospatial perspective)
- **Use SDMX to serve INSPIRE data and metadata**
- Find equivalents for Census Grid Data in INSPIRE (for data & metadata) => create consistent information

Model Mapping



Metadata mapping results

INSPIRE extended SDMX/Census metadata

- For most of the concepts 1 to 1 mapping is possible
- Where missing, additional concepts were added
- Elements can and will be prefilled by Eurostat
- Data Providers can modify the content where needed

Data mapping results

INSPIRE extended SDMX/Census data

- For some of the concepts 1 to 1 mapping is possible:
  - GENDER (INSPIRE) → SEX (SDMX)
  - GM_SURFACE (Geography) → GRID_1km
- Where missing, additional dimensions were added
  - Place of usual residence one year prior to the census
  - Place of birth
- Data structured as any other statistical hypercube

Next steps

- Evaluate different implementations for download and view services
- Test generic extensions of SDMX to other INSPIRE data models

Key messages for integrating standards

- Incorporate additional content as early as possible in the transmission workflow
- Transform as late as possible
- In distributed architectures, transform centrally
- Implementing standards best with existing tools -> Census Hub, GeoPortal
- Hide the complexity of the standards from as many people as possible

Conclusion

- First implementation of INSPIRE for statistics at EU level
- Positive example of cooperation between INSPIRE and SDMX community
- Pragmatism is essential for successful use of standards