UN-GGIM: Europe Work Group on Data Integration

Report on task B2.1 "The methods of implementing the prioritised combinations of data: Review of current European Interoperability Frameworks and geospatial and statistical integration projects regarding methods of combinations of data"

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1. Executive Summary

This report contributes towards UN-GGIM: Europe's Work Group B on Data Integration. It forms part of the overall work of sub-group B.2 "Recommendations for methods implementing the prioritised combinations of data".

The aim of this report is to review existing European interoperability frameworks, and geospatial and statistical integration projects regarding methods of combinations of data, to understand and test the differences, similarities, and areas of overlap in the execution of interoperability frameworks across various organisations. It is expected that a correlation between similar practices and successful output of information and data will be apparent, once the examples are analysed.

Each member of the working group has provided examples, either at a local, national, or European level. These have been tested against a set of criteria determined by the work group and show where the successes and challenges lay in implementing different ways of combining different sources of data at local, national, and European levels.

The criteria that each provided interoperability framework has been reviewed against include:

1. Does the framework extend between different organisations?
    a. Ideally between statistical and geospatial organisations (due to the composition of the members of the working group).
2. Is the framework located within a singular organisation?
    a. Interdepartmental within an organisation, or
    b. Departments creating and using data from different sources.
3. Does the framework extend between or across different legal boundaries?
    a. Across national borders.
    b. Across locally defined boundaries.
4. What are the types of datasets that are being used or exchanged?
5. Are the data sets 'open' of 'paid for'[1]?
    a. Open data – data that can be freely used, re-used, and redistributed by anyone.
    b. Paid data – a data set that is created, owned, and maintained by organisations and for with others must pay a fee to licence/use the data.
6. Does the framework consider different business models?

2. Background, acknowledgements, and disclaimers

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) is the global forum for discussion, promotion, sharing of knowledge and good practice, and setting the global agenda relating to geospatial information. It provides a forum to liaise and coordinate among and between Member States and international organisations.

To align the strategic aims of UN-GGIM, Regional Committees have been set up to best serve the needs of different regions of the world. The Regional Committee UN-GGIM: Europe was established

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[1] We acknowledge that in practice the situation is not as binary as discussed here. For the case studies provided we feel that this broad description covers the main areas of focus, data may be free-of-charge but with some restrictions, free-at-the-point-of-use, or free for specific users.

on 1 October 2014. Its work plan focuses on two issues: increasing data interoperability, and harmonization by proposing core geospatial data and enabling the integration of geospatial data with other information/data (statistical, environmental, etc.) to foster further usage.

Germany chairs Work Group B "Data Integration". It is common understanding that Work Group B envisages a global vision with the focus on Europe for all tasks / deliverables. Strategic and political papers for "evidence based decision making" are needed rather than technical ones.

Following a consultative period, Work Group B set out its first work plan. Work Group B will supply deliverables for three main tasks:

1. Definition of the priority user needs for combinations of data;

2. Recommendation for methods implementing the prioritised combinations of data; and

3. Recommendation about how to manage side-effects induced by data combinations.

WG B decided to distribute the work to three sub-groups B1, B2 and B3, one for each task.

This report relates to sub-group B.2. the United Kingdom, represented by Ordnance Survey was asked to lead this task. B.2 has been split into three sub-task:

1. Review current European Interoperability Frameworks and geospatial and statistical integration projects regarding methods of combinations of data.
2. Provide best practice guidance to the interactions between NMCAs/NSIs/Environmental Agencies and other relevant organisations.
3. Review current use of data from multiple sources to identify case studies and best practices relevant for combinations with core data.

A wide range of national mapping, cadastral, and statistical agencies have contributed to the final version of this report. These contributions have been in the form of physical meeting, telephone conference, and email exchanges. At the closure of this report National Mapping and Cadastral Agencies, and National Statistical Institutes from 17 Member States, as well as representatives from European Agencies (Eurostat/JRC) have provided input to the report. A full list of contributors can be found in Annexe B. All the contributors are thanked for their contributions during the project, the full reports of B2 should help contributing organisations to provide case studies and evidence bases to their governments to promote the use of geospatial and statistical information for informed decision making.

The scope of this report has been limited to interoperability frameworks that represent the domains of national mapping, cadastre, and statistics, other thematic domains have not been considered due to the lack of representation on the Working Group, and therefore have been considered out of scope.

In providing this report to the UN-GGIM: Europe Executive Committee sub-group B.2 discharges these actions.

3. Introduction

The focus of this sub-task is to review existing European interoperability frameworks, and geospatial and statistical integration projects regarding methods of combinations of data, to understand and test the differences, similarities, and areas of overlap in the execution of interoperability frameworks across various organisations. To do this the report first defines what is meant by the term interoperability, and how it will be used in this context.

The report then provides an overview of the different case studies and examples of interoperability frameworks that are in use across Europe. The initial scope of the project was to compare current and historical examples of interoperability. However, given the wide number and wide scope of frameworks provided by members of the Work Group, it was decided to focus only on those that are currently in use.

4. What is interoperability

This section describes the meaning of the term interoperability, and provides an overview of the different classifications of interoperability. It provides context to the analysis that has been completed. Other terms and definitions of interoperability may be available; however, these definitions were agreed at the outset of the project by the working group.

4.1 Definition of interoperability

Interoperability describes the ability to share data or information between different entities such as computer systems, individuals, disciplines, organisations, and countries. It allows collaboration to take place by providing a common ground that can be utilised by those wishing to collaborate, for example by ensuring data is shared in the same format.

Interoperability is a property of a product or system, whose interfaces are completely understood to work with other products or systems, present or future, without any restricted access or implementation. Typically, there may be interoperability within a system, but often there are difficulties in linking to other systems or data sources.

An Interoperability Framework can be defined as the overarching set of policies, standards and guidelines which describe the way in which organisations have agreed, or should agree, to do business with each other. An Interoperability Framework is, therefore, not a static document and may have to be adapted over time as technologies, standards and administrative requirements change.

4.2 The relationship between interoperability and open standards

The work group felt it necessary to differentiate between interoperability and open standards. The reason is explained in the paragraph above; standards form an integral part of an Interoperability Framework.

A standard is usually established by consensus and approved by a recognised body – there are many examples of domain specific Standards Development Organisations. Standards provide – for common and repeated use – rules, guidelines, or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. They are usually established in a formal document that sets out uniform technical criteria, methods, processes, and practices. An

open standard is commonly understood to be publicly available and has various 'rights of use' associated with it.

Open standards rely on a consultative group including representatives from vendors, academics, and any others holding a stake in the development of an open standard. The representatives discuss and debate the technical and economic merits, demerits, and feasibility of a proposed common protocol. The resulting common document is endorsed as a common standard. This document is subsequently released to the public, and henceforth becomes an open standard. It is usually published and is available freely or at a nominal cost to all, with no further encumbrances. Various vendors and individuals can use the standards document to make products that implement the common protocol defined in the standard, and are thus interoperable by design, with no liability or advantage for any customer for choosing one product over another based on standardised features.

Interoperability and open standards are similar as they both set out to provide an exchange between two or more parties. Interoperability Frameworks can be applied at any stage of a workflow and to any part of a dataset or data creation process and do not need to be accessible to everyone, whereas open data standards are applied before production begins and are accessible to anyone.

UN-GGIM has, for several years, been considering and discussing a work package on *Implementation and adoption of standards for the global geospatial information community.* This work has led to the creation of information guides and good practices, including 'A guide to the role of standards in Geospatial Information Management[2]' and a 'National Mapping Authority Perspective: International Geospatial Standards[3]'. These documents, and the subsequent work of the working group should be one of the first points of interaction between organisations and international geospatial standards.

4.3 Three classifications of interoperability

After detailed discussion and research it was agreed that interoperability can be classified into these three broad areas:

- **Technical interoperability:** The ability for different technologies to communicate and exchange data based upon well-defined and widely-adopted interface standards.

- **Semantic interoperability:** The ability of each end-point to communicate data and have the receiving party understand the message in the sense intended by the sending party.

- **Policy interoperability:** Common business policies and processes (e.g. identify proofing and identity vetting[4]) related to the transmission, receipt, and acceptance of data between systems, which a legal framework supports.

Semantic interoperability allows multiple organisations to process each other's information in a meaningful way by ensuring that the precise meaning of exchanged information is understood and preserved throughout exchanges.

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[2] http://ggim.un.org/docs/meetings/GGIM4/E-C20-2014-8_Essential%20Standards%20Guide%20for%20UNGGIM.pdf
[3] http://ggim.un.org/docs/meetings/GGIM4/National%20Mapping%20Authority%20Perspective%20-%20International%20Geospatial%20Standards.pdf
[4] In this example, we describe identity vetting as "the process of confirming an individual's identity and identify any attributes that may pose security or other concerns in the public and private sectors." (http://itlaw.wikia.com/wiki/Identity_vetting)

Incompatibility between legislation in different countries can make technical interoperability impossible. Legal initiatives created through policy interoperability may be needed to remedy such situations.

When information is exchanged between countries to provide European public services, the legal validity of such information must be maintained across borders and data protection legislation in both originating and receiving countries must be respected.

It was decided that the focus of the task should be towards **semantic** and **policy** interoperability practices. This is due to pre-existing technical interoperability frameworks in place across Europe, and the fact that there are few well established policy and semantic interoperability examples in Europe.

5. Interoperability Framework examples

5.1 Scope of research

Each member of the working group provided case studies to be included in this review. These case studies could be within their own organisation, across different organisations, or across borders. The case studies provided were aligned to a common framework to make the extraction of information easier. Information requested included:

1. Short summary of the Interoperability Framework being discussed.
2. Key principles for the framework. A framework agreement can be seen as an agreement between one or more public authorities within a Member State or between Member States concluded prior to the dataset even being required. As some of the frameworks are more in depth than others, this section covers information relevant to the individual frameworks.
3. Licensing - what considerations, restrictions are in place. Details of how licences are handled between open data and organisations datasets. How is the licence applied to customers?
4. Sourcing, processing, and promotion methods. How are the member organisations clear on what kind of data or service is available and how the data or service can be obtained and used?
5. Charges. The mechanism used for charging and cost effectiveness. Who should pay for services and where should the finances operate.
6. Time constraints. Any timings for response, compliance of delivery as set out in the frameworks.
7. Notable successes since the launch of the framework. Improvements noted since implementation.

The intention of this research is to see whether local and European-wide interoperability frameworks could be compared to identify areas of commonality and overlap, and to identify the limitations where interoperability may be possible at local level, but not across borders[5].

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[5] As referenced in the 'Background, acknowledgements, and disclaimers' chapter, the scope of this report has been limited to interoperability frameworks that represent the domains of national mapping, cadastre, and statistics, other thematic domains have not been considered due to the lack of representation on the Working Group, and therefore have been considered out of scope.

5.2 Interoperability Frameworks received

Cross-border examples (European or Global)	Single border examples (within organisations or countries)
Copernicus	Austrian Address Register
DCAT (and extensions GeoDCAT-AP and StatDCAT-AP)	FUAGIS
ECOMET	GIP.AT (Graph Integration Framework)
ELF	Istat (Italian NSI) geoportal
EULF	Norway Digital
INSPIRE	SDI Germany: GDI-DE
OneGeology	Spanish Cadastral Electronic Office
	Swedish Geodata Cooperation
	Swiss FSDI
	Table Joining Service - Statistics Netherlands
	Turkey National GIS Infrastructure

6. Summary Analysis

Summary analysis can be seen below:

Framework		Criteria	Single organisation	Multiple organisations	Across legal boundaries	Defined licensing considerations	Multiple data types	Charges? Open data	Charges? Paid data
Framework	cross-boarder	Copernicus		✓	✓	✓	✓	✓	
		DCAT (GeoDCAT-AP and StatDCAT-AP)		✓	✓	✓	✓	✓	
		ECOMET		✓	✓	✓		✓	✓
		ELF		✓	✓	✓	✓	✓	✓
		EULF		✓	✓	✓		✓	✓
		INSPIRE		✓	✓	✓	✓	✓	✓
		OneGeology		✓	✓	✓			✓
	single-border	Austrian Address Register		✓		✓			✓
		FUAGIS		✓		✓	✓	✓	✓
		GIP.AT (Graph Integration Framework)		✓			✓		
		Istat (Italian NSI) geoportal		✓		✓	✓	✓	
		Norway Digital		✓		✓	✓		✓
		SDI Germany: GDI-DE		✓		✓		✓	✓
		Spanish Cadastral Electronic Office		✓		✓	✓	✓	
		Swedish Geodata Cooperation		✓		✓	✓		✓
		Swiss FSDI		✓		✓	✓	✓	
		Table Joining Service - Statistics Netherlands		✓		N/A	✓	N/A	N/A
		Turkey National GIS Infrastructure		✓		✓	✓		

6.1 Statistical Geospatial Framework

One key development since the beginning of this project, has been the development of the Statistical Geospatial Framework (SGF) on a request from the UN Statistical Commission, and led by the Australian Bureau of Statistics. The SGF has been developed on the concept that essentially all statistical information has a location, and that this location information, if recorded and stored, could be used as an evidence base to inform decision making. Building on several prior works such as the Australian national SGF, other national best practices, and the results of the GEOSTAT projects in the European Statistical System (ESS), ABS undertook a project to look at the challenge of linking spatial and statistical information, and how the integration could happen to achieve the required levels of integrating statistical and geospatial information[6].

The Statistical Geospatial Framework is a high-level, generic, framework that consists of five principles which are considered essential for integrating geospatial and statistical information. The five principles cover all phases of statistical production, from data collection to dissemination. They are underpinned using common standards, best practice and interoperable frameworks[7].
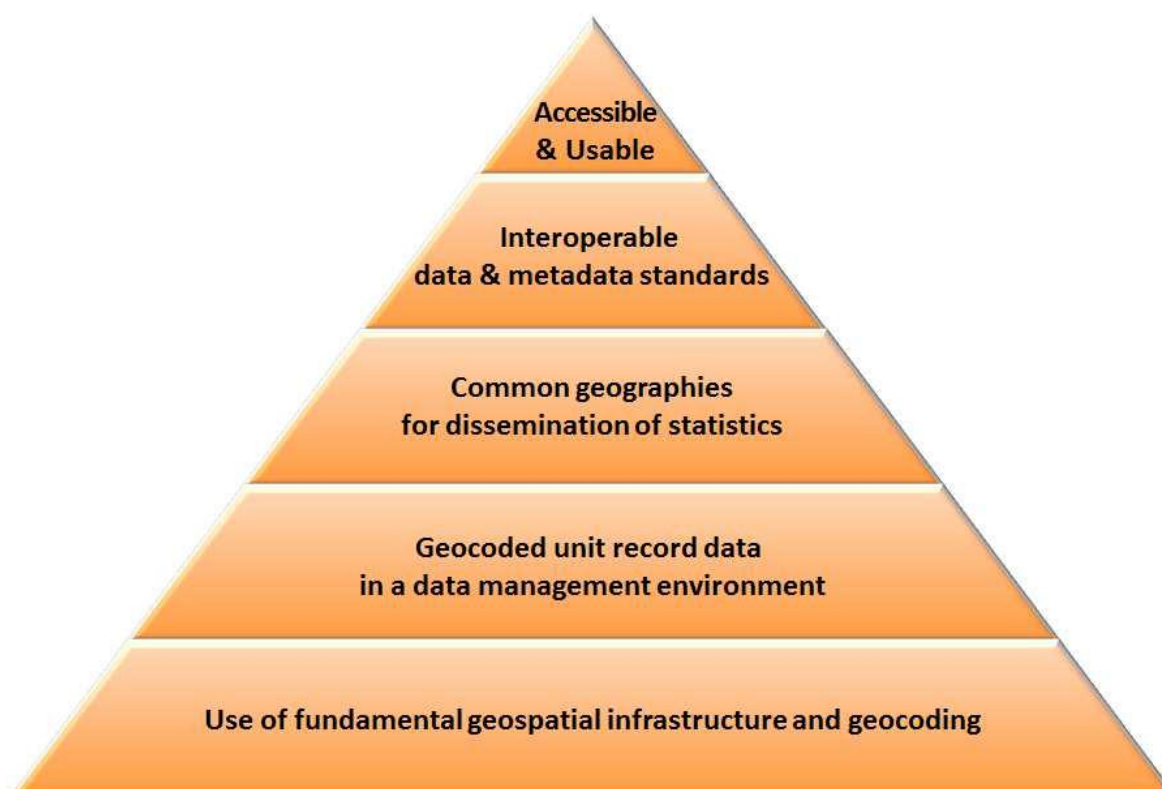
Figure: Proposed Statistical Geospatial Framework

The SGF has been explored in detail in several countries such as Australia, Mexico, New Zealand, Egypt, and United Arab Emirates, and several case studies have been presented to UN-GGIM Committee of Experts during plenary sessions and via the Expert Group on the Integration of Statistical and Geospatial Information.

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[6] http://unstats.un.org/unsd/statcom/doc13/2013-2-ProgReview-E.pdf

[7] http://ggim.un.org/docs/meetings/3rd%20UN-EG-ISGI/Proposal-for-a-global-statistical-geospatial-framework.pdf

Within Europe, the GEOSTAT 2 project which ran from 2015 until 2016 has developed detailed recommendations on geocoding statistics, which is at the core of the SGF. The follow-up project GEOSTAT 3 is due to start in February 2017 and will run until the end of 2018, it will take a more comprehensive and systematic view at the SGF. The project aims at developing a ESS version of the SGF, considering European specifics issues. This will result in guidelines on how to implement the SGF within Europe and on how to lead to harmonisation of implementation approaches which should result in more interoperability between Member States.

7. Findings and conclusions

There is, and has been, much work undertaken to define interoperability frameworks. The initial aim of the work group was to identify which of the Interoperability Frameworks provided the best overarching, cross-border framework and then would have recommended this as a case study to follow for subsequent new projects. During the processing of the information, it became clear that given the widely differing natures of the case studies, in terms of scope, legal basis, and timeframes for information that there could be no 'one-size fits all' approach to defining an interoperability framework.

Instead, the analysis undertaken suggests that a good European Interoperability Framework should have:

- **A simple goal:** to reduce effort across participating countries and organisations.
- **Simple straightforward licencing:** All licencing should be compiled into a singular, easy to understand license which covers all user of the data.
- **The result of providing reductions in administrative overheads:** an adopted framework should make sure that the allocation of resources to complete the tasks are considered.
- **A single point of data dissemination:** whether it is through a Web Map Service, or other provision.
- **A nominated committee:** that has been established and responsible for finances, allocation of resources, and other decisions.
- **An easily accessible documentation system:** webpages are a useful tool; users can see prototypes of the products, and have a forum where they can exchange questions on problems relating to the integration of the data, and other relevant topics. This should include a portal for the sharing of knowledge and resources.

Recommendation 1. During the research process, it was intended that semantic interoperability would also be considered. It proved to be not possible to use this type of information for comparison purposes, it was discovered that semantics vary based on the data subject matter. Despite this **UN-GGIM: Europe WGB.2 recommends that the basic framework (described above, and extrapolated from the policy examples analysed) should be incorporated into any new interoperability framework.** The application of the framework would result in successfully outcomes for certain datasets where statistical and geospatial information must be joined to provide tangible outputs, for example flood risk planning, or the migration of populations during extreme events.

Recommendation 2. Although the analysis of technical interoperable frameworks was agreed to be out of scope of this report it is worth noting that the stated aim of the Statistical Data and Metadata eXchange (SDMX) was to develop and use more efficient processes for exchange and sharing of

statistical data and metadata among international organisations and their member countries. To achieve this goal, SDMX provides standard formats for data and metadata, together with content guidelines and an IT architecture for exchange of data and metadata.[8] There is growing recognition that geospatial information can be collected from a variety of different sources, examples include National Mapping and Cadastral Agencies, global platform providers, or individuals through volunteered geographical information. **It is still a challenge however that statistical information needs to come from an authoritative source. It could therefore be concluded that whenever geospatial information is needed for statistical purposes it should come from an authoritative source.**

Recommendation 3. The Statistical Geospatial Framework provides an opportunity for the implementation of the linking of Statistical and Geospatial Information in a consistent and harmonised approach. It is expected that eventually the SGF will be the overarching methodological framework for the integration of statistical and geospatial information. The European Statistical System will be funding a GEOSTAT 3 project to develop a European version of the SGF. **UN-GGIM: Europe Member States are encouraged to input into the GEOSTAT 3 project once announced.**

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[8] http://ggim.un.org/docs/meetings/2nd%20UN-EG-ISGI/UN-GGIM%20EG%20Lisbon%20meeting%20Session%206%20background%20paper%20Metadata%20DCAT.pdf

Annexe A – Interoperability Framework case studies

The case studies have been presented in alphabetical order. The pan-European examples have been listed first, followed by the country/organisational examples.

A.1 Copernicus

The Copernicus programme is based on a partnership between the European Union, European Space Agency, and the Member States. It builds on existing European and national capacities and complements them with new assets developed in common. To implement this approach, the Commission endeavours to maintain a dialogue with ESA and Member States owning relevant space and in situ assets.

Framework specifics

- Copernicus is coordinated with activities at national, European and international levels.
- Coordinated contributions of Member States aiming at the operational delivery of services and the long-term availability of necessary observation data.
- Development of Copernicus services and ensure the complementarity, consistency and links between Copernicus and other relevant European Union policies, instruments, programs and actions to ensure that those policies, instruments, programs and actions benefit from Copernicus services.

Licensing

- The Commission, respecting third party data and information policies and without prejudice to rules and procedures applicable to space and in situ infrastructure under national control or under control of international organisations, may adopt delegated acts concerning:
  - The conditions and procedures regarding access to, registration and use of Copernicus data and Copernicus information, including the dissemination means.
  - The technical criteria necessary to prevent the disruption of Copernicus data and Copernicus information, including priority of access;
  - The criteria and procedures for the restriction of acquisition or dissemination of Copernicus data and Copernicus information due to conflicting rights.
- The Commission shall establish the relevant licensing conditions and procedures for dedicated missions' data and Copernicus information, and the transmission of satellite data to receiving stations or via dedicated high bandwidth connections to stations not part of Copernicus in compliance with this Regulation and applicable third-party rights.

Sourcing, processing, and promotion methods

- Entities entrusted with implementation tasks shall provide their services to all Member States.
- A Commission may implement acts and measures to promote the use of Copernicus data / information by Member States and support their access to the technology and development in Earth Observation. Such measures shall not have the effect of distorting free competition.
- When contracts involve, require and/or contain classified information, the contracting authority shall specify in the tender documents the measures and requirements necessary to ensure the security of such information at the requisite level.
- The contracting authority shall specify in the tender documents its requirements in relation to the reliability of supplies and of the provision of services for the execution of the contract.

- The contracting authority shall request the tenderer to subcontract a share of the contract by competitive tendering at the appropriate levels of sub-contracting to companies other than those that belong to the tenderer's group particularly new entrants and small and medium-sized enterprises (SMEs).

Charges

- A Commission manages charges, costs, and funds.
- Long-term stable investment environment and consult stakeholders when deciding to change products of both Copernicus data and Copernicus information services covered by this Regulation.
- The contracting authority may award a contract in the form of a conditional stage-payment contract. This shall include a fixed stage which is accompanied by a budgetary commitment which results in a firm commitment to provide the works, supplies or services contracted for that stage and one or more stages which are conditional in terms of both budget and execution.
- The Commission shall provide all relevant information pertaining to Copernicus, particularly in terms of risk management, overall cost, annual operating costs of each significant item of Copernicus infrastructure, schedule, performance, procurement and the assessment of the management of intellectual property rights.
- Dedicated mission data and Copernicus information shall be made available through Copernicus dissemination platforms, under pre-defined technical conditions, on a full, open and free-of-charge basis.
- The Commission shall take the appropriate measures to ensure that the financial interests of the European Union are protected, when actions financed under Copernicus are implemented, by the application of preventive measures against fraud, corruption, and any other illegal activities, by effective checks and, if irregularities are detected, by the recovery of the amounts wrongly paid and, where appropriate, by effective, proportionate, and dissuasive administrative and financial penalties.

Time Constraints

- The Commission sets scheduling.
- Regulation is binding and applicable immediately after release.

A.2 GeoDCAT-AP

Data Catalog Vocabulary (DCAT) is an RDF vocabulary designed to facilitate interoperability between data catalogues published in the Web. Data can come in many formats, ranging from spreadsheets over XML and RDF to various speciality formats. DCAT does not make any assumptions about the format of the datasets described in a catalogue. Its basic use case is to enable cross-data portal search for data sets and make public sector data better searchable across borders and sectors. This can be achieved by the exchange of descriptions of datasets among data portals. By using DCAT to describe datasets in data catalogues, publishers increase discoverability and enable applications easily to consume metadata from multiple catalogues. It further enables decentralized publishing of catalogues. DCAT is widely used as a metadata specification in Open Data Portals. DCAT is a W3 recommended specification.

GeoDCAT-AP is an extension of the DCAT application profile for data portals in Europe (DCAT-AP) for describing geospatial datasets, dataset series, and services. GeoDCAT unfolds its full interoperability potential in conjunction with StatDCAT which is a metadata profile currently under review/approval to document statistics (development of a SDMX interoperable extension of DCAT-AP). With these two domain specific extensions of DCAT-AP to statistics and geospatial information, the discovery of statistical and geospatial information through open data portals can be greatly increased.

Framework specifics

- The specification is a joint initiative of DG CONNECT, the EU Publications Office and the ISA Programme.
- GeoDCAT-AP specification does not replace either the INSPIRE Metadata Regulation nor the INSPIRE Metadata technical guidelines based on ISO 19115 and ISO19119. Its purpose is to give owners of geospatial metadata the possibility to achieve more by providing an additional RDF syntax binding.
- Specific attention was paid to interoperability of GeoDCAT not only with INSPIRE but also with the wider ISO 19115 Standard on metadata, for potentially outside EU application.

Licensing

- In order to foster the sharing and reuse of government data, it is important for a data provider to clearly specify at which terms and conditions their datasets can be reused. This can be easily done by referring to well-known licences and identifying them using URIs.
- DCAT-AP encourages implementers to use widely recognised licences such as Creative Commons licences, and in particular the CC Zero Public Domain Dedication, the Open Data Commons Public Domain Dedication and License (PDDL), the ISA Open Metadata Licence, the European Union Public Licence (EUPL) and open government licences, such as the UK's Open Government Licence. However, it has been noted that more specific advice on how to express a licence document and how to apply the licence type vocabulary is needed for the mentioned licences and for locally defined licences.

Sourcing, processing, and promotion methods

- GeoDCAT-AP will make it easier to share descriptions of spatial datasets between spatial data portals and general data portals, and thus help increase public and cross-sector access to high value datasets.

- In March 2015, the ISA Programme of the European Commission started working on a GeoDCAT-AP extension.
- The StatDCAT-AP project has just been discussed between European bodies responsible for DCAT and Eurostat as one of the main sponsors of SDMX in Europe. It is expected that the development of a SDMX interoperable extension of DCAT-AP will require about one year.

Charges

- No charges for accessing the data.

Time Constraints

- A first version was developed in 2013 and a revision was published in November 2015.

A.3 ECOMET

ECOMET is an Economic Interest Grouping of the National Meteorological Services of the European Economic Area. The European Commission (Directorate-General Competition) approved the ECOMET arrangements in October 1999.

Members are the National Meteorological Services of Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Iceland, Italy, Latvia, Luxembourg, the Netherlands, Norway, Portugal, Romania, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Framework specifics

- Guarantee the access to meteorological data and products.
- Assist the Members to maintain and improve their infrastructure.
- Increase the use and improve the distribution of meteorological data, products and services of the Members while maintaining and improving their quality.
- Allow the users to access all meteorological data and products through one Member, an idea of one-stop-shop.

Licensing

- The Members can license each other's data and products.
- Model licences are used to harmonise the licensing conditions.
- It is up to a Licensor which conditions to use if any.
- The Subsidiaries must be given in the Licence.
- Non-Chargeable data and products have no conditions on their use, except for the general requirement that the source of data should be mentioned.

Sourcing, processing, and promotion methods

- The arrangements of the ECOMET grouping are set out in the Formation Agreement, Internal Rules of Administration and Internal Rules of Operation. ECOMET General Assembly meets twice a year.
- Clear contact details are available for national contact points. Each Member is responsible for pricing own data and products according to its national law and data policy.

Charges

- The pricing of data and products is each member's own responsibility depending on their national law and data policy.
- Secretariat organises financial transactions.
- Has Non-chargeable data and products
- Has Chargeable data and products
- Displays a Price list.
- Can have Tariff modulations.

Time Constraints – N/A

Successes

- Fewer obstacles at the point of use.

- Reduction of total effort.
- The licences include options and conditions for different user groups:
  - End Users
  - Broadcasters and Publishers
  - Service Providers
  - Research and education
- The licences include also conditions depending on the type of use
- Creation and supply of value added service (VAS) products
- Redistribution of data and products as part of VAS
- Internet broadcasting
- There is an option for redistribution from Service Provider Holding Company to Subsidiary, which is allowed if the Holding Company declares that it has the majority of the voting rights in the Subsidiary. In this case the names of the Subsidiaries must be given in the Licence
- Clear processes: ECOMET has a Guide to assist Members to comply with the arrangements.
- The Members report quarterly on their sales of each other's data and products to the ECOMET Secretariat in Brussels.

A.4 European Location Framework

The European Location Framework (ELF) project has developed a technical infrastructure for future European location services. It provides a unique gateway to harmonised pan-European maps, geographic and land information. It is a practical implementation of INSPIRE and complements the activities of European national mapping, cadastral and land registry authorities. The European Location Framework will meet user needs whilst reducing costs, create new business opportunities, and increase the reuse of public sector information.

What are the benefits?

- A single source of official, quality-assured data from Europe's national mapping, cadastral and land registry authorities.
- A single point of access for licensing data from multiple countries.
- Harmonised data delivered to a common and consistent specification.

The 44-month project is supported by a consortium of 40 partner across Europe including private companies, academic organisations and national mapping, land registry and cadastral authorities. The project is co-funded by the European Commission's Competitive and Innovation Framework Programme (CIP).

Framework specifics

The background and framework for the ELF is the INSPIRE directive with its technical, administrative, and legal requirements.

- A sustainable, i.e. financially viable, operational European Location Framework (ELF) is both an ambition of the project and a key commitment made by the European National Mapping and Cadastral Authorities through their membership of and commitment to the purpose and strategy of their representative body, EuroGeographics.
- ELF represents a major shift in responsibilities and organisational role for the NMCAs. The ELF Data and Services that forms the base of the ELF Products, will be set up and controlled by the ELF Data Providers (DP). The DP are not turning over responsibility for data content or service operations to anyone else, unless they specifically decide to do so.
- The ELF platform will not be changing, reworking or even storing the ELF Data. There will be a certain amount of harvesting for intermediate storage (for example to deliver a cached WMTS or cascaded WFS service, or to display metadata), but this is a technical solution to be able to serve the user in a more efficient manner.

Licensing

- It provides a single point of access for licensing data from official sources. The aim is to minimize the number of contracts to a single contract and license model.
- The recommendation is that ELF will engage with both direct and indirect customer channels, but should not seek to serve end-users directly, except for those who are European in scope and size, some of whom are already using the EuroGeographics as their one-stop shopping for European reference data. The direct channels are mainly large governmental European organisations. The indirect channel are value-added resellers that will be providing products for the end-users in specific sectors including the consumer market. A set of licenses is proposed:

- o Evaluation license
  - o Developers license
  - o End user license
  - o Value added reseller license
- Data distributed via the ELF platform remains in the ownership of the data provider, and ideally will be available at no cost
- A license manager enables the user to easily find the conditions for use on the ELF platform. Information on licenses and pricing mechanisms as well as contact details are available in all the official languages of the data provider's country and strongly recommended in English.

Sourcing, processing, and promotion methods

- A data provider agreement (DPA) needs to be signed by each DP. In signing the DPA, the DP is also supporting the goals of ELF, and becomes a party to present and future discussions on solutions and development. The ELF DPA will ensure that the ELF Data and Services provided by the DP can be used in the ELF Products on the terms required by the DP while ensuring that the user can be offered harmonised conditions for the use of the ELF products.
- The project website provides information on all aspects of the project and includes general and technical help as well as a link to the ELF showcase application featuring a package of pilot products and services.
- Promotion methods: ELF awareness tour, ELF training webinars, newsletter, social media networks, presentations at SDI conferences

Charges

- The pricing of data is each member's own responsibility depending on their national law and data policy. National specifics are described as part of the ELF DPA. Charges are not realised during project lifetime.

Time Constraints

- ELF Service level agreement describes a set of minimum performance indicators. The agreement is part of the ELF DPA.
- For the ELF services, the starting point are the indicators in the INSPIRE Regulation on Network Services and the associated recommendations in the INSPIRE Technical Guidelines.

A.5 European Union Location Framework

The purpose of EULF is to help "location-enable" eGovernment, by providing a framework for assessment and action for exchange and sharing location information. This framework is relevant to all sectors and across borders, using INSPIRE in new situations and delivering location interoperability alongside the other ISA actions. The EULF vision is based on the premise that "more effective e-services, savings in time and money, and increased growth and employment will result from adopting a coherent European framework of guidance and actions to foster interoperable cross-sector and cross-border sharing and use of location information".

Framework specifics

- The first underlying principle calls for subsidiarity and proportionality as enshrined in the EU Treaty.
- When establishing European public services, public administrations should focus on functional needs and defer decisions on technology as long as possible in order to avoid imposing specific technologies or products on their partners and to be able to adapt to the rapidly evolving technological environment.
- Subject to security constraints, citizens and businesses should have the right to verify the information that administrations have collected about them and to be consulted whether this information may be used for purposes other than those for which it was originally supplied.
- Citizens and businesses should be able to understand administrative processes. They should have the right to track administrative procedures that involve them, and have insight into the rationale behind decisions that could affect them.

Licensing

- Ideally, European public services and licensing provided EU-wide should be available in all official EU languages to ensure that rights and expectations of European citizens are met.

Sourcing, processing, and promotion methods

- Records and information in electronic form held by administrations for the purpose of documenting procedures and decisions must be preserved.
- To guarantee the long-term preservation of electronic records and other kinds of information, formats should be selected to ensure long-term accessibility, including preservation of associated electronic signatures and other electronic certifications, such as mandates.
- For information sources owned and managed by national administrations, preservation is a purely national matter. For European public services and for information that is not purely national, preservation becomes a European issue, requiring an appropriate 'preservation policy'.

Charges

- Public administrations should ensure that solutions serve businesses and citizens in the most effective and efficient way and provide the best value for taxpayer money.

Time Constraints – N/A

A.6 INSPIRE

Infrastructure for spatial information in the European community (INSPIRE) have an outline of the framework policy. The INSPIRE work program used the Data and Service Sharing Drafting Team (DT-DSS) to develop recommendations for cross border data and service sharing. Due to the ever-changing scope for practice, it was decided that a good practice guide should be written rather than a finalised best practice document.

Framework specifics

- The framework applies to information created and maintained by the Public Sector. The framework agreement related to the sharing aspect prior to the actual usage of the spatial data and services. This also means that the information on the practical steps for getting access to the spatial data sets and services have to be communicated to the users.
- In most cases, a successful framework agreement will include several partners and several data sets and services, which can be all accessed by the end user using one single mechanism and standardised licenses.
- There is a requirement for an agency which has the responsibility and resources to give relevant answers to questions and queries put forward by the involved parties and for the maintenance of the infrastructure in place, it is important to have a forum where information can be given to the community involved and answers to questions can be provided.

Licensing

- A formal written or electronic licence is not mandatory and the supplier may choose not to use one. If no written licence is used, when data is shared under the INSPIRE Directive the directive will apply, and if it is provided by a member state to a community institution or body, the regulation on data and service sharing will apply.
- The use of framework agreements includes the need for a consistent data policy for all the providers involved. The licence conditions of the different organisations will get more harmonised during the development of the framework agreement.
- Any user can easily find the conditions for use on the website and can download a copy of the use conditions if he wants to.
- Information on licences and pricing mechanisms, as well as contact details are available in all the official languages, in the languages of the neighbouring countries or in English.
- Policy should include third party data access and use rights.

Sourcing, processing, and promotion methods

- Clear and smooth procedures for sharing data with other public authorities should be in place. This includes requests for access to the data sets and services being completed in a timely manner, provisions for answering any queries as to the usefulness for purpose that other public authorities may have, and provisions for responding to emergency demands for data.
- Ensure that the public know where they can find the data or services. The public should be made aware of new products, updates and activities via promotions. Online access should be permitted where possible.
- During collection, processing and production of data, metadata should be kept up-to-date frequently and be available via the network services. Any quality control reports and methods are to be released upon request.

- All the conditions for using the data and services are described in clear and understandable terms. The conditions are explained for all types of use. For a particular type of use, more information is needed by the public authority in order to determine the conditions.
- The user can obtain further information within a reasonable time, if needed taking into account an urgent need for access to the particular data or service. An e-mail address and a phone number are available online for obtaining more information on the data and services and ideally a response is given within a few working days.

Charges

- There are a variety of different approaches to calculate charges, one important aspect all charging approaches have in common is that the resulting charges should not constitute an obstacle at the point of use. Also, charges should be coherent, related to the use and easy to understand and implement.
- There is sufficient information available on pricing to enable the user to determine how much he will be charged for on the data or service he will use. A clear description on how charges are calculated is available. This includes the different factors considered and it might comprise the actual formula used to calculate the charges.
- Cost effective administration of charges means that only a small percentage of the revenue generated through charges is required to cover the administrative procedures needed on both sides (users and producers) to raise these charges in the first place.

Time constraints

- There is a set response time of 20 days unless another period is mutually agreed between the parties.

A.7 OneGeology

OneGeology is a global initiative to improve the accessibility of geological spatial data, the interoperability of that data and the transfer and exchange of knowhow and experience. Since its inception in 2006 it has been hugely successful and 115 nations are now participating with over 40 of those nations serving their data to a web map portal. OneGeology is coordinated by the British Geological Survey. OneGeology is basically a distributed multi-national spatial infrastructure.

Framework specifics

- Standards and processes to deliver clear information and practical support.
- Administrative and technical infrastructures are provided.
- Data is not harmonised as it varies too much and would be difficult to maintain.

Licensing

- Map data distributed as part of OneGeology will remain in the ownership of the originating geological survey or organisation, and ideally be available at no cost. You will need authority to be able to provide the map for OneGeology use.

Sourcing, processing, and promotion methods

- Daily updated website which provides up to date information on all aspects of the project and includes much downloadable technical and general help and information.
- Video and audio advertisement.
- Presentations at many events in both SDI and geology domains, globally, nationally, and regionally; regular newsletters, and social media networks.
- Telephone and sometimes in-country support is provided.

Charges

- Membership fees

Time Constraints – N/A

Successes

- Well-communicated policy for coordination.
- Significant effort has been put into outreach and the high media profile has undoubtedly been a major factor in encouraging participation.
- The outreach has been achieved by professional media advice and input; press releases aimed at the general (as well as professional) media; ensuring information about the project was simple to understand.
- Multilingual translation of key web documents.
- Effective sharing across levels of government: State and federal levels
- Documented "cookbooks" take participants (who may have no prior knowledge) through the process of making spatial data web-accessible.
- The project has adopted a "buddy" system where countries with the expertise pair up with those nations who need help to get started.
- Coordination is through a small operational and technical "hub", supported by operational and technical working groups formed from OneGeology participants.

- Documents relating to data delivery and standards are on the website, as well as the default "use statement", Intellectual Property Rights, policy and guidance, registry.

A.8 Austrian Address Register

The Austrian Address Register provides the authoritative georeferenced dataset of addresses for Austria. It is part of the Austrian cadastral legislation and bases on a contract between all municipalities (and cities) as well as the Austrian statistical office.

Framework specifics

- The authoritative dataset of addresses for Austria is the main reference frame for addresses in Austria concerning addressability, spelling, indenture number usage, and spatial reference.
- The address register consolidates the spatial address reference and the spatial reference for the Austrian professional and habitation register, which is held at the Austrian statistical office.
- The agreements obligate all municipalities to maintain the addresses and their geo-referencing in their sphere of action.
- The agreements authorise the Austrian Federal Agency for Metrology and Surveying to store and provide the address datasets through a central dissemination centre (e-geodata Austria).
- Any income is used to maintain the infrastructure and surplus is provided back to municipalities.

Licensing

- The overall number of contracts (~2 500 municipalities) is reduced to a single contract license model
- A diversity of geospatial address data can be minimized.

Sourcing, processing, and promotion methods

- A Steering Committee of the participating priorities is responsible for the communication, the contract licence model, adoption of legal acts, distribution model, pricing models and moulding of the dataset.
- The steering committee is the single access point for the citizen.
- The data quality becomes improved by maintenance procedures and client feedback, which are considered be following up by the steering committee.

Charges

- A steering committee decides a common price and licencing model based on market comparisons. This model includes open data distribution as well as a standardised pricing model.
- The revenues are strictly used to run the data and service infrastructure.

Time constraints

- N/A

Successes

- The consolidated procedure between municipalities, federal agency of metrology and surveying and the statistical office lead to improved data quality.
- The steering committee of the address register is the single access point for citizens and clients to clarify questions concerning addresses.

A.9 FUAGIS

Finnish Urban Area Geographic Information Service (FUAGIS) improves efficiency and quality of municipal service processes in technical and environmental sector. The project will offer three main products:

- A Municipal Technical and Environmental Sector Electronic User Service Platform for citizens;

- A standardized Data Exchange Interface; and

- A National Municipal GI Portal (NMGIP).

Framework specifics

- NMGIP offers one marketplace to get and purchase municipal GI via internet.
- NMGIP meets the requirements of both INSPIRE and PSI directives offering WMS and WFS based services to support customer's machine-to-machine interaction as well as downloading of municipal GI.
- NMGIP will be linked to National INSPIRE Metadata and Viewing Portal administered by National Land Survey as INSPIRE Coordinating Body in Finland.
- Ownership of the NMGIP will belong to municipalities.
- Association of Finnish Local and Regional Authorities (ALFRA) has responsibility to organize the NMGIP service on behalf of municipalities.
- Municipal co-operation in this project is based on voluntary agreement with municipalities at this moment representing 81% percent of inhabitants of the country.

Licensing

- Use conditions including pricing are published through NMGIP online and are available for users.

Sourcing, processing, and promotion methods

- Ten software vendors are partners in the project when defining and implementing Data Exchange Interfaces into municipal processes in technical and environmental sector.
- Further information is also available by email and telephone.
- The service integrates use of different municipal data services.

Charges

- The project is financed by Ministry of Financing, municipalities and ALFRA, who is the owner of the project.
- The budget is about €2.5 million.

Time Constraints

- NMGIP was defined during the year 2010 and implemented during the first half of year 2011.
- The project started in February 2009 and ended in May 2011.

Successes

- NMGIP offers access to all municipalities in one service and thus reduces obstacles at the point of use.
- The agreement will offer harmonised municipal licenses, charging mechanism and data policy.
- Metadata is up-to-date and available.
- The FUAGIS concept is based on the principle of data being available at the point at which it is created. NMGIP serves metadata for all datasets and services from municipalities and has direct access to the municipal process where data is created.

A.10 GIP.AT (Graph Integration Framework)

The purpose of the GIT.at framework allows digital management of the traffic data in compliance with standardised rules. To this end it is necessary for the various reference systems used to store data (=graphs) to be aware of one another. This framework is the Graph Integration Platform (GIP). It is maintained by a steering committee, all municipalities, cities and regional authorities and is made available free of charge to all municipalities, cities and other local and regional authorities.
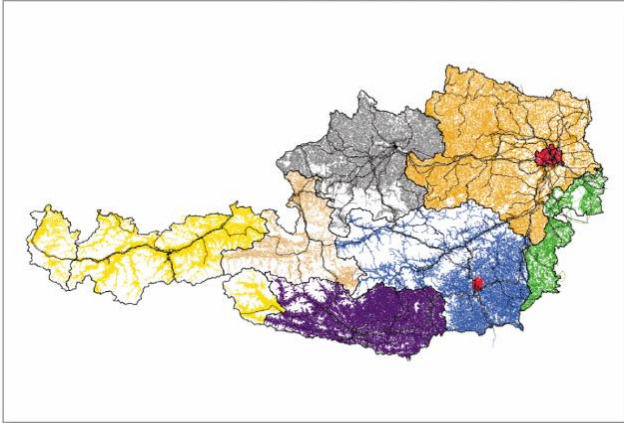
Framework specifics

- A joint, nationwide transport graph provides a digital map of Austria's transport network available to all authorities.
- All authorities are embedded in the maintenance of the transport graph.
- The ongoing adjustment and improvement of transport infrastructure always needs to take into account pertinent laws and is usually associated with changes to traffic management and organisation.
- The municipal departments and district administrations have all the information on free-flowing traffic. The authorities in the federal provinces and municipalities have all the information on public and stationary traffic.
- It is now possible to compile traffic-related data created by means of e-government processes to comply with legal requirements and make it directly available in digital format.

Licensing – N/A

Sourcing, processing, and promotion methods

- A steering committee is responsible for the governance of infrastructure, its maintenance and the change management of the technical framework.
- The steering committee is the single access point for issues concerning the framework.
- The steering committee is the coordination body for all participating parties (municipalities, cities and regional authorities)

Charges

- Whilst no information is available on charges for the use and reuse of information, the GIP.at project has a total financing volume of EUR 1,950,800 and was made possible by the Climate and Energy Fund, receiving a 50% subsidy under the framework programme "Public Transport".

Time constraints – N/A

Successes

Benefits for all municipalities, cities, and regional authorities are:

- Daily updates of all traffic related action
- Quick information
- Fewer on-site inspections and negotiation, leading to
- Accelerated processes with all administrative authorities
- Quality enhancements thanks to easily recognisable content-related inconsistencies
- Advantages for emergency services due to simplified accident report procedures as well as data forwarding and data provisioning
- Numerous projects and services are already using the advantages of Graph Integration Platform (GIP) being the nationwide Austrian reference traffic network graph.

A.11 ISTAT (Italian NSI) geoportal

The Italian National Statistical Institute GISTAT (Geographic Information System for Statistics) is and SDI to promote the use of the geospatial information linked to official statistics (http://gisportal.istat.it).

Framework specifics

- Geospatial data linked to official statistical information are available for free download in an open format, and even for a machine-to machine usage through online Web Map Services. Most of the geospatial data comes from the census mapping cartography at different years (2011, 2001, 1991) for the entire Italian territory. (20 regions, 110 provinces, more than 8 000 municipalities, more than 60 000 localities, more than 400 000 enumeration areas per each census year.)
- Interactive web applications focused on spatial analysis together with pre-processed geostatistical maps are available to support territorial analysis and procedures for citizens.
- Experiences of cooperation based on that SDI:
    - Experience of cooperation with other internal departments (e.g. GISTAT integration with ISTAT LOD portal)
    - Experience of digital cooperation with more than 8 000 municipalities to produce GISTAT census mapping cartography.
    - Experience of cooperation with other public institutions (e.g. interactive cartography component of Water Portal (Portale delle Acque) has been developed on top and is hosted on GISTAT, it is a government portal to disseminate information concerning water resources http://www.acqua.gov.it/index.php?id=27&L=0)
        - The technical interoperability has not been implemented, so manuals steps are required to enhance and update the data published on the portal.
        - Detailed accounts of how the technical aspects of data interoperability inside each institution: each institution provide its own data. ISTAT was responsible for the harmonisation of data and for the design of the portal (and the interactive mapping). Next steps are oriented to enhance the technical interoperability to avoid data duplication.
        - The technical interoperability has not been implemented, so manuals steps are required to enhance and update the data published on the portal.
        - Detailed accounts of how the technical aspects of data interoperability inside each institution: each institution provide its own data. ISTAT was responsible for the harmonisation of data and for the design of the portal (and the interactive mapping). Next steps are oriented to enhance the technical interoperability to avoid data duplication

Licensing

- ISTAT operates under a Creative Commons License – Attribution – 3.0 and if not otherwise stated, data and analysis from the ISTAT website can be copied, distributed, transmitted and freely adapted, even for commercial purposes provided that a source is acknowledged.
- No permission is necessary to link to pages on ISTAT website.
- Data download is free of charge.

Sourcing, processing, and promotion methods

- GISTAT provided Web Map Services and WebGIS applications to reach internet geostatistical users.
- Metadata catalogue is on a testing phase on the intranet; it supports discovery OGC services and download services (INSPIRE compliant).
- GISTAT homepage is accessible from ISTAT homepage at the territorial data section (http://www.istat.it/it/strumenti/territorio-e-cartografia).
- Moving towards multilingual dissemination (e.g. http://gisportal.istat.it/bt.flussi/?lang=eng)

Charges – N/A

Time constraints

- Most of data have a temporal validity, especially data related to statistics. In the metadata catalogue, time validity is explicitly set. Generally interactive tools require the user to set a temporal filter.

Successes

Benefits for all municipalities, cities, and regional authorities are:

- An open geospatial platform implemented by a National Statistical Institute.
- First steps to be INSPIRE compliant to contribute to European Statistical System (ESS).
- Promoting the use of geospatial information for statistical use.
- Joint development of inter-governmental geospatial applications.
- Example of geospatial data harmonisation among all the Italian municipalities re-distribution for free.
- Portale Acque was a success of policy interoperability among ISTAT, the government department for hydrogeological disasters and other government agencies dealing with environmental topics.

A.12 Norway digital

Norway digital provides a contractual, voluntary framework in which public sector data owners and users can participate. It allows them to share data, and participate in the development and implementation of a national geodata policy.

Framework specifics

- A general agreement negotiated between all parties and a special agreement for each party with details of their rights and obligations.

Licensing

- All participants are getting access based on common licensing terms.

Sourcing, processing, and promotion methods

- Any updates or new data are made available at once to the other parties.
- A result of the co-operation is a national geo-portal on-line, where metadata and other information about the datasets are available to the public.
- Included is a download service for ND participants.

Charges

- Each party is paying a fee based on their usage of data.
- If a party contributes data, they receive reimbursement for that, and are obligated to use the funds to improve on the data and services for the framework.
- Agreements and applicable payment is done in advance, allowing participants to budget their need for geodata for the whole year regardless of what needs may come up during the year.
- The pricing is done on a yearly basis and all participants know in advance how much they will be charged.

Time Constraints

- Discrepancies between projected and actual use that requires changes, are dealt with in the following years negotiations.

Successes

- The general agreement for Norway digital provides a clearly defined and well communicated policy for co-ordination.
- Efficient communication is provided by a system of contacts, a common website and various forums for technical, administrative and general policy issues. These forums also provide technical and administrative support.
- The documentation and the website provide clear and transparent information to existing and potential new stakeholders.
- Instant access to all data over a shared network according to a national standard provides effective sharing across levels of government.
- The secretariat provides practical support as well as an administrative and technical infrastructure.

- The existence of agreements and shared services gives direct access without any obstacles at the point of use.
- Licenses are negotiated yearly for all parties, greatly reducing the effort for each participant for getting licences with all partners that deliver relevant data.
- The central agreement provides clear processes for making decisions relating to the Agreement.
- Several forums are provided for exchange of information.
- Metadata is mostly up-to-date and available for the participants and the public through the geoportal.
- Clear contact details and speedy process for acquiring further information.

A.13 SDI Germany: GDI-DE

The Spatial Data Infrastructure Germany (Geodateninfrastruktur Deutschland - GDI-DE) is an organisation in the responsibility of the Federal Government, the Länder (states) and the municipalities. The overall goal of GDI-DE is providing easy access to spatial data sets over standardized internet technology. The spatial data infrastructure should serve the need of politicians and administration as well as users coming from the private sector. The GDI-DE is the national part of the European Spatial Data Infrastructure, which is regulated by the EU-Directive INSPIRE.

Framework specifics

- The GDI-DE framework is formally set up by an administrative agreement. It includes organisational, financial and legal aspects. It is published through the GDI-DE Website: http://www.geoportal.de/SharedDocs/Downloads/DE/GDI-DE/Verwaltungsvereinbarung_2013.html (German language). A technical framework is also available, called the "GDI-DE architecture". It includes several documents about strategy, technology, and an action plan. Spatial data sets of the GDI-DE must be compliant to the GDI-DE architecture.

Licensing

- There is no GDI-DE licence, but there is a GDI-DE obligation that licence conditions should be published through metadata information.
- Use Conditions and licenses can be either open or restricted, but open conditions are preferred. "Open Data resources" should be marked with a certain "metadata key word (open data)". The metadata sets should provide further technical information, e.g. a resource information (e.g. URL) where the use condition is documented.
- The GDI-DE catalogue (Geodatenkatalog.de) is one of the main sources of the "National Open Data Portal (https://www.govdata.de/)". Metadata information about "Open Data sets" can therefore be filtered (keyword) and then be transferred into the Open Data Portal or other applications.

Sourcing, processing, and promotion methods

- Any user can easily find the provided data within the infrastructure on a website or through a service.
- All GDI-DE services are available through a central catalogue called "Geodatenkatalog.de". The GDI-DE data and service providers are obliged to publish all their resources through "Geodatenkatalog.de". This catalogue is integrated inside the National Geoportal (www.geoportal.de), which is the promotion platform of the GDI-DE.

Charges

- The Federal Government and the Länder are funding the budget for the national coordination process and the maintenance of the National SDI Components: Geoportal.de, Geodatenkatlog.de, GDI-DE Test suite and Registry.
- Furthermore, the Federal Government and each of the Länder are financing their own decentralized SDI structures. The use of all those components is in general free of charge.
- Charging for individual datasets and services is in the responsibility of data owners and service providers.

Time constraints

- Time and compliance regulations are similar to the INSPIRE-regulations. Test about time and compliance conformity can be carried out by a National SDI component: GDI-DE Test suite

Successes

- More than 100 000 metadata sets about SDI resources are available.
- Automated routines for testing metadata and services implemented.
- Automated routines to identify and deliver data to INSPIRE implemented.

A.14 Spanish Cadastral Electronic Office

The Spanish cadastre is a pioneer public sector organisation in its facilitation of access and re-use of its data for free for both commercial and non-commercial purposes. It has evolved from being a government tax collection and a real estate security service to being a socially valuable tool since this data is used in an increasing number of application and new services. This approach has led progressively to a huge success in demand, with millions of visits and requests to download the cadastre's data.

The Spanish Cadastral Information System www.sedecatastro.gob.es is a dynamic, open system with numerous flows of interchange of information with multiple external agents who interact with the Cadastre's databases both as suppliers of information and as users and clients.

Spanish Cadastre is one of the main data providers of the Spanish Spatial Data Infrastructure (IDEE) and offers INSPIRE services for 52 million Cadastral Parcels, 40 million Addresses and 13 million Buildings.

Framework specifics

- The Spanish cadastral law establishes that the Spanish General Directorate for Cadastre (SGDC) is responsible of creation, maintenance and diffusion of the cadastral data either directly or in collaboration with local authorities and other public entities.
- All citizens, notaries and registrars and the public administrations which work in the territory are obliged by law to submit information on the changes in the real estate in the Cadastre with the technical conditions defined by the cadastre that verifies that the graphical information is correct.
- Therefore, Spanish cadastre offers to its collaborators all its data for free in standard formats and services and provide the tools and the proceedings to update and use the cadastral information.
- The collaboration system has been set up by administrative agreements. They are published through the web page of cadastre www.catastro.meh.es.
- The exchange technical framework is also available in this page.
- The dissemination of cadastre information also lays out the free nature of this information for both non-commercial and commercial re-users that allows mass downloads under a simple and clear license model by any citizen or private company.

Licensing

- The collaborators can view and download cadastral data and use cadastral services free of charge without licence.
- Other private users can view non-protected data, including all cadastral cartography, without licence free of charge. But the download of this information is under a license of transfer of rights to be obtained automatically in the download process, assuming its use the knowledge and acceptance of the access requirements and the terms of the license. This license does not authorize the diffusion, distribution or commercialization of the given **original** information, which cannot be spread either by Internet or by any other way without its previous transformation in another product.
- The conditions are published through metadata information that it is also available in the Spanish Spatial data infrastructure www.idee.es.

Sourcing, processing, and promotion methods

- The cadastral platform for exchange information with customers and partners permits all municipalities, notaries, land registrars and other public administration as statistic department, environmental department, agriculture department, urbanism department, public works department etc. to collaborate in the maintenance and use cadastral data for their activities.

  - The strategy consists of gathering other Public Administrations, as well as other organizations, sharing useful information for all of them.

  - They are all considered as providers and beneficiaries of the Spanish General Directorate for Cadastre: they help Cadastre to maintain the data base updated and they can acquire all necessary data for their goals

- Data is electronically provided by collaborators; all the exchange of information can be done through web services and they can also process the information working directly in the cadastral platform.

- Spanish cadastre is also responsible for the dissemination of the information to private users. Cadastral data such as large volumes of information, including all digital cartography, are easily accessible and free of charge.

- The current framework is clearly a pro re-users' policy which encourages all parties to access the information for any purpose, although it also lays out a number of complementary rights and obligations. The copyright remains with the Cadastre and any re-user must add value to the information to be able to launch a new product or service. Just reproducing the information of the Cadastre, without any added value is not allowed.

Charges

- The data and services are free of charge.

Time constraints

- Data is continuously updated.

Successes

- The Electronic Office of the Spanish Cadastre has more than 53 million of visits in 2015.
- The Cadastral platform for exchange information with customers and partners is well known and used by all the Spanish administrations that work in the territory with a win-win approach. With more than 60 000 registered users.
- The complete cadastral cartography can be viewed and download in a very easy way, free of charge, by citizens, companies and administration and it is widely used by society; annual downloads reaches over 124 million maps.
- The increase in use and transparency of the system has resulted in users telling it about errors in the data or potential improvements, thus improving the quality of the data with the re-users' feedback.

A.15 Swedish Geodata Cooperation

Framework specifics

- Swedish SDI is based on several important corner-stones, such as the National Geodata Strategy, the Geodata Cooperation, the standardisation work and the technical solution with a national Geodata portal and the links to the European INSPIRE Geoportal.
- The Geodata Cooperation Agreement includes how to handle organization, steering, coordination and responsibilities as well as technical prerequisites, forms of supply and terms of use of spatial data.
- The agreement is based on the data sharing principles of INSPIRE, Lantmäteriet negotiated with all the geospatial data providers per INSPIRE to sign the agreement during 2010 – mainly to get them to accept the proposed annual fee and the business model.

Licensing

- The Geodata Cooperation Agreement includes how to handle organization, steering, coordination and responsibilities as well as technical prerequisites, forms of supply and terms of use of spatial data.
- Municipalities, government agencies and other organisations which conduct official duties can also join the Geodata Cooperation, and thereby get access to all geodata in the Product Catalogue, for official use.

Sourcing, processing, and promotion methods

- Sustainable cooperation within the infrastructure for spatial information and is managed by the National Mapping and Cadastre Authority, Lantmäteriet.
- Parties in the cooperation are authorities with an information responsibility per the Swedish Act and Ordinance on Spatial Information, based on the INSPIRE directive, and municipalities, government agencies and other organizations with official duties.
- Available geodata are presented and described in a Product Catalogue.
- The Geodata portal show metadata, provided per a Swedish metadata profile (based on ISO), view services and links to download services.

Charges

- The parties in the Geodata Cooperation offer each other their spatial data for official use to an annual fee.
- A partner signs One Agreement, a partner pays One annual fee (Municipalities 10.000 € - 100.000 €, Public Authorities 5.000 € - 650.000 €). Gives access to > 400 geodata products from 19 public data providers.
- The next step that is being discussed in Sweden now is how to find a way to let the funding needed to provide data for public use go directly to the data providers as appropriations.

Time constraints

- The Geodata Cooperation fulfils the INSPIRE data sharing objectives and a special Geodata Cooperation Agreement was put in place in Sweden 2011.

Successes

- Cost-effective way for the public sector to use data of high quality

- Spatial data is available as services on the web making it easier for the private sector to benefit from this infrastructure, as it gives easier access with known conditions and licenses.
- "With the agreement we got access to so much new, high quality geospatial information that we think it was well worth it."

A.16 Swiss FSDI

To establish and develop a Federal Spatial Data Infrastructure (FSDI) is a politically approved and supported initiative of the Swiss federal administration under the lead of its national mapping agency (Swisstopo) for the last 15 years. This endeavour constitutes also the core of the Swiss Legislation on Geoinformation which has been in effect since 2008. Its main objective is to promote and facilitate the generation and utilisation of public geodata by providing harmonised and standardised ways to meta-information and data access e.g. by dedicated geoservices and a national web geoportal.

Framework specifics

- The Swiss National Law on Geoinformation accompanied by nine ordinances forms the legal basis and describes the main constituents, objectives and components of the FSDI.
- The participants include all federal administrative bodies producing and using Geoinformation. By special agreements its facilities and access mechanisms are also extended to local (e.g. cantonal and communal) administrations.
- The majority of geoservices such as a geodata catalogue, a map viewer and WMS service for public geodata, a geodata shop (not yet operational) are not only open to authorities, but can be used as well by any interested parties and persons both within and outside of Switzerland.

Licensing

- All metadata, the map viewer as well as the WMS Service are freely accessible to private sector users and to the public.
- The use of downloaded geodata, as well as cartographic representations, requires mentioning the data sources and is subject to specific terms and conditions, which can be seen at www.geo.admin.ch/internet/geoportal/en/home/geoadmin/contact.html. For specific geodata, additional restrictions may apply (e.g. special fees for commercial use).
- In these services, links are provided to download the actual geodata, either automatically or by redirecting the users to the corresponding sites of individual partners of the FSDI.

Sourcing, processing, and promotional methods

- The Geoportal provides access to a vast set of spatial information on the territory all the commonly used spatial data sets are accessible online. An annex to the main geoinformation ordinance lists all government geodata available as well as the conditions for access (i.e. internet download available, visualization in the geoportal).
- Each geodata set has to be described in a standardized data model language in order to be integrated in the NSDI.
- The services currently offered include a view service, a catalogue of all the public data sets with related discovery service, a data models repository and a download service for some spatial data sets.
- In addition to the data itself, the FSDI promotes its data and services very actively and presents its application potential, e.g. by StoryMaps, brochures, special instruction materials and courses for teachers and school classes, participation in national/international competitions, conferences and exhibitions

Charges

- The main developments and activities are funded by the Swiss Government through the budget of the national mapping agency Swisstopo. The production, description, modelling and standardization of geodata are co-funded through the budgets of the other federal offices as well as the budgets of the contributing cantonal, regional and communal offices for their respective geodata.
- All services and most data are provided to the users free of charge. Whereas the planned geodata shop will also disseminate payable geodata and geoinformation products.

Time Constraints

- Legislation is binding and applicable immediately after release, with clearly specified periods for the implementation of harmonized, homogeneous data models, metadata information, concepts for data archival and permanent data availability.

Successes

- Successful definition, political acceptance, and implementation of detailed and comprehensive legislation on Geoinformation.
- Rules, specifications, and standards to share Geoinformation and to access common services.
- Establishment of widely used and acknowledged national geodata portals encompassing comprehensive information and various geoservices
- Efficient communication is provided by a system of contracts, a common website and various forums for technical, administrative and general policy issues. These forums also provide technical and administrative support.
- The documentation and the website provide clear and transparent information to existing and potential new stakeholders.
- The secretariat provides practical support as well as administrative and technical infrastructure.

A.17 Table Joining Service - Statistics Netherlands

Framework specifics

- In 2013, Statistics Netherlands was rewarded a grant from Eurostat to research the business case for a Table Joining Service (TJS), resulting in a report with a positive business case. Several activities have launched off the back of these results such as a Health Statistics implementation done under the auspices of the European Location Framework.

Licensing

- N/A – Framework is a proposal at time of inclusion.

Sourcing, processing, and promotion methods

- Statistics Netherlands thinks that a combined European action by means of a Table Joining Service, operating on existing table services (Eurostat SDMX web services) and map services, is a very cost-effective way to meet the INSPIRE goals.
- Officially, all statistical offices of the member states are responsible for the publication of their map service per INSPIRE. This would mean that 28 statistical offices would create map services for all their tables that fit the Inspire themes for Population and Demography, Human Health and Energy. This is a very large and costly effort, which can be avoided once a combined European action is undertaken by means of a TJS operating on the Eurostat SDMX web services.

Charges

- N/A – Framework is a proposal at time of inclusion.

Time constraints

- N/A – Framework is a proposal at time of inclusion.

Successes

- Data is machine readable and can be used in several applications without the need for a statistical officer.
- Cost effective way to meet inspire goals, allowing European Geographical information more available for the public in a harmonised way.
- Ability to create map services on demand rather than creating bespoke maps that may or may not be useful. This is particularly useful when making maps with statistical tables as the number of map services required to generate a product of each statistical table would be costly to store.
- Connecting the source tables allows the data to remain as up to date as possible.
- The ability to use the online service to create maps means customers don't need costly GIS applications and other data handling software.

A.18 Turkey National GIS Infrastructure

Turkey started e-government actions to build Turkey's National Spatial Data Infrastructure titled as "Turkey National GIS" (TUCBS or TRGIS in English) in 2004.

Framework specifics

- TRGIS actions aim to enable effective use and sharing of geographic data on digital communication network by developing standards, policies, and technologies.
- Consecutive actions determined current situation and general vision. However, requirements could not be determined on production, management, and sharing of geographic data.
- Public institutions in Turkey started investment for Information and Communication Technologies (ICTs) in the 1990s especially.

Licensing

- National and international SDI initiatives are examined. After examining legal and administrative structure in Turkey; vision, mission and expectations are determined in the context of TRGIS. Implementation strategy steps are defined. The draft TRGIS framework legislation is prepared after examining INSPIRE directives and SDI legislation in European countries.
- Legislation and implementation rules are examined to manage TRGIS portal and to determine data specifications and responsibility of data providers. And, possible legal arrangements are investigated to develop TRGIS in the long term.

Sourcing, processing, and promotion methods

- Site selection analysis is done considering the relevant standards. Centralized, distributed architecture and cloud computing architectures are analysed by examining the infrastructures of the institutions that can be used as data centre and portal centre.
- INSPIRE, ISO and OGC criteria, web services, personnel criteria, software/hardware details are examined to build TRGIS portal for the institutions. The portal implementation rules are defined by considering infrastructure and responsibilities in terms of network services and network access.
- In Turkey, geographical data produced by different institutional stakeholders and the geographic information system applications, decision-making process by contributing to the creation of a structure to avoid information loss in terms of time and effort required.

Charges – N/A

Time constraints

- TRGIS actions like National SDI initiatives around the World were carried out in Turkey since 2004.
- Uncoordinated bureaucracy and authorization changes constantly hamper the sustainability of TRGIS progress. In this way, beside capacity building activities, TRGIS require process-based approach in the long term instead of product-based approach in short term.

Successes

- TRGIS draft legislation was prepared and is put into practice in March 2015. The legislation, namely, "Establishment and Maintenance of National Geographical Information System",

includes contents like INSPIRE legislation accepted in European countries. Other legislation requirements were also examined. The sections of this legislation include:
- TRGIS vision, aim, scope, and definitions,
- TRGIS administrative structure with units, principles, and duties to coordinate TRGIS activities in Turkey,
- TRGIS base and thematic geo-data themes with definitions,
- Responsibilities of stakeholder institutions,
- TRGIS metadata,
- TRGIS network services with properties and pricing policy,
- TRGIS interoperability principle for sharing geo-data sets and services,
- TRGIS calendar.
- Guide for Interoperability Principles was published in 2009 and updated in 2012 by DPT within the scope of E-Turkey Project. This aims the interoperability between all institutions to serve geo-data sets in electronic environment to the community.

Annexe B – List of Contributors

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