European Commission

JRC SCIENTIFIC AND POLICY REPORTS

INSPIRE Annex II and III Themes Testing and Consultation Summary

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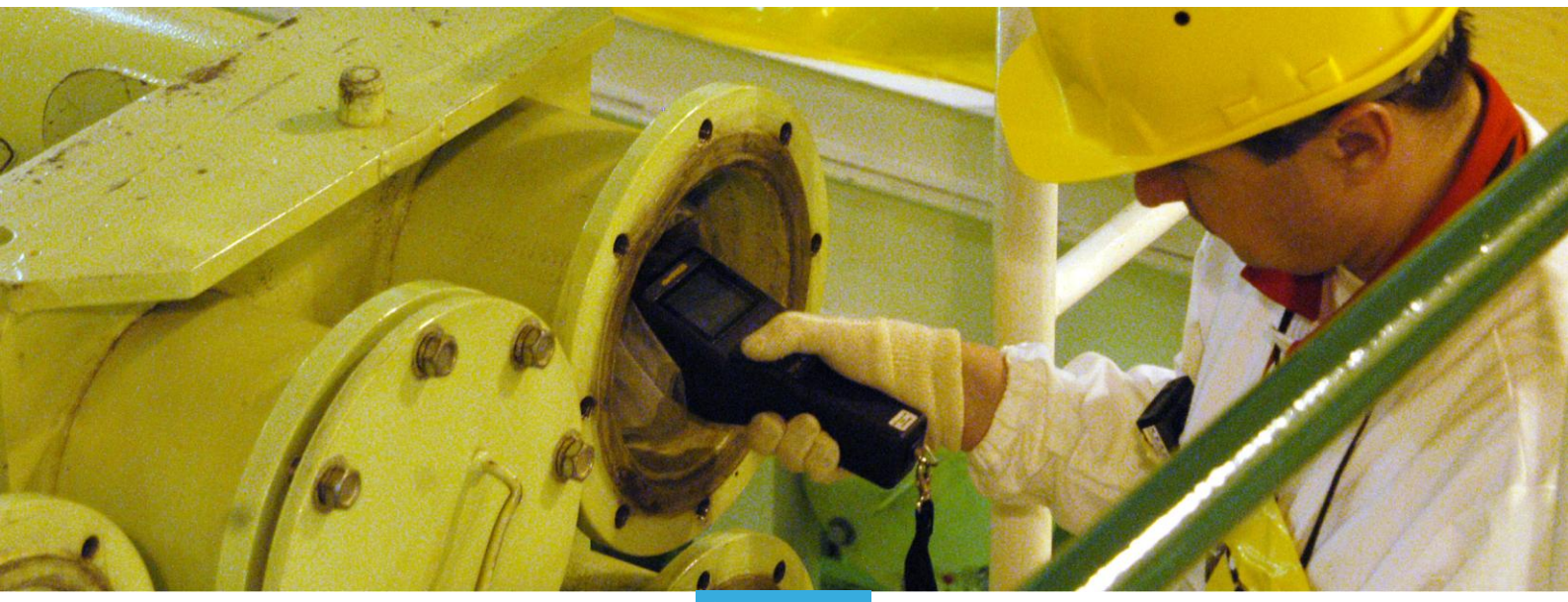
2012



Joint Research Centre

INSPIRE

Infrastructure for Spatial Information in Europe

INSPIRE Annex II and III Themes Testing and Consultation Summary

Title	INSPIRE Annex II and III Themes Testing and Consultation Summary
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Date	2012-12-21
Subject	Spatial data specifications development and implementation.
Status	Final
Publisher	JRC INSPIRE Data Specifications Team
Type	Text
Description	The summary of the process of INSPIRE Annex II and III themes spatial data specifications testing and consultation (2011-04-08 – 2011-10-21)
Contributor	JRC Data Specifications Team, Annex II and III TWGs, SDICs & LMOs testing and consultation participants
Format	Portable Document Format (pdf)
Source	
Rights	Public
Identifier	inspire_annex_ii_iii_testing_consultation_summary.pdf
Language	En
Relation	INSPIRE Roadmap for data specifications http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2/list/5
Coverage	Annex II and III data specification development process (2010-2012)

These are Dublin Core metadata elements. See for more details and examples http://www.dublincore.org/.

Acronyms / Glossary

Used Term	Definition
CT	Consolidation Team
DG JRC	Directorate General Joint Research Centre
DS	Data Specification
EU	European Union
FGI	Finnish Geodetic Institute
FME	Feature Manipulation Engine (Spatial Data Transformation Platform)
GIS	Geographic Information System
GML	Geography Markup Language
HTML	HyperText Markup Language
INSPIRE	Infrastructure for Spatial Information in the European Community
LMO	Legally Mandated Organisation
SDE	ESRI ArcSDE (Spatial Database Engine)
SDIC	Spatial Data Interest Community
SHP	ESRI Shapefile
TWG	Thematic Working Group
TXT	Text File
UML	Unified Modeling Language
XLS	Microsoft Excel Format
XML	Extensible Markup Language

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Executive summary

The establishment of spatial data infrastructures offers frameworks allowing effective exchange and utilisation of digital spatial related information in order to support a large number of the policies and activities across the various domains and sectors in Europe. Achievement of this ambition requires participatory approach based on stakeholders' involvement. The Directive 2007/2/EC[1] of the European Parliament and of the Council adopted on 14 March 2007 aims at establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) for environmental policies, or policies and activities that have an impact on the environment.

As a building block of the infrastructure, provisions on the interoperability of spatial data sets and services are foreseen. Interoperability of spatial data sets (for themes described in Annexes I, II, III of the Directive) is one of the main components aiming to support the establishment of an European infrastructure, based on the infrastructures for spatial information created and maintained by the Member States.

The development framework elaborated by the INSPIRE Data Specification Drafting Team[2] ensures that the data specifications are coherent across the different themes. It summarizes the methodology to be used for the data specifications development and provides a coherent set of requirements and recommendations to achieve interoperability. The testing phase represented one of the steps defined in the Methodology for the development of data specifications[3] and was included in the roadmap defined by the Consolidation Team (CT) guiding the work of the Thematic Working Groups (TWGs) for the Annex II and III data specifications development process[4].

INSPIRE Annex II and III data specifications testing and consultation were two separate but very closely related activities which ran in parallel. Both activities were done by in-kind contribution.

The main aim of the testing process was to review the draft INSPIRE Annex II and III themes data specifications (Version 2.0) under real conditions and report back to Thematic Working Groups (TWGs) and INSPIRE CT the gained experience. Experience and the cost benefit considerations obtained during testing helped to shape version 3.0 of the data specifications.

The majority of the tests were focused on transformation feasibility, but fitness for purpose tests were carried out too. The results of testing were submitted via 64 standardized reports (7 unfinished) that were taken into consideration by the TWGs for further data specifications optimisation.

The main aim of the consultation process was the revision of data specification documents (V.2.0), where special attention was paid on the domain-specific aspects and cross-thematic aspects (overlaps, gaps and inconsistencies). In total there were 5561 comments received from 110 SDICs and LMOs, out of which 994 comments were identified as direct outcome of the testing exercise. All comments were resolved and taken into account by the TWGs during the preparation of the data specifications version 3.0 and their resolution is published on INSPIRE website.

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32007L0002:EN:NOT

[2] http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2/list/3

[3] http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2/list/1

[4] http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2/list/5/action_type/Adoption

Purpose of this document

The main purpose of this document is to summarize the results from the testing and consultation process of the INSPIRE Annex II and III themes data specifications. Short introduction (Chapter 1) provides basic overview of the process, including selection of INSPIRE related legal references. The testing process (Chapters 2 and 3) was aimed to review the draft INSPIRE Annex II and III themes data specifications (Version 2.0) under real conditions, focusing to verify feasibility of making data available in compliance with the proposed data specifications and to evaluate if the INSPIRE compliant data can be used for relevant use cases. In addition, this document gives the overview of cost and benefits considerations obtained during the testing. This testing process also provided the first test-bed for interaction with and between the stakeholders and allowed them to team up together to exchange the available contribution as well as experiences. The consultation process (Chapter 4) aimed to review the data specification documents (Version 2.0) with main attention on the domain-specific aspects and cross-thematic aspects (overlaps, gaps and inconsistencies). The way, how testing and consultation outcomes were taken into the consideration is summarized (Chapter 5) with conclusion (Chapter 6) in the final part of the document.

1 Introduction

The Directive 2007/2/EC of the European Parliament and the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) foresees Implementing Rules laying down technical arrangement for interoperability, and where practicable, harmonization of spatial datasets and services as part of the infrastructure.

This testing and consultation report summary concerns the testing and consultation phase of the draft INSPIRE Data Specifications v2.0 for the Annex II and III spatial data themes, which took place in parallel for a period of 4 months between 20 June and 21 October 2011 (*Figure 1*).

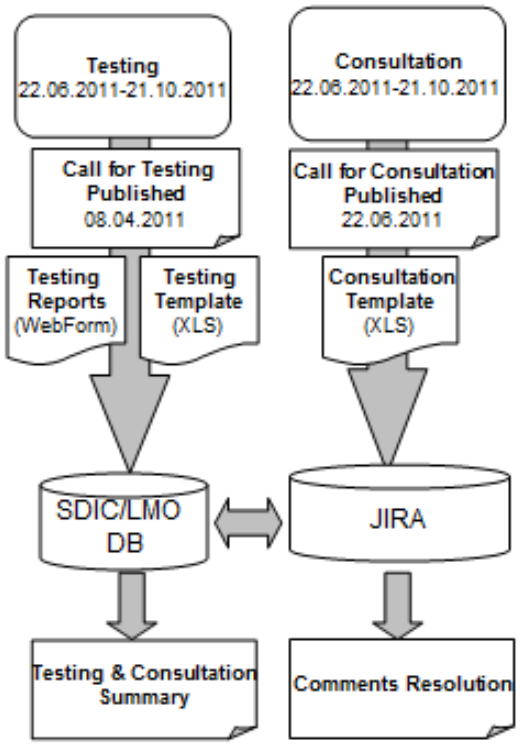


Figure 1. Testing and Consultation process overview

1.1 INSPIRE Directive: recitals and articles related to testing

The following recitals and articles of the Directive refer to the testing of the data specifications:

Art. 7 of the Directive foresees Implementing Rules laying down technical arrangement for interoperability, and where practicable, harmonization of spatial datasets and services.

The Implementing Rules will be based on the technical provisions of the INSPIRE data specifications, currently being developed by the TWGs for each of the data themes listed in Annex II and III of the Directive.

Art. 7 further specify that the Implementing Rules shall consider, amongst others, feasibility and cost-benefit aspects.

Recital (6) is particularly relevant to the vision of INSPIRE stating that the European spatial data infrastructure should allow "to combine spatial data from different sources across the Community in a consistent way".

Recital (13) clarifies that INSPIRE should not set requirements for the collection of new data, while Recital (16) states that the Implementing Rules should be based, where possible, on international standards and should not result in excessive costs for the Member States.

The stakeholders' testing and consultation was organized by the European Commission Joint Research Centre, with appropriate instructions and facilities to support registration, teaming-up for testing, sharing of experiences, tools, data and results among the participants.

2.1 Purpose of the testing

The main purpose of the testing was to test and review the draft INSPIRE Annex II and III themes data specifications (Version 2.0) under real conditions with following consequences:

- The TWGs used the results of the testing to adapt and/or refine the data specifications for their respective themes (see chapter 5.1).
- The INSPIRE CT used the results of testing and the general feedback received during the testing phase in the elaboration of the draft Implementing Rules for the "Interoperability of Spatial Data Sets and Services" for the Annex II and III themes. In particular, the feedback helped in some cases to decide which content of the data specifications will be used in the Implementing Rules, and which part will stay in the technical guidelines (see chapter 5.2). The cost and benefit considerations, when available, help on that decision.
- Registered SDICs and LMOs used testing to assess how the proposed INSPIRE Annex II and III themes data specifications can be used under their own conditions (see chapter 5.3).

2.2 Scope of testing

The scope of testing was limited to:

- The INSPIRE Data Specifications (Version 2.0);
- The INSPIRE Annex II and III themes:
    - Annex II
        - Elevation
        - Land cover
        - Orthoimagery
        - Geology
    - Annex III

  - Statistical units
  - Buildings
  - Soil
  - Land use
  - Human health and safety
  - Utility and governmental services
  - Environmental monitoring facilities
  - Production and industrial facilities
  - Agricultural and aquacultural facilities
  - Population distribution, demography
  - Area management/restriction/regulation zones and reporting units
  - Natural risk zones
  - Atmospheric conditions
  - Meteorological geographical features
  - Oceanographic geographical features
  - Sea regions
  - Bio-geographical regions
  - Habitats and biotopes
  - Species distribution
  - Energy resources
  - Mineral resources
- The INSPIRE Annex I themes, where relevant in connection to Annex II+III themes:
- The technical feasibility and fitness for purpose
- Cost-benefits considerations.

2.3 Types of testing

The testing process covered two types of testing:

- Feasibility testing
- Fitness for purpose testing.

The objective of the feasibility testing was to measure the technical feasibility and the effort related to transforming existing data (e.g. from Member States' organizations) into data compliant with the requirements and schemas proposed in the data specification documents. Although the focus of testing was on the transformation of the data structure, other requirements of the data specifications (for instance for reference systems) could also be considered.

The objective of fitness for purpose testing was to assess the benefits of harmonized data specifications from an end-user or application point of view. Fitness for purpose testing aimed at demonstrating the usefulness of spatial data compliant with the INSPIRE data specifications when addressing real applications – the use cases.

It was up to the testers to consider whether they will execute both types of tests, as fitness for purpose testing was depending on the results from the feasibility testing and it requires more time and resources.

Most of the tests were focused on transformation from local to INSPIRE data model, in a modality of online or offline transformation. Only a few fitness for purpose tests were carried out. More detailed results from the testing are described in chapter 3.

2.4 Testing timing

Although core period for the testing took place 4 months between 20 June and 21 October 2011, the process of testing was initiated earlier in order to establish the testing environment. The whole process could be divided into the three main parts (*Figure 2*).

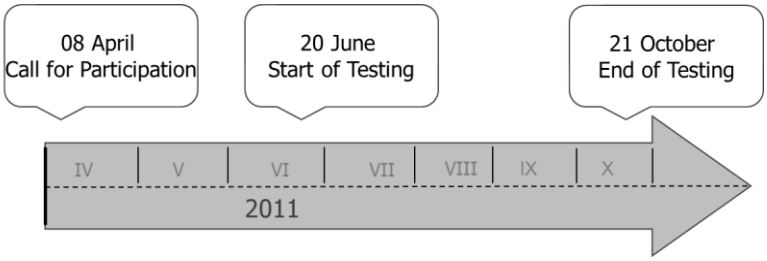


Figure 2. Testing timing

The first part of the process was focused on the establishment of the testing environment, preparing and publishing the call for testing participation and registration, setting up testing related tools and preparation of additional documentation supporting the testing process. Main testing activity took place within 4 months period. This phase was bounded by the deadline, in order to be able to collect and evaluate the testing results, in line with the INSPIRE roadmap. Nevertheless, to allow the testing participants to continue their testing when necessary and to deliver the results in later phase, considering the interest to keep the mutual access to the other testing participants and their testing results, the INSPIRE Forum testing platform remained open and updated reports were possible to be delivered later.

Summary of milestones with the activities setting the scene:

Milestone	**Activity**
08 April 2011	INSPIRE Annex II and III Data Specifications v2.0 testing – Launch of Call for Participation
15 May 2011	Submission of application form for testing registration
20 June 2011	Publication of Data Specifications v2.0 for consultation and testing
20 June 2011	Start of testing and consultations INSPIRE Annex II and III Data Specifications v2.0
22 June 2011	Kick-off web meeting for Testing Annex II and III Data Specifications
21 October 2011	End of testing and consultations INSPIRE Annex II and III Data Specifications v2.0
21 October 2011	Delivery of comments and documentation to JRC Data Specification Team by testing participants

2.4.1 Call for participation

The European Commission via DG JRC launched the Call for Participation for the involvement of SDICs and LMOs in the testing of the INSPIRE Annex II and III data specifications v2.0 on 8 April 2011[5]. This call provided the opportunity for the stakeholders to express the interest to participate on the testing with their in-kind contribution, using the webform registration. The call was open till the end of testing period (21 October 2011). Nevertheless, the testing participants were kindly asked to register by 15 May 2011 to facilitate better planning and organization of the required support. In total 95 SDICs and LMOs[6] registered for testing. Some of the registrations represented European projects with the participation of several Member States and ad-hoc consortium organized for testing the INSPIRE data specifications for Annex II and III.

2.4.2 Registration of the testing participants

The main purpose of the registration was to identify the group of the stakeholders willing to execute the testing within their own infrastructures. Creating this kind of focused group, helped to execute the communication between the testing facilitators and participants more effectively.

An online registration form was made available to register SDICs and LMOs. During the registration, the testing participants were asked to provide the following sets of information:

- Contact person for testing (Coordinator)
- Testing scope
- Contributions to the testing infrastructure
- Contributions to the feasibility testing
- Contributions to fitness for purpose testing
- Possibility to cooperate and team up with other SDICs or LMOs.

Testing participants were also asked to indicate whether they agree to share the data they provided for the testing with the other testing participants, if they agree to publicly share their testing contributions and also if they need additional support to execute the testing activity.

2.5 Roles in testing

To ensure the INSPIRE Annex II and III testing process fulfil expectations defined in the Methodology for the development of data specifications (D 2.6, Version 3.0)[7] the organizational framework with the participants had to be established. To proceed the testing the two main roles were identified:

- **Testing facilitators** represented by JRC Data Specification Team and TWGs
- **Testing participants** registered as SDICs and LMOs.

2.5.1 Testing facilitators

Executing the testing process requires facilitating all related activities, including creation of the testing environment which was established by the JRC Data Specification Team, assisted by the TWGs. Besides the general organization of the process, the need for collaborative environment, ensuring the connection with the testing participants has been guaranteed.

[5] http://inspire.jrc.ec.europa.eu/index.cfm/newsid/10401

[6] http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2/list/an23

[7] http://inspire.jrc.ec.europa.eu/reports/ImplementingRules/DataSpecifications/D2.6_v3.0.pdf

2.5.2 Testing participants

Testing participants were the representatives of the registered INSPIRE SDICs and LMOs, willing to test the proposed INSPIRE Annex II and III data specifications v2.0 under real world conditions. Projects, organizations, companies, consortia, or other parties that were interested, but not yet registered as a SDIC or LMO, were invited to register as such through the INSPIRE website in order to take part in the testing.

It is important to highlight that the participation was based on in-kind contribution.

In reply to the Call for participation, 95 stakeholders registered to join the process. Some European projects with the participation of several Member States registered for testing, as well as ad-hoc consortium organized for testing the INSPIRE data specifications for Annex II and III.

Where possible, testing participants were invited to team up, in order to share the resources, experience and knowledge. If more than one organisation participated as a testing team, one organisation should be identified to represent the testing and to submit the testing report.

2.6 Tools and material supporting the testing

2.6.1 INSPIRE Forum Data Specification Testing Group

To support the testing process, the collaborative networking platform have been established in the INSPIRE Forum web site[8]. The main purpose of the INSPIRE Forum Testing Group was to provide the source of relevant information, communication platform for all testing participants, supporting the exchange of information, experience and knowledge.

2.6.2 Web Meeting with testing participants

Kick-off web meeting was organized in order to provide the essential set of instructions and guidance for the testing participants. The Kick-off web meeting for testing took place on 22 June 2011 with the attendance of more than 70 participants. This meeting was split into two main parts. First part was dedicated to the presentations explaining background and details related to the testing; second part was dealing with questions raised by testing participants. All presentations, including video recordings are available in the INSPIRE Forum Testing Group Website[9].

2.6.3 Supporting material

To ensure the testing participants were provided with the relevant and accurate information, the process had to be accompanied with the relevant support material. It included:

- The Call for testing participation[10]
- The draft versions of Data Specification v2.0 on <Theme Name> – Draft Guidelines: 24 PDF documents, including “Guidelines for the use of Observations & Measurements and Sensor Web Enablement-related standards in INSPIRE Annex II and III data specification development” and “Proposed Changes to the Generic Conceptual Model and Encoding Guidelines”[11]

[8] http://inspire-forum.jrc.ec.europa.eu/pg/groups/32922/inspire-annex-iiiii-data-specification-testing/

[9] http://inspire-forum.jrc.ec.europa.eu/pg/pages/view/33159/

[10] http://inspire.jrc.ec.europa.eu/index.cfm/pageid/241/documentid/2667

[11] http://inspire.jrc.ec.europa.eu/index.cfm/pageid/201/consultation/45851

- GML Application Schemas[12]
- For Reference
  - UML Model (svn, XMI, EAP, HTML)[13]
  - The "INSPIRE Data Specifications Cost-benefit considerations" document[14]
  - INSPIRE Annex I testing summary report[15]
- Other document under consultation
  - Short presentations of each TWG describing the Annex II/III themes
  - Background material on transformation methodologies applied in different INSPIRE-related projects
  - Examples of use-cases where more than one theme are needed.

2.6.4 Testing reports

Testing participants could summarize the experience they collected during the testing process in a testing report webform[16] based on the testing report template, containing four main parts:

- Testing organization
- Feasibility testing
- Fitness for purpose testing
- Cost benefit considerations.

Testing participants were also invited to submit relevant comments via XLS spreadsheet and to use the upload facility to attach any relevant related material, as attachment to the testing reports. Purpose of testing comments was to get a structured way for feedback on testing results. They were treated as a part of the consultation process.

The testing process was summarized in 64 testing reports with 7 unfinished which were not further analysed. The list of testing participants is given in Annex 2. Distribution by the Member States is shown in Table 1.

12 http://inspire.jrc.ec.europa.eu/documents/Data_Specifications/INSPIRE_GML_application_schemas_v2.0.2.zip

13 http://inspire.jrc.ec.europa.eu/index.cfm/pageid/2/list/datamodels

14 http://inspire-forum.jrc.ec.europa.eu/mod/file/download.php?file_guid=42392

15 http://inspire.jrc.ec.europa.eu/index.cfm/pageid/241/documentid/2887

16 http://inspire.jrc.ec.europa.eu/testing/all.pdf

Table 1. Overview of testing reports by country

No	Country	Testing reports	%
1	AUSTRIA	1	1.8%
2	BELGIUM	6	10.5%
3	CZECH REPUBLIC	8	14.0%
4	DENMARK	1	1.8%
5	EC (JRC)	2	3.5%
6	FINLAND	1	1.8%
7	FRANCE	3	5.3%
8	GERMANY	5	8.8%
9	HUNGARY	1	1.8%
10	ITALY	6	10.5%
11	LITHUANIA	1	1.8%
12	NETHERLANDS	2	3.5%
13	POLAND	3	5.3%
14	ROMANIA	1	1.8%
15	SLOVAKIA	1	1.8%
16	SPAIN	10	17.5%
17	SWEDEN	1	1.8%
18	UNITED KINGDOM	4	7.0%
	Sum	**57**	100.0%
LMO and SDIC might present the contribution by many different organisations from different countries and therefore some of those are not mentioned here.			

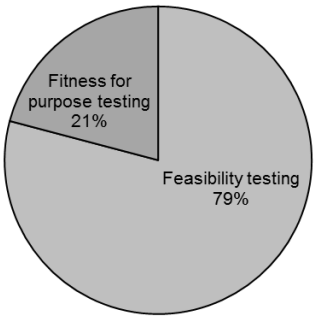
The complete geographic coverage may be even wider, as some projects and testbeds were established across the various partners from various countries. The participation of the LMOs was slightly higher (37 LMOs) than in case of SDICs (27 SDICs).

Regarding LMOs, in 10 cases there were consortia with more than one partner and with different testing roles: Bundesanstalt für Geowissenschaften und Rohstoffe (9), Czech Geological Survey (2), Slovak environmental agency (2), Regione Piemonte (2), Comissió de Coordinació Cartogràfica de Catalunya (5), Geonovum (2), Spanish Directorate General for Cadastre (2), Danish Enterprise and Construction Authority (3), State Agency for Geo-Information and Surveying of the Free and Hanseatic City of Hamburg (2), IDEE Working Group of the Commission on Geomatics (3).

Within the SDICs, there were also several cases of partner consortia or project partner consortia with different testing roles: Polish Hydrogeological Survey (2), The Polish Geological Institute - National Research Institute (2), Geo-Information in Protected Areas and Nature Conservation (12), NAVARRE TERRITORIAL INFORMATION SYSTEM (5), Plan4all (16), Assessment and Strategic Development of INSPIRE compliant Geodata-Services for European Soil Data (11), GeoTest project (5).

More than 40 testing reports delivered additional material related to the testing as mapping tables, samples of transformed metadata and data, comments delivered via SDIC/LMO consultation, etc. The testing reports of participants who agreed to publish their results are publicly available on the INSPIRE web site.

Graph 1 shows the percentage of testing reports by type of testing.



Graph 1. Type of testing

Most of the testing reports were focused on the feasibility testing which was performed and reported in 53 reports. Fitness for purpose testing was performed and reported in 14 reports. In a 10 cases testing participants performed both type of testing, while in 4 reports they performed just fitness for purpose testing.

3.1 Feasibility testing

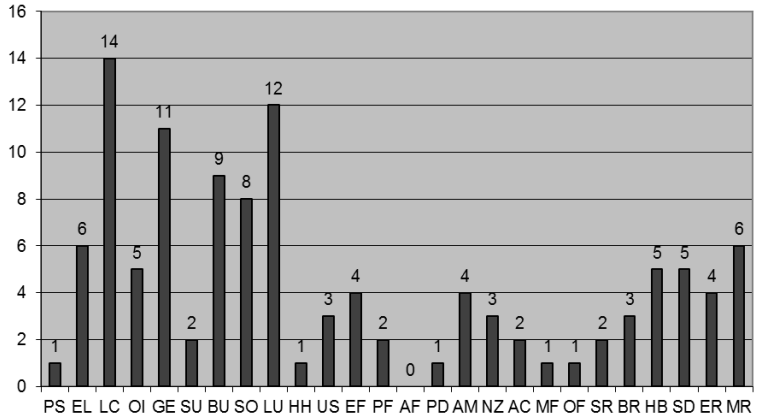
3.1.1 Testing description

The objective of the feasibility testing was to measure the technical feasibility and the effort related to transform existing data (e.g. from Member States' organizations) into data compliant with the requirements and schemas proposed in the data specification documents. Although the main focus of the testing was on the transformation of the data structure, other requirements of the data specifications (for instance reference systems, data quality, dataset level metadata, or portrayal) could be also considered. The encoding of the data was specified in the INSPIRE data specifications. The data could be transformed off-line or on-the-fly, for example using transformation services, but the latter was not the primary goal of the testing. Feasibility testing was expected to identify areas where it was possible, difficult or impossible to transform national data sets into the proposed INSPIRE schema.

Feasibility testing could include a number of tasks, namely (but not necessarily limited to) the following:

- Development of mapping tables, transformation rules or workflows
- Implementing the mapping rules in a transformation tool or service
- Execute the transformation
- Validate the transformed data against the schema specified in the Encoding section of the data specification (e.g. the GML application schema)
- Provide the transformed data through an INSPIRE Network Service, or through other adequate services.

All INSPIRE Annex II and III themes were tested except one: Agricultural and aquaculture facilities (AF) for which there was no testing report submitted (*Graph 2*).



Graph 2. Amount of testing reports per tested INSPIRE theme

The theme Protected Sites (PS) from Annex I was also tested and reported in one report. Amongst the most frequent tested themes were identified Land Cover (14 reports), followed by the Land Use (12 reports) and Geology (11 reports). It is important to mention that in some cases, testing participants described more than one theme in a single testing report (they tested more themes) so that **total amount of reports for all tested themes was 115**. In general Annex II themes received higher attention during the testing and, in some cases, only one testing report was submitted for some of the Annex III themes (HH, PD, MF, OF).

Testing participants were also questioned about the methodology used in the testing and the description of software and tools used for testing. Answers showed that there were different approaches in methodology. To give an overview, here it is the extract of the most frequently mentioned:

- Studying and analysis of data specifications
- Comparison of data models
- Mapping of existing data models to INSPIRE
- Matching tables, SQL views
- Manual transformation
- Paper, text gap analysis.

It can be summarized that all approaches actually started with studying of data specifications v2.0. Then, it was followed by creation of matching tables and transformation rules. Finally transformation was performed, either automatically by some software tools, or manually.

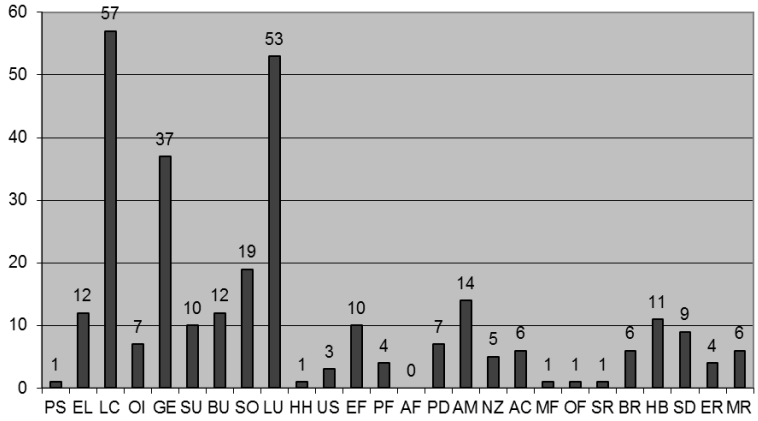
Also it is worth to mention that some datasets were used for testing across various themes. There were situations as well where two or more datasets from single data provider were used for testing of one particular theme.

Various software and tools were identified and used during the feasibility testing. The list of the software license providers, including the list of reported software tools is in Annex 5.

3.1.2 Source data description

Initial set of questions from the testing report template was focused on the data sources used as input for the feasibility testing. Testing participants used the data with the structure as currently available within their databases and information systems.

In total, 240 datasets were used in feasibility testing (*Graph 3*).



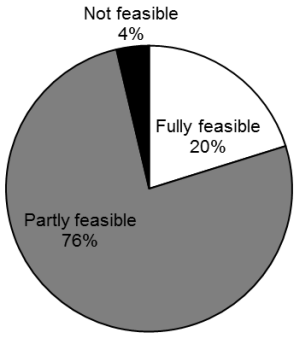
Graph 3. Number of input tested datasets per theme

The highest number of datasets was used for testing Land Cover (LC) and Land Use (LU) themes followed by Geology (GE) and Soil (SO). Some datasets were used in testing more than one theme. These statistics also follows the amount of reports submitted per theme (Graph 2).

3.1.3 Testing results

3.1.3.1 Overall and theme specific transformation feasibility

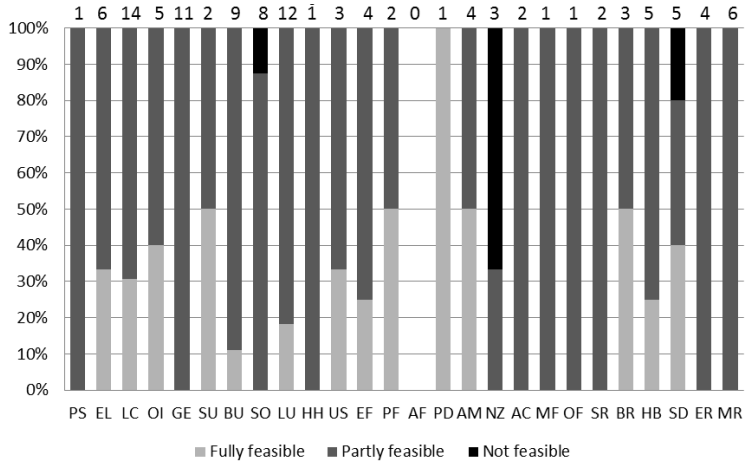
Graph 4 shows the overall feasibility of the transformation.



Graph 4. Feasibility of transformation

Majority (76%) of participants reported that transformation is partly feasible. It means that some of the relevant spatial objects in the input data sets (and/or their attributes/relationships) could not be transformed into a corresponding structure of the proposed INSPIRE schema and/or some of the transformed objects are not fully compliant with the requirements of the proposed INSPIRE schemas (e.g. multiplicity). One fifth of the participants (20%) reported full feasibility to transform their datasets into the INSPIRE structure. Remaining (4%) of participants reported that transformation is not feasible, meaning that none or hardly any of the relevant spatial objects in the input data sets (and/or their attributes/relationships) could be transformed into a corresponding structure of the proposed INSPIRE schemas. Possible reason for that is the lack of usage of relevant data sets necessary to make a compliant data set for the specific theme. Participants could also describe the issues and provide suggestions for improvements of data specifications in the Testing XLS spreadsheet used for collecting comments. There were 48 comments files submitted in total, which were further analysed by the TWGs. Further details about the comments from testing are available in chapter 3.3.

Graph 5 shows feasibility of the transformation per each particular theme with number of reports per theme on the top.

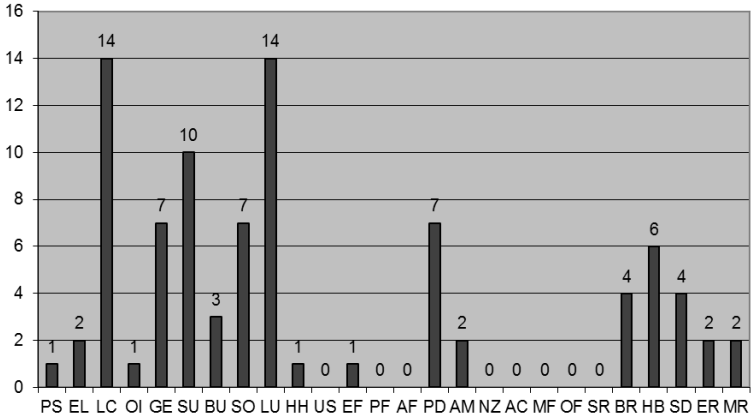


Graph 5. Feasibility of transformation per Annex II and III themes

Results helped to focus attention on themes where issues of no feasibility were reported (Natural risk zones (NZ), Species distribution (SD) and Soil (SO). Nevertheless, the total number of reports per theme should be considered (e.g. in the case of NZ there were three reports and two of them reported that transformation is not feasible).

3.1.3.2 Output datasets and services

Participants were also asked to describe the output datasets/services as results of the transformation testing (*Graph 6*).

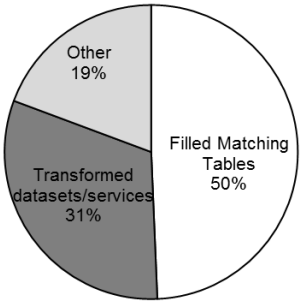


Graph 6. Number of output datasets/services per theme

The highest number of output datasets was produced for LC and LU followed by SU and SO. All output datasets were declared as INSPIRE conformant. It shows clearly very strong correlation between number of input and output datasets per theme. For some themes there was no output datasets reported.

3.1.3.3 Testing outcomes

Graph 7 shows the main outcomes of feasibility testing.

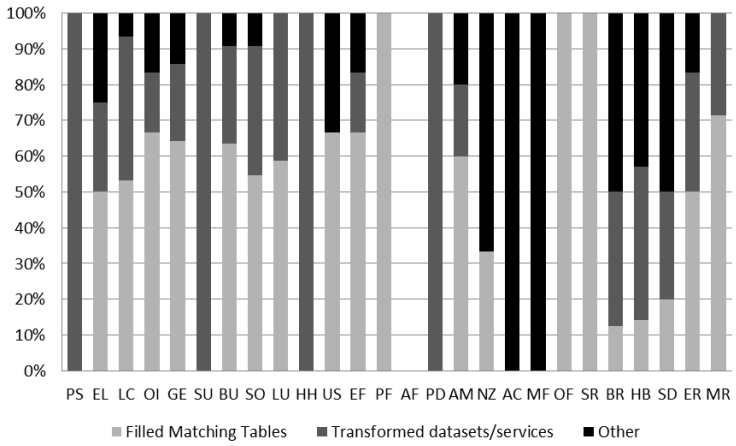


Graph 7. Feasibility testing outcomes

This section of testing report was dedicated to the question, how far testing participants managed to execute testing exercise, in terms of testing process completeness. Half of the testing participants managed to achieve conceptual mapping between their local datasets schemas and INSPIRE via matching tables allowing semantic mapping in tabular form. Ability to execute complete transformation and achievement of transformed datasets / services delivery was reported by 31% of testing participants. Last option allowed participants to describe any other outcomes occurred during the testing, like for example:

- java4inspire library
- testing reports
- testing comments
- comparisons
- paper exercises
- harmonized WMS service.

Graph 8 shows distribution of outcomes per each particular theme.



Graph 8. Feasibility outcomes per each theme

Differences between outcomes for particular themes are in the correlation with the number of datasets used for the testing. The most valuable indicator is transformed dataset/service, which clearly shows success of feasibility testing. It means that testing participants were able to fully perform data transformation.

3.1.3.4 Tested application schemas

Since each INSPIRE annex II and III theme consists of one or more application schemas.

Table 2 shows which application schemas where tested for each particular theme.

Table 2. Application schema(s) used for testing per each theme

PS	Protected Sites Full	1
	Protected Sites Natura2000	0
	Protected Sites Simple	0
EL	Elevation - Base	5
	Elevation - Vector Elements	4
	Elevation - Coverages	6
	Elevation - TIN	4
GE	GeologyCore	7
	GeologyExtension	7
	HydrogeologyCore	5
	GeophysicsCore	4
	GeophysicsExtension	0
	GeologyMain	5
LC	Land Cover - Base	12
	Land Cover - Points	0
	Land Cover - Surfaces	9
OI	Orthoimagery	5
AF	Agricultural and Aquaculture Facilities CoreModel	0
	Agricultural and Aquaculture Facilities ExtendedModel	0
AM	Reporting Units	1
	Area Management Restriction and Regulation Zones	4
AC	AC-MF	2
BR	Bio-geographicalRegions	3
BU	Building	4
	BuildingCore2D	8
	BuildingCore3D	1
	BuildingExtended2D	4
	BuildingExtended3D	1
ER	Energy Resources - Base	0
	Energy Resources - Features	3
	Energy Resources - Coverages	2
EF	Environmental Monitoring Facilities	4
HB	HabitatsAndBiotopes	3
	HabitatsAndBiotopes Implementation	2
HH	HumanHealthandSafety	1
LU	Existing Land Use	6
	Land Use Core Model	8
	Planned Land Use	8
MF	AC-MF	1
MR	MineralResourcesCore	6
	MineralResourcesExtension	1
NZ	Core_Model	3
	Coverage_Model	1
	Floods_Example_Model	0
OF	Oceanographic Geographical Features	1
PD	Population distribution - demography	1
PF	Production Cross Theme Harmonisation	0
	Production and Industrial Facilities	1
	Production and Industrial Facilities - extensions	0
SR	Sea Regions	1
	Sea Regions - Extension	0
	Sea Regions - Addendum	0
SO	Soil - Core	7
SD	SpeciesDistribution	2
	SpeciesDistribution Implementation	2
SU	Core	2
	Grid	0
	NUTS	1
	Urban Audit	1
	Vector	1
US	Administrative and social governmental services	2
	Utility Networks	3
	Waste Management	0
	Electricity Network	3
	Oil & Gas Network	2
	Sewer Network	3
	Telecommunications Network	2
	Water Network	3

It can be summarized that the majority of application schemas were tested. In general all core application schemas were included, except AF and ER. Some application schemas were tested more than once.

3.1.4 Cost benefit considerations

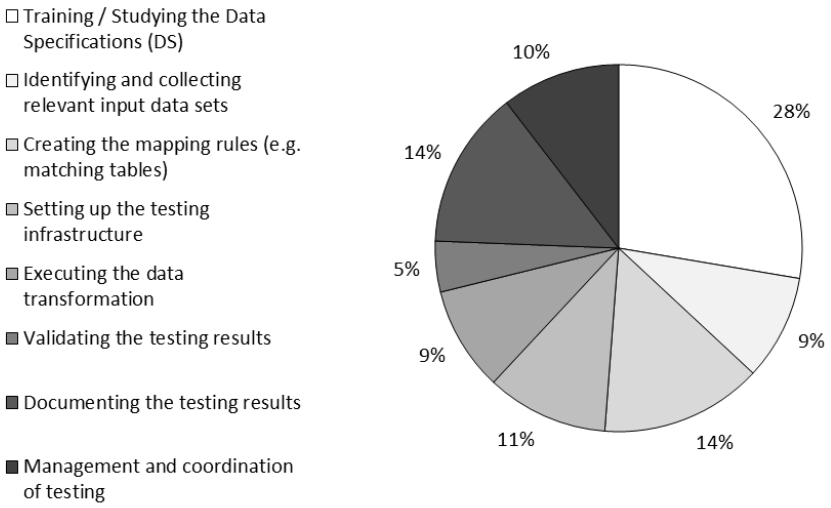
To evaluate the potential impact of the proposed INSPIRE data specifications v2.0 in terms of data transformation questions were asked about the encountered costs and the identified or foreseen benefits. The costs were expected to be expressed quantitatively in person days (PD), whilst benefits could be expressed qualitatively. The overall participants' response was satisfactory as almost three quarters (73%, 47 cases) reported costs in sense of effort required for each area of the feasibility testing and (58%, 37 cases) reported benefits identified during the feasibility testing for their institution (partners, testing group).

It can be concluded that costs were simpler to quantify and easier to recognize as compared to benefits in this testing phase. In the reality, some costs are only applied once, as part of the infrastructure (normally the highest) that it is only done once, while others are related to the transformation or other step in the process, using the result any time it is necessary. In this testing, such distinction could not be done. The amount and type of identified benefits clearly show stakeholders' awareness and the potential for added value of interoperable datasets and services. It also confirms some previous SDI cost/benefit researches and studies, which pointed

out that it is easier to quantify costs than benefits. It is obvious that testing participants could very easily count the number of days that they spent on feasibility testing. On the other hand to quantify benefits in the same manner was much more complex issue. Nevertheless the results of cost benefit considerations provide important information about the diversity of costs and benefits. Therefore the results should be very carefully analysed when they are used for decisions and/or conclusions.

3.1.4.1 Costs

Testing participants were asked to specify the effort required for each phase of the feasibility testing and to express it in the number of person-days (PD) for the whole testing period. The testing process was divided in the following 8 different phases (*Graph 9*).



Graph 9. Distribution of costs for the feasibility testing activities

The graph shows the distribution of the costs by phase. It is clear that the efforts related to the investment in training and studying the DS represents the most significant cost in the whole testing cycle. Relatively high costs were reported on creating mapping tables and creating testing reports. This confirms that those steps are the most recourse consuming where the level of automation is limited and manual intervention is required. The reported cost values greatly differ from participant to participant (e.g. one report indicated 7 PD in total spent on theme BU while another one stated 146 PD for the same). The conclusion is that to know how many PD are required, a more elaborated testing is necessary, to distinguish which factors influence more for the same application schema (number of necessary data sets, type of data set, tools used, etc..

In total the participants spent 2872 PD on Annex II-III testing, which divided by the number of participants and the themes results in average 25 PD for each theme/participant. However, if we exclude values of highest deviation, this average becomes much less (about 4-5 PD). In summary we can conclude that the relative distribution of costs reflects the real situation, but absolute values should be used with a great attention. Differences in cost values reported by participants seem to be primarily correlated with the level of infrastructure development already in place in the testing organisation, but also with overall INSPIRE “awareness”.

3.1.4.2 Benefits

This part of the testing report asked to identify the potential benefits foreseen during the feasibility testing in qualitative terms. Participants reported different types of benefits that could be grouped in two major categories: data preparedness for INSPIRE and capacity building. The greatest benefit identified from participants was capacity building. This fact is very significant

and is absolutely in correlation with the identification of costs where the biggest costs are related to capacity building activities. It generates a clear message to EC and Member States that this activity cannot be neglected in further INSPIRE implementation and maintenance. The list of all identified benefits is in Annex 6.

3.2 Fitness for purpose testing

The objective of fitness for purpose testing was to assess the benefits of harmonised data specifications from an end-user or application point of view. Fitness for purpose testing aimed at demonstrating the usefulness of spatial data compliance with the INSPIRE data specifications in real applications or use cases. The use cases could be either the ones described in the INSPIRE data specifications (located in Annex B of Data Specifications v2.0), or use cases defined by the testing participants themselves based on their existing applications or tasks. Other use cases were provided as examples in the auxiliary material for testing. By definition, fitness for purpose testing was expected to involve cross-theme, cross-border, and/or cross-language elements.

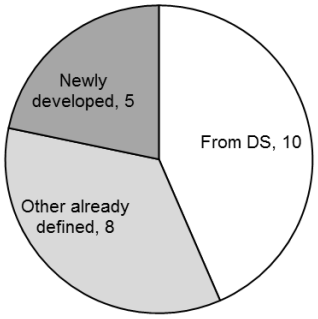
The main condition of fitness for purpose testing was to use data compliant to the INSPIRE data specifications, i.e. the results from the feasibility testing (i.e. output dataset as product of feasibility testing) under the real life settings.

The main goals of the fitness for purpose testing were:

- To show whether the chosen use case can be implemented using data that is harmonized according to an INSPIRE data specification
- To illustrate benefits of a scenario that uses INSPIRE compliant data by comparing to a baseline scenario that does not use INSPIRE compliant data non-interoperable data.

3.2.1 Use cases

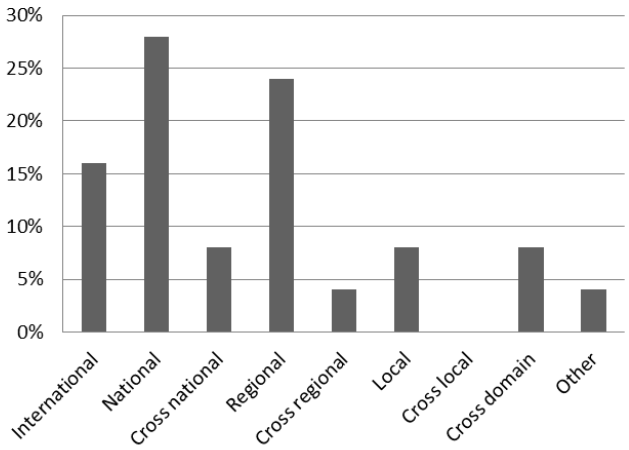
Testing participants were asked to identify, quantify and describe the use cases (a specific task or process from the point of view of a user) underlying the fitness for purpose test. In total 23 use cases were delivered. *Graph 10* shows the different types of use cases regarding to their source.



Graph 10. Use cases types

Most of the use cases (10) originated from the INSPIRE data specifications. Eight were already defined, while 5 were newly developed by the testing organisation.

Graph 11 shows the distribution of use cases according to their scope.



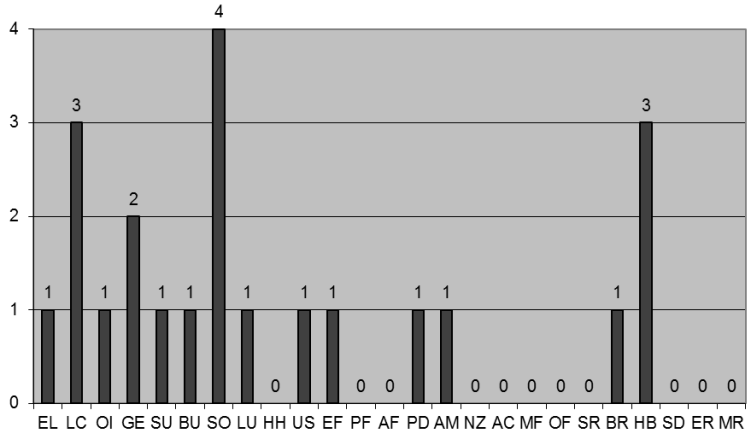
Graph 11. Scope of the use cases

The highest number of the use cases belonged to national level, followed by regional and international. Some of use cases were reported with multiple scopes (e.g. national and regional, etc.).

3.2.2 Data sources and software

In five testing reports participants mentioned that they used datasets from the feasibility testing to perform their use case. Participants were also invited to describe additional datasets/services used in the testing. This was done in case of 9 testing reports.

Participants were asked to select the data specification(s) containing the use case they used for testing (*Graph 12*). Some themes were covered by more than one use case, but there were themes, which were not covered by use cases at all.



Graph 12. Amount of uses cases per theme

For the execution of the fitness for purpose testing, the implementing software and workflows can play a very important role too. Participants reported different software and tools used in fitness for purpose testing. Summary of the software tools used in this type of testing is available in Annex 5.

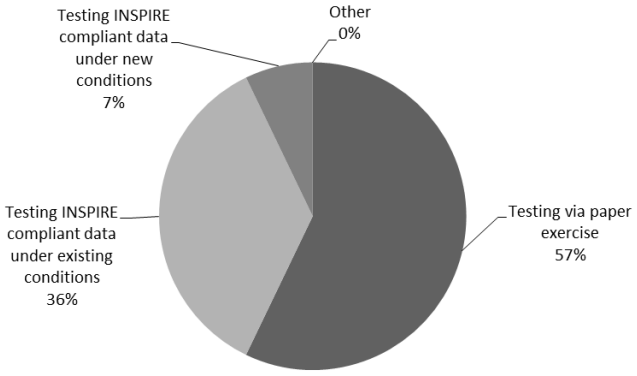
3.2.3 Testing results

3.2.3.1 Testing approach

The approaches applied to execute fitness for purpose testing can be divided as follows:

- Testing as paper exercise (The data requirements for a specific use case were compared with (mapped to) the application schemas for a given spatial data theme)
- Testing INSPIRE compliant data under existing conditions (INSPIRE-compliant data were used in an existing system, GIS or web client to perform a specific task, analysis or visualization)
- Testing INSPIRE compliant data under new conditions (INSPIRE-compliant data were used to implement a new specific task, application, analysis, visualization, etc.)
- Other.

The majority of participants used testing as paper exercise approach (*Graph 13*).



Graph 13. Way how the fitness for purpose testing was executed

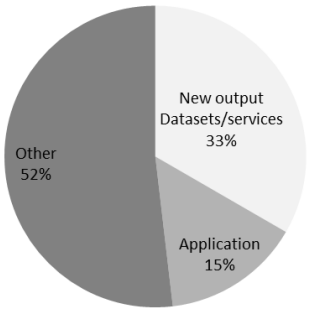
A very interesting indicator is the 7% of testing INSPIRE compliant data under new conditions. It actually means an added value; i.e. INSPIRE compliant data may open new possibilities for their further usage. In 5 cases testing reports indicated using existing infrastructure to execute testing. Both categories (existing and new conditions) provide important guidance for implementation and maintenance, where the detailed description of the conditions in the tests can help the rest of the stakeholders to identify minimal requirements when they apply INSPIRE compliant data in their use-cases in real life conditions.

The overall results of this type of testing can be biased by

- the various complexity of use cases
- the diversity of the technical possibilities of testers
- the time limitations of the testing exercise, which is presumably the reason of the popularity of the paper exercise.

3.2.3.2 Testing outcomes

Graph 14 shows the outcome from fitness for purpose testing.

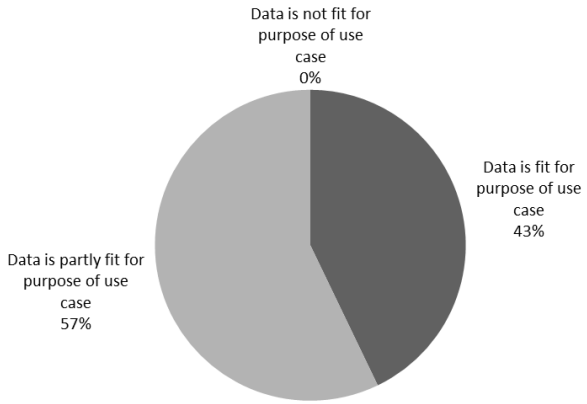


Graph 14. Fitness for purpose testing outcomes

Concerning this criterion testing participants were expected to indicate which category the outcome of their testing belongs to. In the responses, 9 use cases were categorised as new output datasets/services, out of which new services (3 WMS and 1 WFS) were accounted in two reports. “Other outcome” was indicated in 14 use cases. In this category participants provided matching tables and some additional comments on testing process. The last category ”application” were indicated by 4 use cases. It should be noted that a single testing activity could resulted in more outputs (e.g. new datasets/services and other).

3.2.3.3 Evaluation of testing results

Graph 15 shows the overall impression from the fitness for purpose testing results.



Graph 15. Overall impression from fitness for purpose testing

The majority of participants accounted the INSPIRE compliant data is partly fit for purpose in 8 tested use cases. When it happened, testers were also asked to describe the issues identified and provide suggestions for improvements (chapter 3.3). It is important to emphasize that the category “data is not fit for purpose of use case” was not encountered at all. The rest of tested use cases (6), witnessed that INSPIRE compliant data fulfilled the expectations.

3.2.4 Cost benefit considerations

To identify the potential impact of the proposed INSPIRE data specifications on the fitness for purpose testing the participants reported the related costs as well as the identified or foreseen benefits.

3.2.4.1 Costs

Regarding the costs the participants were asked to estimate the costs (in PD) of additional harmonization needed to utilize INSPIRE compliant datasets in their use case. The average value for costs is about 8 PD. However, it must be pointed out that this value is a result from only 8 reports that quantified costs. So this number is not representative; therefore the supplied values should be interpreted very carefully.

3.2.4.2 Benefits

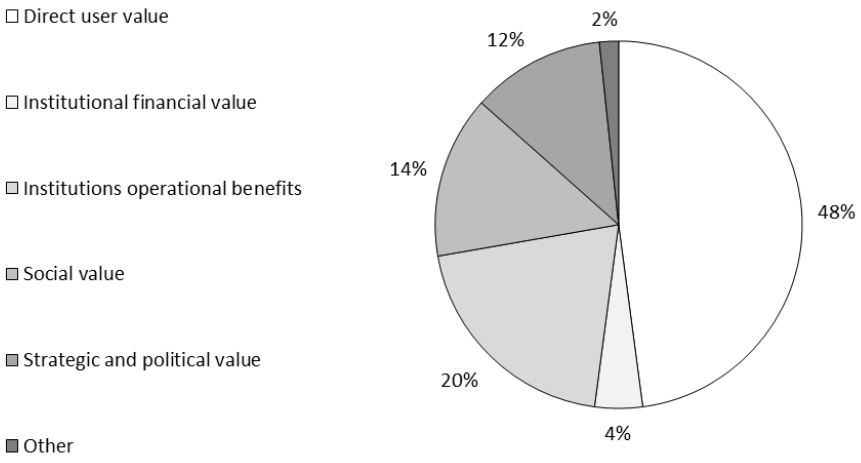
From the point of view of the benefits, the testing participants could indicate the benefits they encountered, or foresaw, when the applications based on the tested use cases were implemented using INSPIRE compliant data. Generally the questions about benefits were divided in two main categories: quantitative and qualitative.

In the quantitative category, participants were asked to estimate the overall savings (in PD) achieved by using INSPIRE compliant data for the tested use cases, comparing to the use of non-INSPIRE compliant data. Participants responded only in 4 reports on this question and the average of benefits was 12 PD. It again confirms that is much easier to quantify costs than benefits.

In the qualitative category, some specific benefits were further considered. Participants were asked to indicate the benefits of interoperable INSPIRE datasets in context of the use case defined. Possible benefits were divided into 6 categories and the participants were asked just to indicate whether the benefits bellow apply (yes/no):

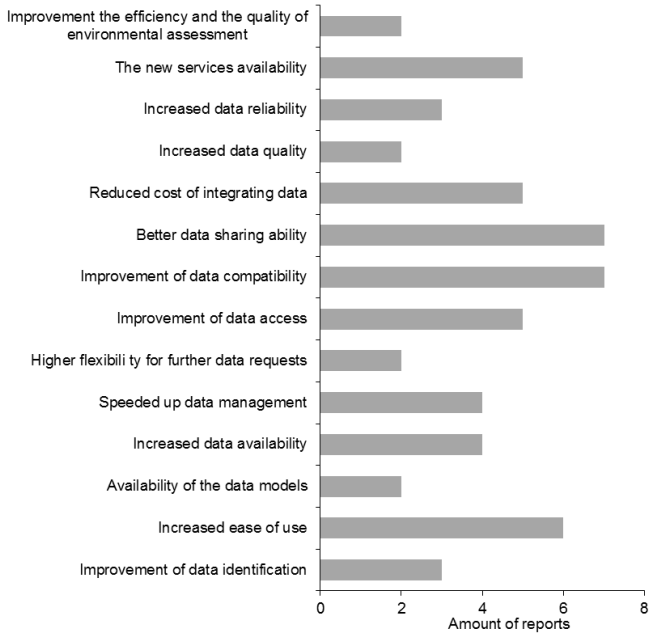
- Direct user value
- Institutional financial value
- Institutions operational benefits
- Social value
- Strategic and political value
- Other.

In total 119 times various benefit types were indicated. Most of the benefits belonged to the category “Direct user value” followed by “Institutional operational benefits” (*Graph 16*).



Graph 16. Benefits identified in course of Fitness for purpose testing

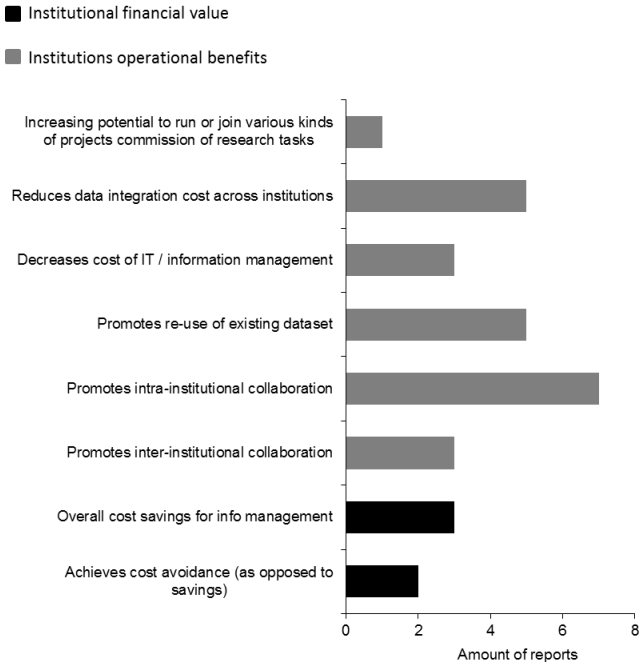
Graph 17 details the "Direct user value" category where of the relevant subcategories were reported in 57 cases.



Graph 17. Direct user value benefits

The most frequently reported benefits in Direct user value category were the improvement of data compatibility and better data sharing/availability, followed by increased ease of use, improvement of data access, reduced cost of integrating data, and the availability of new services.

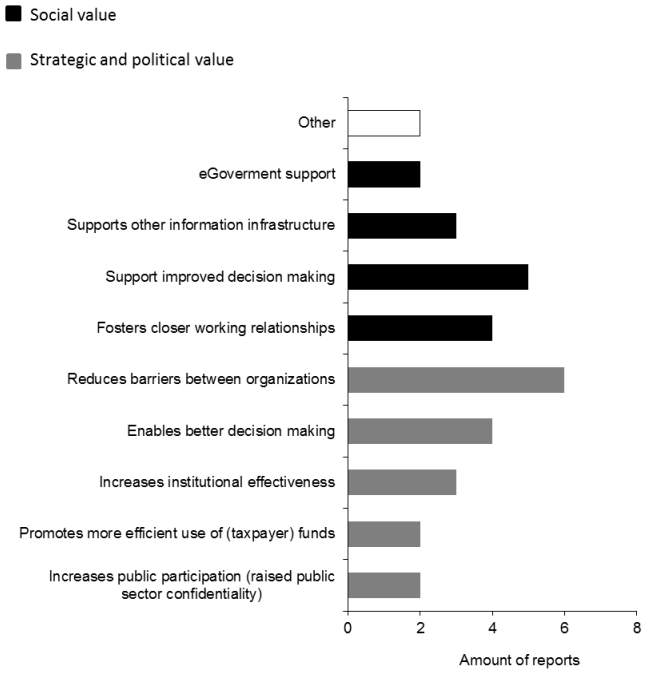
Graph 18 shows Institutional financial value and Institutions operational benefits.



Graph 18. Institutional financial value and Institutions operational benefits

The major identified benefits were promoting intra-institutional collaboration, re-using existing datasets and reduction of data integration cost within/across the institutions. Operational benefits seem to have much higher weight than financial values.

Graph 19 shows Social, Strategic and Political Value benefits.



Graph 19. Social, Strategic and political benefits

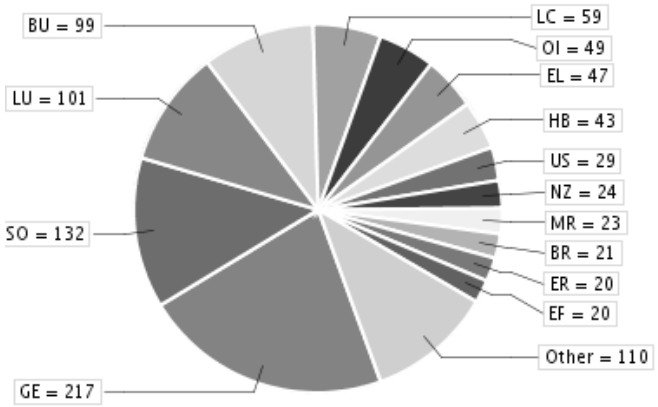
The most significant identified benefits lay in the reduction of barriers between organisations and in the improved support to decision making.

In one report other than the listed benefits the improvement of data availability at national level, was reported although such a benefit could have been considered as a type of Direct user value benefit. The second one mentioned. For conclusion, it is important to point out that much more benefits will occur after the infrastructure will become mature enough and operational.

3.3 Comments from testing and additional submitted testing related material

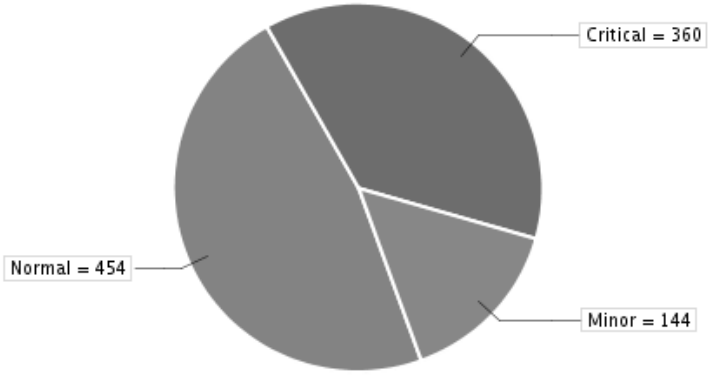
At the end of testing process, participants were asked to upload the “Testing XLS spreadsheet for comments” (Annex 3), if they identified any relevant comment reflecting issues encountered during testing. In total there were 48 files with 994 comments. The comments collected were processed and resolved by the Annex II and III TWGs, the DS Drafting Team and the EC INSPIRE Team.

Participants were also asked to provide, if relevant, any other testing related materials (INSPIRE compliant datasets, matching tables, SLDs, configuration guidelines etc.). In total there were 48 *.zip archives with heterogenic but very valuable materials.



Graph 20. Distribution of comments from testing by themes

Comments received as an outcome from the testing provided important feedback from implementation level, where testing participants were invited to describe the issues they encountered during the testing execution. From the theme perspective, most of the comments were collected for the themes identified in *Graph 20*. From the priority point of view, the majority of comments were identified as “normal”, see *Graph 21*.



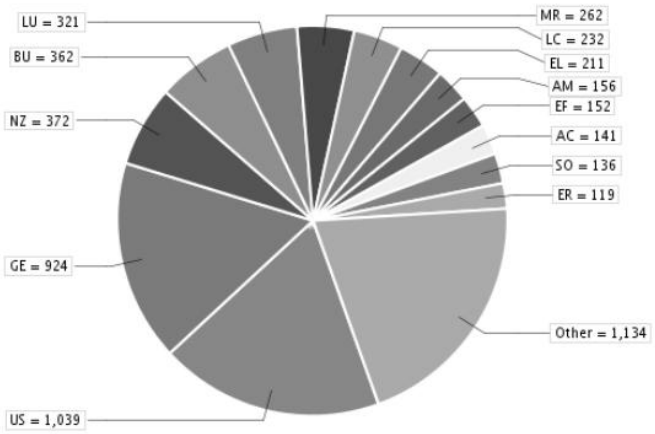
Graph 21. Comments from testing - Priority level

4 Consultation

Consultation and testing were two separate, but closely related activities. The main aim of the consultation was:

- Review of data specification documents (V.2.0);
- Domain-specific aspects;
- Cross-thematic aspects (overlaps, gaps and inconsistencies).

As a summary there were 5561 comments from 110 SDICs/LMOs (50 SDICs and 60 LMOs), from 22 countries. *Graph 22* shows the distribution of comments per Annex II and III themes.



Graph 22. Distribution of comments from consultation by themes

The majority of comments were addressed to theme Utility and governmental services (US) followed by Geology (GE). Comments were delivered using the XLS spreadsheets (Annex 4) and then imported to JIRA system for further processing. The comments collected through consultation were processed by the Annex II and III TWGs, the DS Drafting Team and the EC INSPIRE Team.

In the comments received from the consultations there were also some cost and benefit considerations but mostly connected with data specifications themselves.

The resolution of the comments from consultation are published on INSPIRE site and they correspond to the DS v3.0rc1 (version 3, release candidate 1).

5 How the results were taken into consideration

INSPIRE Annex II and III testing results were used as an important community input to the development process of the data themes specifications. This contribution was transferred to the third version of data specifications which provided the base for the text of the legally binding Implementing Rules (IR). The third version of data specifications named as a Technical Guidelines provides the supporting documentation for the implementation of IRs.

From the general overview, the main input from the testing was addressed to the data content and structure of data specifications (Chapter 5), followed by comments and recommendations addressing the content of the Overview (Chapter 2), Annexes (Use cases), Dataset-level metadata, Data quality as well as Executive summary, Portrayal and Delivery chapters.

Outcomes of the process of testing and consultation were utilized at various levels within the INSPIRE data specification development process.

5.1 Thematic Working Groups (TWGs)

TWGs evaluated the results from the testing in the process of data specifications development for the version 3. In many cases there was a direct contact established with the testing participants or through the INSPIRE Testing Forum. TWGs also prepared the resolution of the comments submitted and identified comments requiring resolution at CT level or across TWGs when related with more than one theme.

5.2 INSPIRE Consolidation Team (CT)

The JRC Data Specification Team collected the feedback from the testing participants, imported comments in the JIRA and distributed them to the relevant TWGs for improving the third version of data specifications. At the same time, this input helped to solve and harmonise issues addressed at general and cross themes level, for which dedicated actions were identified and put in place, as well as later on during the process of drafting the IR legal text, taking the relevant considerations into account. Where needed, the resolution of some comments from testing and consultation were discussed with the CT or during the Comments resolution workshop.

5.3 Testing participants

The participants involved in testing provided their considerations through the testing reports, but also very important, they had the opportunity to deal with the transformation and application related aspects of data harmonization proposed by the INSPIRE. This gave them the opportunity to see what kinds of requirements will have to be considered during the implementation of INSPIRE and to verify what should be improved for the final data specifications. The teaming up for testing and the dedicated Forum allowed to facilitate the exchange of experiences between stakeholders via learning by doing process. Participating on testing and consultation phase increased awareness and preparation of stakeholders for the process of INSPIRE implementation and maintenance.

6 Conclusions

INSPIRE Annex II and III testing and consultation process provided very comprehensive and useful interaction with stakeholders, showing the importance of these communities input and practical validation of the proposed measures. Evaluation of this kind of impact can ensure that the real implementation will be done easier, following the pre-operational testing exercise.

Outcomes of testing show that the data specifications were feasible to implement, with the considerations included in this summary. The results of the testing were used to prepare the Data specifications (version 3.0), which were further used for the drafting of the Implementing rules.

The great number of received comments through testing and consultation process showed significant and rising interest of stakeholders to participate in the process of data specification's development. This type of collaboration and coordination process give indeed important benefit for INSPIRE as well as for the stakeholders. All comments were considered and used in the preparation of Data specifications (version 3.0).

Although there were issues which required specific attention, the testing process fulfilled the expectations and provided important input for upcoming activities related with the INSPIRE implementation and maintenance. It can be concluded that the benefits from testing and consultation process can be achieved by the whole INSPIRE community.

Considering the circumstances of in-kind contribution and the involvement of the stakeholders, European Commission would like to acknowledge the contributions of the individuals and organizations participating on the process of INSPIRE Annex II and III themes consultation and testing.

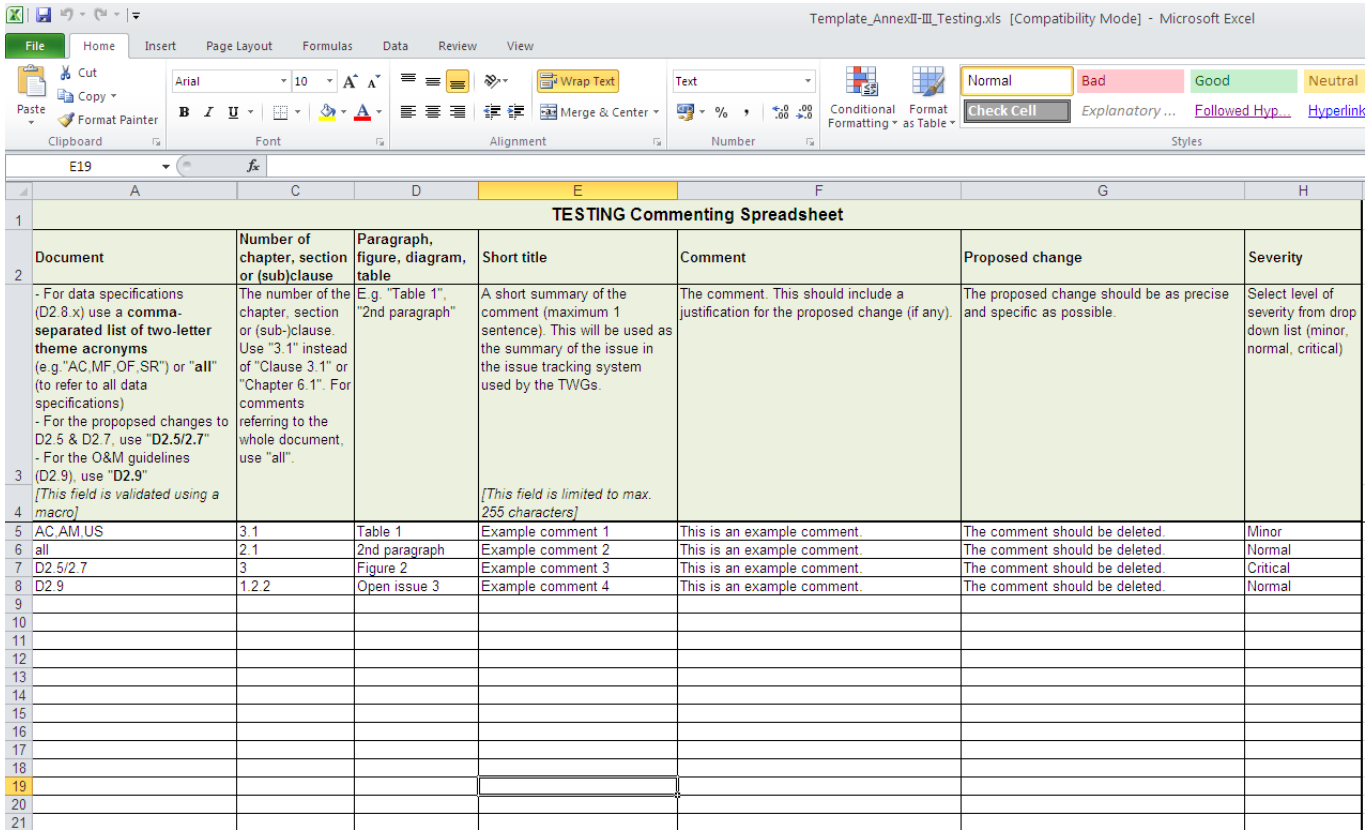
Annex 1 List of registered testing participants

1	AEA Energy & Environment
2	APAT - Italian Agency for Environmental Protection and for Technical Services
3	Agentschap Ondernemen
4	Assessment and Strategic Development of INSPIRE compliant Geodata-Services for European Soil Data (eContentplus-project)
5	Bavarian Ministry of Finance
6	Belgian Interregional Environment Agency (IRCEL - CELINE)
7	Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)
8	CENIA, Czech Environmental Information Agency
9	Comissió de Coordinació Cartogràfica de Catalunya
10	Czech Geological Survey
11	Czech Office for Surveying, Mapping and Cadastre
12	Czech Statistical Office
13	Danish Enterprise and Construction Authority
14	DataModelingAndTopology(Faculty of Geodesy)
15	Departement Ruimtelijke Ordening, Woonbeleid en Onroerend Erfgoed
16	Direccion General para la Biodiversidad
17	Direction Générale de l'Aménagement, du Logement et de la Nature
18	ENVEurope - Environmental quality and pressures assessment across Europe: the LTER network as an integrated and shared system for ecosystem monitoring
19	ERDAS Europe
20	ESBN Working Group on INSPIRE
21	ESRI Europe
22	EU FP7 Science Project CARBONES (CARBON fluxES and pools over Europe and the globe)
23	Eotvos Lorand Geophysical Institute, ELGI
24	FP7 project and e-infrastructure of 26 marine geological and geophysical data centres
25	Flemish government - Environment, Nature and Energy Department - Land and Soil Protection, Subsoil, and Natural Resources Division
26	Fotec Forschungs- und Technologietransfer GmbH
27	GDI-BW
28	GENESIS
29	GIS Institute
30	GMES Atmosphere Service/Atmospheric Chemistry Modellers
31	GS Soil
32	Geo-Information in Protected Areas and Nature Conservation
33	GeoTest project
34	Geodesy, Cartography and Cadastre Authority of the Slovak Republic- GCCA
35	Geofoto
36	Geoland 2 SDI task
37	Geological Institute of Hungary
38	Geological Survey of Finland
39	Geological Survey of Slovenia
40	Geonovum
41	Gobierno de La Rioja
42	Help forest
43	Hydrosoft Veleslavin
44	IDEE Working Group of the Commission on Geomatics (National Geographic High Council)
45	INSTITUT CARTOGRAFIC DE CATALUNYA
46	Institut Géographique National
47	Institute of Spatial Management and Housing, Warsaw
48	Instituto Geológico y Minero de España (IGME)
49	Italian Regions Association for GIS
50	JRC - IES - SDI
51	LaMMA - Regione Toscana - CNR IBIMET
52	Laboratório Nacional de Energia e Geologia, I.P.
53	Marine Environmental Data and Information Network
54	Met Office
55	Monitoring Atmospheric Composition and Climate
56	NAVARRE TERRITORIAL INFORMATION SYSTEM
57	National Assembly of the Land Cover and Use Information System of Spain (SIOSE)
58	Nature Agency
59	Naturvårdsverket (Swedish EPA)
60	Ordnance Survey
61	PanGeo FP7 Project
62	Plan4all
63	Planetek Italia s.r.l.
64	Polish Association for Spatial Information
65	Polish Geological Survey
66	Polish Hydrogeological Survey
67	Regione Emilia-Romagna
68	Regione Piemonte
69	SDI GDI-Flanders
70	Services in Earth Observation
71	Sistema Informativo Territoriale e Ambientale Diffuso del Sistema Piemonte
72	Slovak environmental agency
73	Snowflake Software
74	Social Validation of INSPIRE Annex III Data Structures in EU Habitats
75	South Moravian Region
76	Spanish Directorate General for Cadastre
77	Spatial Data Infrastructure of Extremadura
78	State Agency for Geo-Information and Surveying of the Free and Hanseatic City of Hamburg
79	Statistic Denmark
80	Statistics Netherlands (CBS)
81	SubCoast: A collaborative project aimed at developing a GMES-service for monitoring and forecasting subsidence hazards in coastal lowland areas around Europe
82	TEST_LOIB
83	The Geological Surveys of Europe
84	The Polish Geological Institute - National Research Institute
85	The State Land Service
86	Thüringer Landesamt für Vermessung und Geoinformation
87	UK Environmental Observation Framework
88	UNEP-WCMC
89	Urban and Spatial planning working group in Prague
90	VMM
91	Water Research Institute
92	conterra
93	geoland2-Satchmo
94	interactive instruments
95	organisationnameMAKIS

Annex 2 List of testing participants delivering reports

N	Testing_coordinator	Country	Status	Comments_file	Zip_file	Feasibility	Fitness
1	LMO: The State Land Service		Unfinished response	None	None	YES	
2	LMO: Institute of Geodesy, Cartography and Remote Sensing		Unfinished response	None	None	YES	
3	SDIC: Laboratório Nacional de Energia e Geologia, I.P.		Unfinished response	None	None		YES
4	SDIC: geoland2-Satchmo	LITHUANIA		None	http://www	YES	
5	LMO: Czech Statistical Office	CZECH REPUBLIC		http://www.ec-gis.o	http://www		YES
6	SDIC: The Geological Surveys of Europe		Unfinished response	None	None	YES	
7	LMO: Fotec Forschungs- und Technologietransfer GmbH	AUSTRIA		http://www.ec-gis.o	None	YES	
8	SDIC: Geo-Information in Protected Areas and Nature Conservation	ITALY		http://www.ec-gis.o	http://www	YES	YES
9	LMO: Environmental Agency of the Republic of Slovenia		Unfinished response	None	None	YES	
10	LMO: UNEP-WCMC	UNITED KINGDOM		http://www.ec-gis.o	None		YES
11	SDIC: Hydrosoft Veleslavin	CZECH REPUBLIC		http://www.ec-gis.o	http://www	YES	
12	SDIC: Polish Hydrogeological Survey	POLAND		http://www.ec-gis.o	http://www	YES	
13	SDIC: Polish Geological Survey	POLAND		http://www.ec-gis.o	http://www		YES
14	LMO: Instituto Geológico y Minero de España (IGME)	SPAIN			http://www	YES	
15	SDIC: South Moravian Region	CZECH REPUBLIC		http://www.ec-gis.o	http://www	YES	
16	SDIC: Geoland 2 SDI task	BELGIUM		None	None	YES	
17	LMO: IDEE Working Group of the Commission on Geomatics (National Geographic High Council)	SPAIN		http://www.ec-gis.o	http://www	YES	
18	SDIC: The Polish Geological Institute - National Research Institute	POLAND		http://www.ec-gis.o	http://www	YES	
19	SDIC: Italian Regions Association for GIS		Unfinished response	None	None	YES	
20	SDIC: EU Information and Policy Support System for Sustainable Supply of	NETHERLANDS		None	None	YES	YES
21	LMO: State Agency for Geo-Information and Surveying of the Free and Hanseatic City of Hamburg	GERMANY		http://www.ec-gis.o	http://www	YES	
22	LMO: Gobierno de La Rioja	SPAIN		Click here to dow loa	Click here to	YES	
23	LMO: Agentura ochrany přírody a krajiny ČR	CZECH REPUBLIC		Click here to dow loa	Click here to	YES	YES
24	LMO: Met Office	UNITED KINGDOM		None	Click here to	YES	
25	LMO: Departement Ruimtelijke Ordening, Woonbeleid en Onroerend Erfgoed	BELGIUM		Click here to dow loa	None	YES	
26	SDIC: GENESIS	FRANCE		Click here to dow loa	None	YES	YES
27	SDIC: Urban and Spatial planning w orking group in Prague	CZECH REPUBLIC		Click here to dow loa	Click here to	YES	
28	SDIC: PROMOTE Air Quality Services Integrating Observations - Development of Basic Localised Information for Europe	BELGIUM		Click here to dow loa	None	YES	
29	LMO: Institut Géographique National	FRANCE		Click here to dow loa	Click here to	YES	
30	LMO: Regione Emilia-Romagna	ITALY		Click here to dow loa	Click here to	YES	YES
31	LMO: Agentschap Ondernemen	BELGIUM		Click here to dow loa	Click here to	YES	
32	LMO: Czech Office for Surveying, Mapping and Cadastre	CZECH REPUBLIC		Click here to dow loa	Click here to	YES	
33	LMO: Flemish government - Environment, Nature and Energy Department - Land and Soil Protection, Subsoil, and Natural Resources Division	BELGIUM		Click here to dow loa	Click here to	YES	
34	LMO: Danish Enterprise and Construction Authority	DENMARK		None	None	YES	
35	SDIC: NAVARRE TERRITORIAL INFORMATION SYSTEM	SPAIN		Click here to dow loa	Click here to	YES	YES
36	SDIC: National Assembly of the Land Cover and Use Information System of Spain (SIOSE)	SPAIN		Click here to dow loa	Click here to	YES	
37	LMO: Spanish Directorate General for Cadastre	SPAIN		Click here to dow loa	Click here to	YES	
38	LMO: Federal Statistical Office of Germany	SPAIN		None	Click here to	YES	
39	LMO: Head Office of Geodesy and Cartography	GERMANY		Click here to dow loa	Click here to	YES	
40	SDIC: LaMMA - Regione Toscana - CNR IBIMET	ITALY		Click here to dow loa	Click here to	YES	
41	SDIC: UK Environmental Observation Framew ork	UNITED KINGDOM		Click here to dow loa	None		YES
42	LMO: Geonovum	NETHERLANDS		Click here to dow loa	Click here to	YES	
43	LMO: GDI-BW	GERMANY		None	Click here to	YES	
44	SDIC: JRC - IES - SDI	ITALY		Click here to dow loa	Click here to	YES	
45	LMO: Comissió de Coordinació Cartogràfica de Catalunya	SPAIN		Click here to dow loa	None	YES	YES
46	LMO: Ordnance Survey	UNITED KINGDOM		Click here to dow loa	Click here to	YES	
47	LMO: APAT - Italian Agency for Environmental Protection and for Technical Services	ITALY		Click here to dow loa	Click here to	YES	YES
48	SDIC: FP7 project and e-infrastructure of 26 marine geological and geophysical data centres	ITALY		None	Click here to dow load		YES
49	LMO: Regione Piemonte	ITALY		None	Click here to	YES	
50	LMO: Direccion General para la Biodiversidad	SPAIN		Click here to dow loa	Click here to	YES	
51	SDIC: ESBN Working Group on INSPIRE	ITALY		Click here to dow loa	Click here to	YES	YES
52	SDIC: Plan4all	CZECH REPUBLIC		Click here to dow loa	Click here to	YES	
53	SDIC: DataModelingAndTopology(Faculty of Geodesy)	ROMANIA		None	Click here to	YES	YES
54	SDIC: Assessment and Strategic Development of INSPIRE compliant Geodata-Services for European Soil Data (eContentplus-project)	GERMANY		Click here to dow loa	Click here to	YES	YES
55	LMO: Slovak environmental agency	SLOVAKIA		Click here to dow loa	Click here to	YES	
56	LMO: Direction Générale de l'Aménagement, du Logement et de la Nature	FRANCE		Click here to dow loa	Click here to	YES	
57	SDIC: SDI GDI-Flanders	BELGIUM		Click here to dow loa	Click here to	YES	
58	LMO: Czech Geological Survey	CZECH REPUBLIC		Click here to dow loa	None	YES	
59	LMO: Bundesanstalt für Geow issenschaften und Rohstoffe (BGR)	GERMANY		Click here to dow loa	Click here to	YES	
60	LMO: Finnish Environment Institute	FINLAND		None	Click here to	YES	
61	LMO: Eotvos Lorand Geophysical Institute, ELGI	HUNGARY		Click here to dow loa	Click here to	YES	
62	SDIC: GeoTest project	SWEDEN		Click here to dow loa	Click here to	YES	
63	LMO: INSTITUT CARTOGRAFIC DE CATALUNYA	SPAIN		Click here to dow loa	Click here to	YES	
64	LMO: Geological Survey of Finland		Unfinished response	None	None	YES	

Annex 3 Commenting spreadsheet for Testing



	A	C	D	E	F	G	H
1	**TESTING Commenting Spreadsheet**						
2	**Document**	**Number of chapter, section or (sub)clause**	**Paragraph, figure, diagram, table**	**Short title**	**Comment**	**Proposed change**	**Severity**
3	- For data specifications (D2.8.x) use a **comma-separated list of two-letter theme acronyms** (e.g."AC,MF,OF,SR") or "**all**" (to refer to all data specifications) - For the propopsed changes to D2.5 & D2.7, use "**D2.5/2.7**" - For the O&M guidelines (D2.9), use "**D2.9**"	The number of the chapter, section or (sub-)clause. Use "3.1" instead of "Clause 3.1" or "Chapter 6.1". For comments referring to the whole document, use "all".	E.g. "Table 1", "2nd paragraph"	A short summary of the comment (maximum 1 sentence). This will be used as the summary of the issue in the issue tracking system used by the TWGs.	The comment. This should include a justification for the proposed change (if any).	The proposed change should be as precise and specific as possible.	Select level of severity from drop down list (minor, normal, critical)
4	*[This field is validated using a macro]*			*[This field is limited to max. 255 characters]*			
5	AC,AM,US	3.1	Table 1	Example comment 1	This is an example comment.	The comment should be deleted.	Minor
6	all	2.1	2nd paragraph	Example comment 2	This is an example comment.	The comment should be deleted.	Normal
7	D2.5/2.7	3	Figure 2	Example comment 3	This is an example comment.	The comment should be deleted.	Critical
8	D2.9	1.2.2	Open issue 3	Example comment 4	This is an example comment.	The comment should be deleted.	Normal
9							
10							
11							
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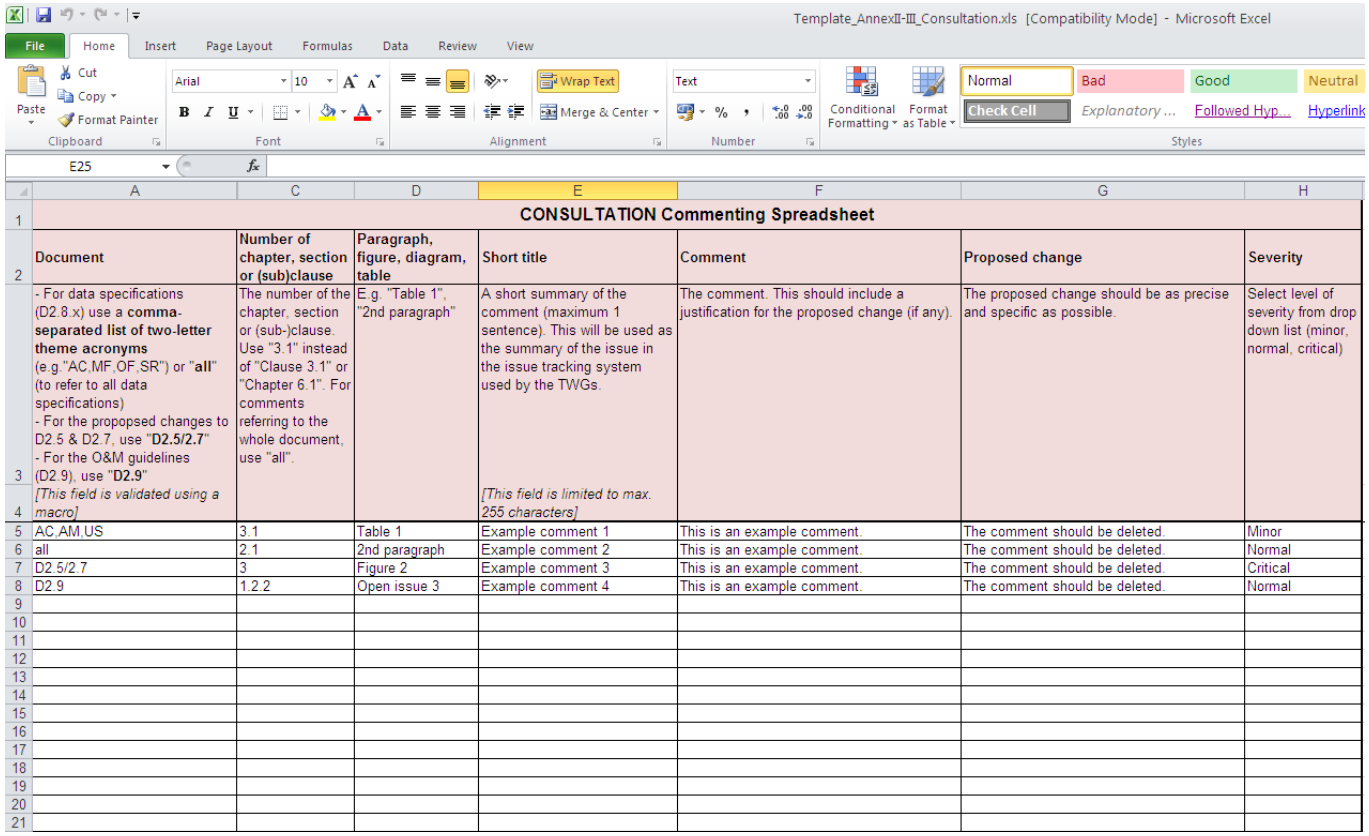
21							

Annex 4 Commenting spreadsheet for Consultation



	A	C	D	E	F	G	H
1	**CONSULTATION Commenting Spreadsheet**						
2	**Document**	**Number of chapter, section or (sub)clause**	**Paragraph, figure, diagram, table**	**Short title**	**Comment**	**Proposed change**	**Severity**
3	- For data specifications (D2.8.x) use a **comma-separated list of two-letter theme acronyms** (e.g."AC,MF,OF,SR") or "**all**" (to refer to all data specifications) - For the propopsed changes to D2.5 & D2.7, use "**D2.5/2.7**" - For the O&M guidelines (D2.9), use "**D2.9**"	The number of the chapter, section or (sub-)clause. Use "3.1" instead of "Clause 3.1" or "Chapter 6.1". For comments referring to the whole document, use "all".	E.g. "Table 1", "2nd paragraph"	A short summary of the comment (maximum 1 sentence). This will be used as the summary of the issue in the issue tracking system used by the TWGs.	The comment. This should include a justification for the proposed change (if any).	The proposed change should be as precise and specific as possible.	Select level of severity from drop down list (minor, normal, critical)
4	*[This field is validated using a macro]*			*[This field is limited to max. 255 characters]*			
5	AC,AM,US	3.1	Table 1	Example comment 1	This is an example comment.	The comment should be deleted.	Minor
6	all	2.1	2nd paragraph	Example comment 2	This is an example comment.	The comment should be deleted.	Normal
7	D2.5/2.7	3	Figure 2	Example comment 3	This is an example comment.	The comment should be deleted.	Critical
8	D2.9	1.2.2	Open issue 3	Example comment 4	This is an example comment.	The comment should be deleted.	Normal
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16							
17							
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19							
20							
21							

Annex 5 List of the software license providers including the list of reported software tools

5.1 Software tools used for Feasibility testing

Adobe Reader X
ArcGIS 10.0 + Data Interoperability Extension
ArcMap + Model Builder
ArcView 3.3
CatMEdit
Eclipse + org.exolab.castor libraries
Enterprise Architect
ESDIN mapping framework
Exwos connector
FME Desktop 2011
FME Desktop 2012 beta version
GeoConverter
Geomedia
GeoNetwork
GeoServer
Global Mapper
GoPublisher
GoPublisher Community version
HALE
INSPIRE online MD editor
mapserver
Mdweb
Microsoft Visual Studio
MS Office
Notepad++ v5.9
ogr2ogr
Oracle DB
Oracle Express
Oracle Spatial
Oracle Spatial 9.i
Oxygen XML Editor 12.2
Paper/pen/brain
PL/SQL+JavaSE6
Platinum Erwin
PostGIS
QuantumGIS
RISSAC
SaxonEE+MSXML4.0
SIGCA2
Snowflake GML Viewer v4.0
SQL Developer
Stylus Studion IDE
Talend OpenStudio 4.2.0
XML Spy
XMLPad

5.2 Software tools used for Fitness for purpose testing

ArcGIS
AGI use Geoconverter
ArcCatalog
ArcGIS
ArcGIS Server
ArcSDE 9.3.1
conTerra terraCatalog 3.0
Eclipse + org.exolab.castor libraries
Enterprise Architect
Exwos
FME Desktop
Geoconverter
GeoNetwork
Geoserver
GISAT use PostgreSQL/PostGIS
MiraMon
MS Excel
Netbeans
Oracle 10g
paper
Snowflake GO Publisher Desktop v1.4
UK EOF Catalogue
UMN MapServer
XMLSpy

Annex 6 Feasibility testing benefits

This Annex transcribes the benefits as they are written in the feasibility testing Reports, to stay close to their real meaning.

- Results showed that LISA can relatively easy be provided as the Austria land cover and land use datasets in context of INSPIRE;
- The costs analysis indicated two values for the number of person-months required to transform the contributors entire data holding:
    - for BR: the lowest value was just over 4 p.m. the highest was 11 p.m. Partners varied as to where they thought these resources were going to be needed (RegPie estimated that this would be in management & co-ordination of transformation procedures TRACASA that it would be in data collection),
    - for HB: the lowest value was less than 3 p.m. the highest was 22 p.m (SNH estimated that this would be in executing the transformation OeAW estimated that this would be in management & co-ordination of transformation procedures),
    - for SD: the lowest value was less than 4 p.m. the highest was 22 p.m (SNH estimated that this would be in remodelling observation data into distribution data RegPie in capacity building and attribute matching).
- All contributors noted that at this stage it was difficult to be precise about predicting the human resources required. All of the contributors have to some extent benefited from the capacity-building effect of the Nature-SDIplus project. Some contributors (e.g. Tracasa SAZP) estimate that having gone through the harmonisation/validation process once with Nature-SDIplus they have all the skills to undertake the same process again with maximum efficiency when the final Data Specification is published. Other contributors (e.g. SNH) were only part of Nature-SDIplus as a network partner so were not fully involved with the transformation/validation process and therefore have a greater capacity-building task ahead of them. However it should be noted that SNH estimate that costs will be in “getting a wider group of interested parties up to speed” rather than in internal capacity-building (which has already been partly achieved) and also estimate that the greatest costs of all will be related to any task that requires “manual intervention” (which may be the case for restructuring the many legacy habitat datasets of the 1990s & 2000s many of which contain mosaics).;
- Engagement in INSPIRE initiative;
- Geologists have known the data specifications and have realized the problems and efforts necessary to populating the INSPIRE digital data;
- Due to lack of resources we stopped the testing during the creation of the mapping rules. But still we have tested the whole workflow of the transformation and know at least for these layers that it is possible to create fully feasible datasets;
- "US: Preparing documentation and spreadsheets to keep records of timing, problems, etc. We think it would be interesting to collaborate with ""W3C POI WG"" and ""ARML 2.0 OGC SWG"" as they are working on defining a POI specification standard. Mapping codelist 10. The time needed to do the ServiceType codelist mappings would be much lower if the category ordered codelist (not the alphabetical one) would have been available in a kind of spreadsheet format instead of pdf format. Mapping attributes 6. Must serviceLocationByAddress contain a full Address feature, with all its XSD structure? Or it may be enough containing only an Address ID?"
- Feasibility and consistency of IDERioja data model with Inspire;

- Discovery of some limits in data sets and their public availability;
- Clearer understanding of key issues in trying to provide INSPIRE-compliant data services. "In depth preview about the data specifications our institution will be obliged to follow. Possibility to comments on the difficult data structure. Possibility to comment on the specific attributes";
- It showed what issues arise when you do an actual transformation or data mapping exercise with a real "legacy" (or application-specific) data model versus an INSPIRE data model. It also creates more involvement from stakeholders;
- "Check that our own orthoimagery data can be easily aligned with the OI data specification. Foresee the processes and tools that will be implemented in order to produce INSPIRE compliant data. Anticipate these developments thanks to the matching table. Identify possible issues in the OI data specification";
- "Soil testing: learning new data transformation methodologies. Geology testing: no relevant benefits";
- "Advance knowledge of requirements. Institution will be better prepared for implementation of final data specification";
- "We obtained insight and understanding on the DS BU. We are able to suggest improvements of the DS BU. We identified a couple of issues where we can suggest an improvement of the source dataset(s). The test was as an opportunity to raise awareness on INSPIRE and the requirements to meet the coming implementing rules on the relevant dataset(s) and themes";
- Proper study and understanding of INSPIRE DS and how to transform Data into INSPIRE DS;
- "Knowledge. Testing tools. Testing of specifications over LC-LU data not from INSPIRE about such as WMS WFS metadata ISO coverages. Shared experience with organizations from other countries involved in European projects. Testing was done under umbrella of HLANDATA & HELM projects. Learn together. Foresee our future. Schedule human and material resources for INSPIRE adoption. Get harmonized and comparable data for LC & LU at European level";
- We have learned GML and ISO topics and we have revised our own buildings data model;
- Is a good opportunity in order to understand how to answer to Inspire requirements using real datasets and at the same time to evolve our databases from a specific application approach toward a general purpose approach;
- "Theme EL: Mainly: 1. knowledge of the Data Specification for Elevation. 2. identification of possible issues/questions with the transformation of the foreseen datasets. Theme HH: 1. Feasibility of transformation using the chosen methodology. 2. Experience with open source ETL tools and evaluation of tools suitability for INSPIRE transformations. 3. Experience with the transformation process (from input data to INPIRE compliant model)";
- The spatial data delivered by the German AAA standards-based data exchange interface is consistent to the draft inspire data model for buildings;
- All material used for this testing are available as the java4inspire library (http://www.osor.eu/projects/java4inspire);
- "FEASIBILITY TESTING THEMES LC & AM: Revision of previously no detected errors in data and metadata. Mainstreaming the metadata for all data. Consistency across the spatial data within the Agency. INSPIRE compliant FEASIBILITY TESTING THEME NZ (Geological Institute of Catalonia): Possible use of the Core and Extended data model at IGC for Natural risk data at small scale FEASIBILITY TESTING THEME NZ (General

Directorate of Civil Protection): The DGPC is a multiple source's data user who will benefit from standardization due to the fact that it will make easier the management of data supplied by each hazard expert. It will help as well in the comparison between data of the different EU states";

- The major benefit is represented by the opportunity to understand the data models and identify the problems opened secondary to test the time and resources necessary to transform data;
- The comparison among data managed by LMO Regione Piemonte and proposed INSPIRE PF data model has been useful to identify gaps in geographical information availability at local level on specific features (e.g. installation and installation part). Involving data providers and stakeholders operating at local level during the testing phase can be considered a starting point for enhancing awareness of information required at European level and improving data production processes;
- Participation in the testing has familiarity with the INSPIRE directive language and analyze in depth the national data this will allow us to improve future data collection focused on the attributes and metadata;
- To have an early feel of how feasible it will be to provide our data in INSPIRE dictated formats;
- "Study of the INSPIRE data specification. Identify/testing different tools for transformation/metadata. Identify minimal requirements for old datasets and metadata. Identify and test different data/metadata formats";
- "RISSAC. Partly understanding of a basically different consideration of our self-developed and –managed spatial soil information systems. Establishment of co-operation with further Hungarian data providers both in the theme soil and other INSPIRE themes. Familiarizing with HUMBOLDT Alignment Editor. NAGREF. The feasibility testing helped and benefited the involved personnel of the institutions to understand and become familiar with INSPIRE Soil data structure and specification and how the existed data can be used according to INSPIRE directive. BGR. As there is no concept like soil form (see dataset description) implementable using the localSoilType (which is on soil types but not combinations with substrate information) the mapping units can only be designated with soil type information. Some codelists are not consistent with those provided by INSPIRE. CAO. Partly understanding of a basically different consideration of our self-developed and –managed soil database. Establishment of co-operation with further Hungarian data providers both in the theme soil and other INSPIRE themes. ISSNP. Better understanding of INSPIRE requirements soil specifications and local data set compliance with them";
- "The main result will be reused to develop the prototype that process the transformation of existing datasets conformant to the national specification into INSPIRE compliant datasets. Although not tested in the frame of Plan4all the objective is to develop web process services to operate that transformation on the fly. The feasibility testing will promote the publishing of local and regional spatial planning data and metadata through the French geoportal and geocatalogue with the view of creating virtually or physically a French geoportal for all spatial plans interoperable with the INSPIRE European portal";
- Since GIS support for other governmental agencies in Flanders is an important task for AGIV the obtained knowledge of the data specification was a clear benefit;
- Being aware of the recent INSPIRE development;
- If you wish to see a detailed list of person days per testing and theme please contact us;
- "1) The feasibility testing helped in understanding how the specifications should be interpreted. 2) The feasibility testing brought forward new unclarities of the draft specifications";

- Knowledge gained if (and how) the tested source data can be transformed to INSPIRE compliant datasets. Knowledge gained about number of attributes that can be matched against the INSPIRE models. Knowledge gained about the complexity of the operations required to transform the source data. Knowledge gained about possible data quality degradations that may occur during the transformation process. Knowledge about software tools used for the transformation and testing process. Knowledge gained when combining different source data to unified INSPIRE datasets (for example testing to combine Land-Elevation and Bathymetry data into one common INSPIRE dataset). Deep knowledge gained about the INSPIRE Data specifications;
- "The benefits identified by the testing groups are: 1. To know the added value to use ICC data at supranational level. At this moment ICC data models are available ICC data requests are flexible and ICC data management is good at national regional or local level. 2. Opportunity to know in depth INSPIRE specifications in order to be taken into account in next versions of the data models. 3. To recognize the added value of the ICC orthoimages in comparison with the quality requirements of the INSPIRE model.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.