Cross-Border Spatial Data Harmonization
An Example of INSPIRE implementation

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- ICT Innovation network & Smart Cities
- INSPIRE
- HARMO-DATA
  - Cross-border spatial data harmonization
  - Data harmonization levels
  - Data harmonization process
  - Geoportal
  - Further development
• GIS / Land Cadaster Modernization
  
  { 1989 } { 40 } { 4.2 mio } { ИГЕА МАК }

• FERI)

• References from Slovenia
  
  – Digital Land Cadaster … 2002
  – Building Cadaster … 2006
  – Mass Appraisal … 2010
  – Legal Regimes … 2010
  – Cadaster of Public Utilities … 2012
  – Network Termination Points …. 2016
  – Building Energy Certificate … 2018
Strategic Research Innovation Partnership – SRIP
Smart specialization strategy of Slovenia
Smart cities & Communities

Founders
Jožef Stefan Institute
University of Maribor
University of Ljubljana
Chamber of Commerce and Industry of Slovenia
ICT technology network
Smart City Integration Platform

ICT Innovation Network

Integral Smart GIS platform
• INSPIRE - general rules to establish infrastructure for spatial information; (support environmental policies)

• INSPIRE should be based on the infrastructures for spatial information established by the Member States

• 34 data themes – defined very detailed

• „Harmonized“ data should be available via network services


http://inspire.ec.europa.eu/


INSPIRE – How it Works

Building Cadastre

Identification

<table>
<thead>
<tr>
<th>Title</th>
<th>Building Cadastre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abstract</td>
<td>Building Cadastre is an official national database of buildings. Building Cadastre includes up-to-date information on buildings and parts of buildings. It includes the collection of documentation and information necessary for historical track changes of buildings. The collection of documentation (in analogue and digital form) includes files and other documents, upon which buildings were officially registered. Basic informations kept in the Building Cadastre are: identification number, owner, position, size, actual use, apartment number. The relation to Register of Spatial Units and house numbers is also provided. The Building Cadastre is technically centralized and is connected with other national systems: Land Cadastre, Register of Spatial Units, Land Registry. The registration of building in Building Cadastre is needed prior to registration of its ownership in the Land Registry.</td>
</tr>
</tbody>
</table>

Associated resources

- **DOWNLOAD SERVICE**
  - INSPIRE stavbe WFS
    - WFS storitev za INSPIRE stavbe / Building
  - INSPIRE stavbe WMS
    - WMS storitev za INSPIRE stavbe / BU Building

- **VIEW SERVICE**
• INTERREG V-A Italy-Slovenia 2014-2020 Programme,
• Three regions: Slovenia (SI), Friuli-Venezia Giulia (I), Veneto (I)

• Purpose:
  • develop common solutions for **more efficient** cross border spatial management
  • **harmonizing** the existing spatial data
  • implementing a cross-border **spatial data platform**
  • developing a common **protocol** for further cooperation
HARMO-DATA: Harmonization principle

- INSPIRE data model (**data specifications**) is a base for data harmonization on a cross-border area
- Implementation of **network services** is a responsibility of each data provider (the project gives extensive assistance)
- Common cross-border platform is NOT designed as one physical platform
- It is build on the base of **existing metadata** system on a Regional/National level
- New component – data searcher (one-stop-shop) – HARMO-DATA geoportal

No long discussions about target data model.
Long term sustainability of the platform.
**HARMO-DATA: Data harmonization levels**

<table>
<thead>
<tr>
<th></th>
<th>Comparable datasets identified</th>
<th>Datasets can be discovered</th>
<th>Datasets are very well documented</th>
<th>Datasets available in multilanguage</th>
<th>Datasets can be easily downloaded</th>
<th>Datasets are harmonized</th>
<th>Datasets are edge matched</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic</strong></td>
<td><img src="#" alt="Checkmark" /></td>
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<td><img src="#" alt="Checkmark" /></td>
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<td><strong>Advanced</strong></td>
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<tr>
<td><strong>Full</strong></td>
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</tr>
</tbody>
</table>

- **Administrative units**
- **Geographical names**
- **Protected sites**
- **Land use**
- **Buildings**
- **Utility and governmental services**
HARMO-DATA: Data harmonization process

1. Identification of Inspire theme
2. Transformation with Hale Studio
3. View results
4. Validate results
5. Metadata for dataset
6. Implementation of services
7. Metadata for services
8. Harvest to Inspire
9. Geoportal Thematic Viewer

WMS 1.3.0
WFS 2.0

ISO/TC 211 Geographic information/Geomatics
HARMO-DATA: Data harmonization tool

HALE STUDIO
License: GNU Lesser General Public License (LGPL) v3.0
Download: https://www.wetransform.to/downloads/
HARMO-DATA: Pilot use cases

- Test if harmonized data are useful (technical, semantical aspect)
- Is it possible to implement each use case in other environment (organizational aspect)
- Use cases related with Sentinel satellite data series
  
  Use case topics:
  - Spatial planning
  - Quality of urban environments
  - Protection of natural resources
  - Disaster management
HARMO-DATA: Pilot use cases

Urban 3D Modelling – Interactive 3D Zoning

Mapping and Assessment of Ecosystems and Services

Public Infrastructure Cadastre
HARMO-DATA: Common platform

- Not one physical platform
- Connection of existing spatial data platforms (SLO, FVG, VEN)
- Main upgrades
  - INSPIRE metadata (multilanguage)
  - Download services (atom feed)
  - Harvesting to the INSPIRE geoportal
- New components
  - HARMO-DATA data searcher (geoportal)
  - Web GIS viewer(s)

**SLO:**
http://prostor4.gov.si/imps

**FVG:**
http://harmodata.regione.fvg.it/consultatore-dati-ambientali-territoriali/home?language=en

**VEN:**
https://www.regione.veneto.it/web/ambiente-e-territorio/metadati
HARMO-DATA: Geoportal

harmo-data.units.it:8080/geoportal/search/index.html
HARMO-DATA: Geoportal

**FILTER BY**

- Search
- SHOW ALL
- metadata
- RSS ATOM
- DOWNLOAD
- MAPS

**SHOW ALL**
- ADMINISTRATIVE UNITS
- GEOGRAPHICAL NAMES
- BUILDINGS
- PROTECTED SITES
- PLANNED LAND USE
- LAND COVER
- SENTINEL

(AU) Administrative units - FVG
Atom feed download services

(GN) Geographical names - FVG
Atom feed download services

(PS) Natura2000 - Slovenia
Atom feed download services

(PLU) Planned Land Use - Slovenia
Atom feed download services

(LC) Corine Land Cover 2012 - Slovenia
Atom feed download services
HARMO-DATA: Geoportal

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Administrative units map
Created from INSPIRE gml

Natura 2000 map
Created from INSPIRE gml

2.5D buildings map
Created from INSPIRE gml - Gorizia & Nova Gorica

Corine Land Cover 2012 in mun. Mira
Detailed CLC2012 in Mira created from Veneto INSPIRE gml and CLC2012 from EEA

Venice lagune high tide map
Venice lagune tide change from Sentinel

Lake Cerknica map
Lake Cerknica changing from Sentinel 2

PLU map Gorizia & Nova Gorica
Created from INSPIRE gml - Gorizia & Nova Gorica

Ecosystem services map
Planned land use and weighted ES total - mun. Mira

Place river map
Place river flooding map from Sentinel 2
• Sometimes harmonized data are not necessary popular among the users
• There are some technical aspects of INSPIRE data format (GML: too big, too complicated)
• Some technical elements of the national/regional infrastructures doesn’t exist yet (registry, metadata not totally compliant)
• Some use cases are more organizational problem (cadaster of underground utilities)
• INSPIRE very useful as a starting point for data harmonization
• Some use cases are easily implemented in other environment (even more with harmonized data: 3D modelling, ecosystem services)
Questions