



Project Acronym: eENVplus
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Project Objectives

eENVplus aims to unlock huge amounts of environmental data, managed by the involved national and regional environment agencies and other public and private environmental stakeholders, through the integration and harmonisation of existing services. These data are not only collected to answer reporting obligations on the environment to the European Union, but also to support national and local policies and actions.



The project does not design just new services but rather, starting from the results of previous European experiences (funded projects, best practices, EU and national and local experiences), it integrates existing infrastructures into an operational framework able to overcome cross-border and language barriers. eENVplus provides not only the ICT infrastructure but also the description and the support to make this infrastructure operational and profitable through the provision of an organisational model and a tutored training framework.

The eENVplus interoperable infrastructure provides Member States and Geographic Information Communities with:

- A comprehensive, open and scalable infrastructure able to integrate existing infrastructures according to the INSPIRE requirements, open standards and interoperable innovative services;
- A common Environment Thesaurus Framework, supporting the integration of existing thesauri relevant for the environmental sector via Linked Data and providing added-value services for its integration and exploitation in pilot applications
- A comprehensive toolkit with procedures, guidelines and examples for data harmonisation and validation supporting Member States during INSPIRE implementation;
- A set of innovative on-line added-value interoperable services aiming to facilitate the development of innovative environmental applications;
- A Training Framework to support, with eLearning tools, the development of the necessary capacities and knowledge to implement INSPIRE, to develop a SEIS and to keep this new adapted infrastructure operational.

Project Activities

The project was launched January 1st, 2013 and will end 31st December 2015 (3-year project). It is structured into 4 overlapped phases:

- Analysis phase (JAN – DEC 2013): results in a detailed set of requirements and documents that will guide the design and implementation of eENVplus infrastructure;
--- *This phase has successfully finished.*
- Initial Operating Capacity (JUL 2013 – DEC 2014): results in an interim version of the „eENVplus infrastructure“
--- *This phase has been ongoing.*
- Validation (DEC 2013 – DEC 2015): results in an interim version of the „eENVplus infrastructure“
--- *This phase has been ongoing.*
- Advanced Operating Capacity (JAN – DEC 2015): results in the final version of the „eENVplus infrastructure“

Moreover, activities dealing with Building Capacity and Training, Dissemination, Exploitation and Sustainability and Management & Coordination are carried out along all the project's phases.

The project activities have covered so far:

- Initiation of the project with organisation of the Project Kick-off Meeting in January 2013 in Genoa (Italy);
- Collection of the pilots' scenario Use Cases (UCs) and their systematic analysis;

- Definition of user requirements of the eENVplus infrastructure and the pilots using the Redmine tool (www.redmine.org);
- Definition of the technical specifications of the several services to be implemented in the eENVplus Infrastructure;
- Collection of detailed information about the source data models, the format and the level of compliance of the source datasets/metadata with respect to the applicable requirements, as well as any further information related to the existing/foreseen workflows and processing to be run in the different Use Cases, as well as details about eventual IPR issues;
- A thorough analysis of the last version of the Data Specifications of the applicable INSPIRE data themes;
- A review of the tools available for spatial datasets and metadata harmonisation and validation;
- Harmonization and validation of datasets and metadata;
- Development of the Thesaurus Framework (TF) integrating different vocabularies for the Environment and TF server deployment;
- Specification of the Thesaurus Framework Exploitation Services (TFES);
- Development of the 1st Thesaurus Framework Exploitation Services and their deployment on the TF server;
- Initiation of harmonization of the first services and preparations for the 1st Integration (eENVplus prototype);
- Definition the scenario demonstrator application and monitoring the pilots progress;
- Scenario demonstrator application and initiation of preparations for the 1st DEMOs;
- Analysis of training needs;
- Updating the Training Framework with training content and maintaining creation of the training content and organization of training actions clustering with other initiatives (LINKVIT and smeSpire);
- Creation and maintenance of project web site (www.eenvplus.eu);
- Following the dissemination plan and publishing of awareness material (Newsletter, Proceedings, Public Deliverables) and Organisation of eENVplus Workshops;
- Communication with National, Local, Regional Environmental Authorities, and Thematic Communities, maintenance of the link with the experts of JRC (Joint Research Center) and with the CEN/TC 287;
- Invitation of representatives of EC, EEA and JRC to participate in project Committees (PMB, AC);
- Organisation of the eENVplus Workshop on June 24th, 2013 at the INSPIRE Conference in Florence (Italy);
- Organisation of the eENVplus Workshop on September 18th, 2013 at the Project Meeting in Leuven (Belgium);
- Organisation of the eENVplus Workshop on November 7th, 2013 at the ASITA Conference in Riva del Garda (Italy);
- Organisation of the eENVplus National Workshop on March 12th, 2014 at the Project Meeting in Prague (Czech Republic);
- Organisation of the Clustering Workshop on June 17th, 2014 at the INSPIRE Conference in Aalborg (Denmark);
- Organisation of the eENVplus National Workshop on October 1st, 2014 at the Project Meeting in Athens (Greece);
- Organisation of the Clustering Workshop on October 15th, 2014 at the ASITA Conference in Florence (Italy).

Main Results Achieved

The main results achieved so far are:

- eENVplus Use Cases:** overall 25 use cases were collected from 10 pilots and detailed in unified structure in the deliverable “**eENVplus Use Cases**”;

- **User Requirements:** over a hundred user requirements were defined based on thorough analysis of the use cases; they were defined using Redmine, a flexible project management web application with issue tracking system; the user requirements are reported in the deliverable “**Use Cases Analysis and User Requirements**”;
- **Services for eENVplus Infrastructure:** during user requirements analysis several services were identified (clarified in respect with those proposed during the preparation of the project) to be implemented in the infrastructure (see the following Chapter on final results);
- **Working Groups:** Technical Responsible, Service Responsible and Pilot responsible established working groups to manage intensive work on the user and (later on) system requirements definition, with the organisation of several Technical Meetings and teleconferences;
- **Collection of information on datasets/metadata:** information included the source data models, the format and the level of compliance of the source datasets/metadata with respect to the applicable requirements, as well as any further information related to the existing/foreseen workflows and processing to be run in the different Use Cases as well as details about eventual IPR issues. The results are reported in the deliverable “**Project Requirements**”;
- **The security requirement definitions** were generated from the analysis of user requirements as well as from issues highlighted during the system architecture definition. The terminology includes terms as AUTHENTICATION, AVAILABILITY, CONFIDENTIALITY, INFORMATION SECURITY, INTEGRITY, SECURITY REQUIREMENTS, SECURITY THREAT; they are reported in the deliverable “**Security requirements**”;
- **The complete set of system specification:** The entire eENVplus architecture has been designed according to the classical multi layer system with a communication paradigm based on open source service oriented architecture; it also covered the design of the set of software components and the client applications to be deployed (especially software interfaces, between already available software components and other pilot's necessities); reported in the deliverables “**System Architecture**” and “**Deployment Plan**”;
- **eENVplus Vision:** the vision of the eENVplus project was refined based on the detailed analysis of the pilot applications and the policies evolutions and upcoming trends to maintain alignment of the project outcomes with the expectations of the involved public and private stakeholders; reported in “**eENVplus Vision**”;
- **Analysis of misalignments between GI standards:** gaps/ misalignments between GI standards have been identified; an on-line register to collect gaps/misalignments during and beyond the project lifetime has been created. GIST in close cooperation with OGC is pursuing the creation of a new OGC Domain Working Group for harmonisation on standardization. This DWG, once established, will effectively channel the gaps/misalignments identified in the on-line register toward their resolution by the competent standardization bodies, providing benefits for the whole GI community;
- **Analysis of INSPIRE Data Specifications:** A thorough analysis of the last version of the Data Specifications of the applicable INSPIRE data themes has been made;
- **Review of harmonisation and validation tools:** tools available for spatial datasets and metadata harmonisation and validation have been analyzed and reported in the deliverable “**Datasets and metadata harmonisation toolkit**” and “**Datasets and metadata validation toolkit**”;
- **Datasets and Metadata Harmonisation and Validation:** eENVplus datasets and metadata have been harmonised and validated; the overall process will be reported in “**Set of harmonised datasets and metadata**”; (*Set of Validated Datasets and metadata is scheduled for December 2014 - January 2015*)
- **Recommendations for WP5 and WP6:** a set of recommendations regarding the set-up and integration of a validation service have been given and reported in “**Recommendations for WP5 and WP6**”;
- **Thesauri survey:** catalogue of available terminological resources for the Environment, definition of the methodological approach to analyse them and in order to identify the vocabularies to be integrated in the TF according to the project application perspective; analysis of methods to evaluate the thesaurus interlinking; investigation of technology for the improvement of the Thesaurus Framework previously developed in the NATURE-SDIplus project; reported in “**Survey on environmental thesauri**”;

- **Thesaurus Framework for the Environment:** enlargement of the content with the publication as Linked Data of the vocabularies identified by the survey, interlinking between the TF vocabularies, interlinking with vocabularies exposed in the LOD cloud. Two vocabularies (EARTH and ThiST) have been also accepted to be exposed in the LOD Cloud of 2014). Release available at <http://linkeddata.ge.imati.cnr.it>;
- **Thesaurus Framework Exploitation Services:** (i) the specification of the identified services to be developed (exploitation services for metadata compilation and data discovery) and; reported in “**Specification document for thesaurus exploitation services**”; (ii) service deployment in the TF server at <http://linkeddata.ge.imati.cnr.it>;
- **Services Technology Platform:** setting up of the central hardware infrastructure that is the physical infrastructure where the services of the eENVplus platform will be centrally hosted;
- **eENVplus Infrastructure:** includes the status of the implementation of the eENVplus infrastructure in terms of technical implementation, data, and services provisions; reported in "eENVplus infrastructure implementation n.1";
- **Evaluation Methodology:** definition of the indicators and the methodologies that will be applied in the “Service Integration and Implementation” development to assess the Quality of Service (QoS) and the Service Level Agreement (SLA) of eENVplus services in “Benchmarking and Definition of Service Level Agreement”. This analysis follows the suggestions provided in the document INSPIRE Network Services Performance Guidelines.; described in "Evaluation methodology and QoS Protocol" document;

Beside the technical results, a number of dissemination outcomes have been carried out:

- **Pilot applications:** a definition of a common approach and time schedule for the pilots implementation taking into account the infrastructure implementation plan; a template with several standard questions, regarding pilots’ use of the eENVplus infrastructure components was distributed to the pilot partners, the contributions were collected and elaborated into “**General concept for Application Development**”;
The technical specifications were defined in according with technical and pilot partners' view and a detailed implementation plan for each use case in each pilot was defined using a specific template. For each use case a mobile or web mock-up simulation was performed in order to identify a components deployment plan. All the web services, needed to perform the pilot application, are well described in „**Applications system specification**“;
A questionnaire was distributed to pilot partners to acquired information regarding the change management plan in their organization related to the pilot application and a risk analysis on the development and implementation plan was performed and described in "**Organisational and change management plan**";
"**Pilot applications progress**", a document describing the status of the implementation of the pilot applications will be published in December 2014 (preliminary information is given in the next Chapter "Final Results, their Impact and Use");
- **Training User Needs Survey:** The questionnaire covered not only the training needs, but the background knowledge, interests, motivation of stakeholders; and preferred methods for improvement of their knowledge, skills, and competences. The analysis defined the necessary training modules and mode of deliveries for three user profiles: i) managers and decision makers, ii) researchers and technical staff; iii) administrative and others; it is reported in additional report “**Training Needs Analysis**”;
- **Creation of Training Curricula:** The curricula consist of a number of knowledge areas which were organised in logical learning units, and which allow establishing learning paths in view of pre-defined learning outcomes; for different stakeholders unique Learning Paths are proposed; elaborated in “**Training Curricula**”;
- **Training Framework:** it includes the eLearning platform, and the related e-learning tools, the Training material organized in the Training Modules, detailed in the meta information included in the Training Package;
- **Project web site** (www.eenvplus.eu);
- **Project Fact Sheet:** available on project web site in 12 languages (CS, NL, FR, DE, EL, HU, IS, IT, PT, SK, SI);

- **Electronic Newsletter:** available upon subscription on the project web site;
- **Dissemination Plan:** rules and plans for the project dissemination, use of project logo, templates and preparation of communication material (agreed in the first months of the project) and individual dissemination at each partner level;
- **eENVplus Workshop:** 6 Workshops have been organized so far and their proceedings are available on the project web site:
 - eENVplus Workshop: organized June 24th, 2013 at the INSPIRE Conference in Florence (IT), [proceedings](#);
 - eENVplus National Workshop (BE): organized September 18th, 2013 in Leuven (BE), [proceedings](#);
 - eENVplus National Workshop (IT): organized November 7th, 2013 at the ASITA Conference in Riva del Garda (IT), [proceedings](#);
 - eENVplus National Workshop (CZ): organized March 12th, 2014 in Prague (CZ), [proceedings](#);
 - Clustering Workshop: organized June 17th, 2014 at the INSPIRE Conference in Aalborg (DK), as clustering Workshop, with other relevant projects for INSPIRE and Interoperability, [proceedings](#);
 - eENVplus National Workshop (EL): organized October 1st, 2014 in Athens (EL), [proceedings](#);
 - Clustering Workshop: organized October 15th, 2014 at the ASITA Conference in Florence (IT), as clustering WS (eENVplus, together with the LIFE-IMAGINE and GeoSmartCity projects), [proceedings](#);
- **Exploitation towards national, regional, local environmental authorities and thematic communities:** several eENVplus members are National Focal Points using contacts among EIONET members; a link with Istituto Nazionale di Geofisica e Vulcanologia (INGV) was established through CNR-IMATI partner; EC SEIS Task Force Members have been contacted and provided with essential information about the project; a strong link with the CEN/TC 287 (the European Standardization Body in Geographic Information) has been established;
- **Exploitation towards SMEs:** it was established a formal liaison between the eENVplus project and the smeSpire FP7 Support Action. The present (600) and future SMEs members of the smeSpire Network will be constantly updated about the eENVplus progress.
- **Exploitation Plan:** the document will define an exploitation roadmap as a blueprint of any exploitation initiative within eENVplus. It will be published in December 2014, and updated at the end of the project (December 2015);
- **Long Term Sustainability Plan:** A plan of the sustainability of the project after its conclusion, including financial plan. It also includes the users' engagement status and the plan of that in the eENVplus long term sustainability perspective. In a draft version it will be published in December 2014, and as a final version in December 2015.

The **eENVplus won CEN/TC 287 Award for Excellence and Innovation at the INSPIRE Conference 2014**. Thanks to the eENVplus validation service, eENVplus was selected as the winner for its continuous efforts to apply GI-standards from CEN/TC 287, ISO 211 and OGC to support the implementation of INSPIRE components in the environmental field ([more](#), [competition announcement](#)).



Final Results, their Impact and Use

1. eENVplus Infrastructure

The eENVplus infrastructure is a standard Spatial Data Infrastructure (SDI) with some Value-Added services provided to satisfy the Pilots' needs.

The general SDI technologies consist of a set of data services that provides geographic data and their attributes. These services and data are documented with metadata that offers the way to discover and visualize the data/services through the web using ad-hoc web services. Moreover, services are provided to access the data and different applications are built to solve specific needs on the data service layer.

The Spatial Data Infrastructure provides an environment to connect these applications with the appropriate data. The core component of SDI technologies responsible for this aim is the so-called Dissemination Layer.

Moreover the Application Layer is the set of technologies that allows searching (Thesaurus Services), accessing (Data Access Services) and processing (Processing Services) datasets contained in Data Layer.

The entire eENVplus architecture, shown in Figure 1, has been designed according to the classical multi-tier (layer) system with a communication paradigm based on open source service oriented architecture, where each component (service), interacts with the others through a set of messages written in a standard format. With the term service, we do not only include each one of the three layers but also all the components inside them, allowing the integration of several multifaceted computational units inside a unique system.

IMPACT: Each eENVplus infrastructure component will be available to all potential stakeholders, according to the Open Source Software - OSS policy, leaving the possibility to re-use and upgrade the code completely free of charge.

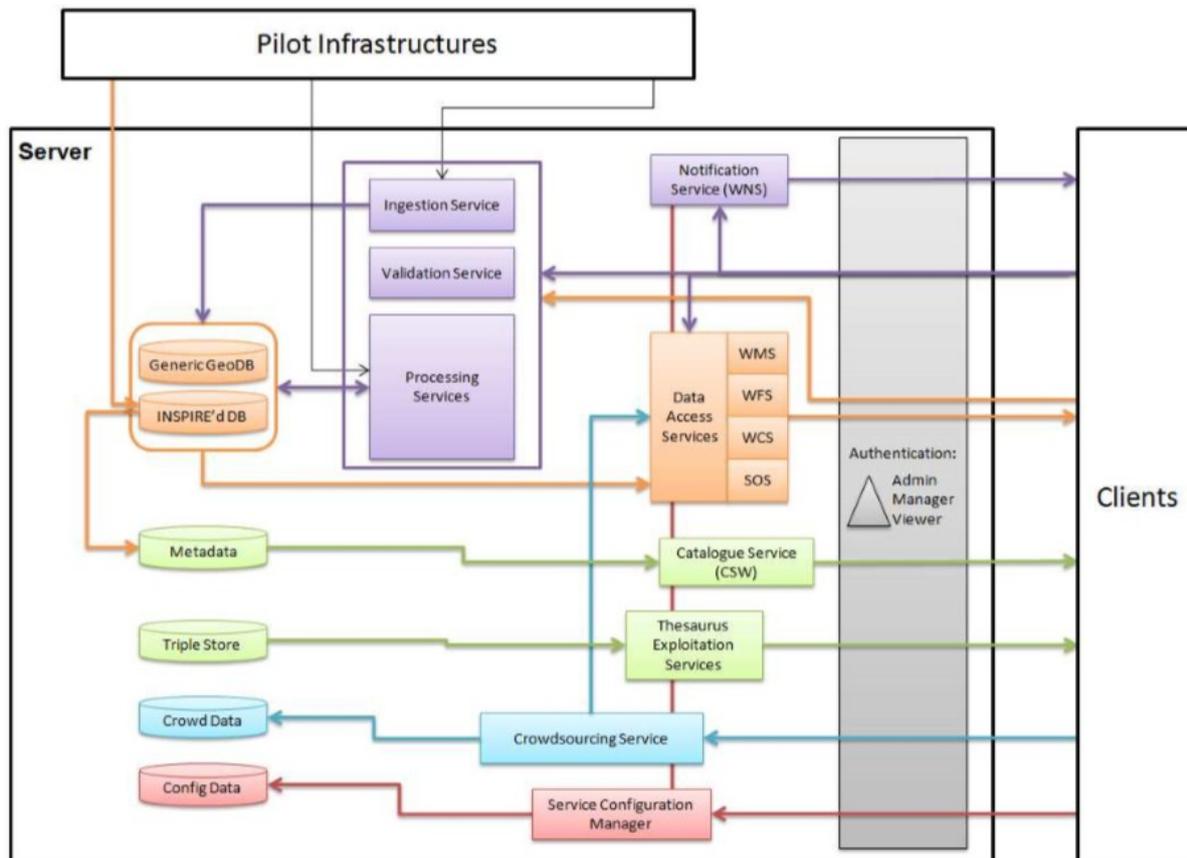


Figure 1 - The eENVplus System Architecture

2. eENVplus Services

The following services are being developed:

○ **Ingestion Service (IS):**

the infrastructure shall comply with a number of requirements that ensure that it will be able to satisfy events like:

- files arrival on a specific FTP site, or
- actions performed by users at client level, or
- transformation of INSPIRE GML encoded files into RDBMS platform

Server: Deegree, GeoBatch

Client: N.A.

○ **Validation Service (VS):**

The eENVplus Validation Service provides executable tests to evaluate whether a gml dataset fulfils the requirements of the INSPIRE Directive. It makes available an implementation for the ATS (Abstract Test Suite) included in the INSPIRE Data Specifications. Where possible tests are completely automated, guidelines to manual execution are provided otherwise. The eEnvPlus Validation Service makes use of the OGC testing facility GML 3.2 (ISO 19136:2007). This executable test suite (ETS) verifies the conformance of GML datasets with respect to INSPIRE application schemas and also with respect to ISO 19136:2007 (GML 3.2.1). Supplementary INSPIRE constraints can be verified making use of theme specific schematron files.

Server: OGC TEAM Engine 4.0.5

Client: no specific application needed, only a web browser is necessary to access the service

○ **Catalogue Services (CS):**

will focus on discovery operations to allow clients to perform searches and retrieval of geographic data and services.

Metadata coming from existing catalogues (e.g. pilots or other) will be cached through harvesting mechanisms, to better performances during search operations.

The instance of the INSPIRE geoportal to be deployed for eENVplus, will provide a specific entry point that offers client access functionality to INSPIRE discovery and view services from existing eENVplus catalogues (e.g., pilots or other). The geoportal goes beyond the traditional SDI portal concept and provides users with a user friendly interface for an enhanced experience, allowing them to easily find and access geospatial data and services, also by the exploitation of the Thesaurus framework services integrated into the geoportal client functionalities.

Server: GeoNetwork, INSPIRE Geoportal

Client: EUOSME, INSPIRE Geoportal

○ **Thesaurus Framework Exploitation Services (TFES):**

focus on functionalities to ensure homogenization of keywords for the metadata compiled by all the project members, and also to guarantee the discoverability of these metadata based on the right search criteria. This goal is being realized using the thesauri concepts, instead of lexical keywords to omit the barrier of different terminologies and different languages addressing the same semantic concept.

Metadata coming from existing catalogues (e.g. pilots or other) have been cached through harvesting mechanisms.

The following list of exploitation services are under development:

- KeywordCompletion
- KeywordExplanation
- KeywordTranslation
- ThesaurusResolution
- QueryReformulation
- SemanticExplorativeSearch

Server: Tomcat, Virtuoso

Client: EUOSME, INSPIRE Geoportal

- **View Service (VwS):**
are related to the graphical representation of geographical information.
Graphical representation means the display of geographical information through the use of maps (base, choropleth).
Server: Geoserver, Deegree
Client: MapStore, Unity3D
- **Download Services for vector data (DS-v):**
will focus on access and filter operations to allow clients to perform search and retrieval of geographic features (vector) and download subset of dataset locally.
Server: Geoserver, Deegree
Client: MapStore
- **Download Services for coverages (DS-c):**
will focus on access and filter operations to allow clients to perform search and retrieval of grid coverages and download them locally.
Server: Geoserver
Client: MapStore
- **Crowdsourcing service (CrS):**
will focus on access, filter and store information provided by end-users about project-related relevant phenomena.
Server: at server level, the Crowdsourcing Service is only requiring base software (Tomcat, PostgreSQL and PostGIS)
Client: PHP Administration Tool, Unity3D
- **eENVplus Processing Services (PS):**
are related to the elaboration of input and the production of output data on the basis of specific algorithm and/or functions.
Here below the list of PS planned: (* indicates PS already implemented; ** indicates PS already deployed)
 - Topological Hierarchical Partition Validation (*)
 - Forest Fire Simulation Service (*)
 - Landslide Susceptibility Map Generation Service (**)
 - Flooding Risk Map Generation Service (**)
 - Urban and Rural Growth Identification Service (**)
 - Georeport**Server:** Geoserver, ArcGIS Server
Client: MapStore
- **Notification Service (NS):**
Notification service inside eENVplus platform provide a decoupled and configurable service to provide notification using various routes of communications (email, etc.).
Server: 52North SWE
Client: at client-side, processing services will be invoked via client application specifically implemented by Pilots: notifications will be provided to email addresses defined in forms implemented by Pilots in their own clients.
- **Advanced Visualisation Service (AvS):**
is a client-side feature. It allows users to visualise data in “augmented reality” mode. GeoServer allows user to install several official and unofficial plugins, to allow users to increase the number of functionalities and file formats supported by the software. For the Advanced Visualization Service, the DDL/BIL plugin, for streaming height maps, is required.
Server: The server capabilities for this section are not required: the View Service has only been extended by adding the BIL formats.
Client: Unity3D

IMPACT: As above at point no. 1.

eENVplus Showcase

The eENVplus showcase has been created to demonstrate and consume, through a general point of view, the eENVplus services. The showcase consists in a web site including the entry points to access the different components produced by eENVplus project representing the different bricks of the eENVplus infrastructure. For this purpose open source software have been reused, configured and optimized.

Currently, four sections has been published ([here](#)):

- Pilot Demonstrator: the entry point to access the pilot applications,
- Metadata Editor: the entry point to access to the eENVplus version of EUOSME with integrated services for the exploitation of the Thesaurus Framework and able to publish metadata directly on the eENVplus catalogue,
- Catalogue Service: the eENVplus customisation of GeoNetwork with the integration of the EUOSME as metadata editor,
- Validation Service: the entry point of the eENVplus validation tools suite.

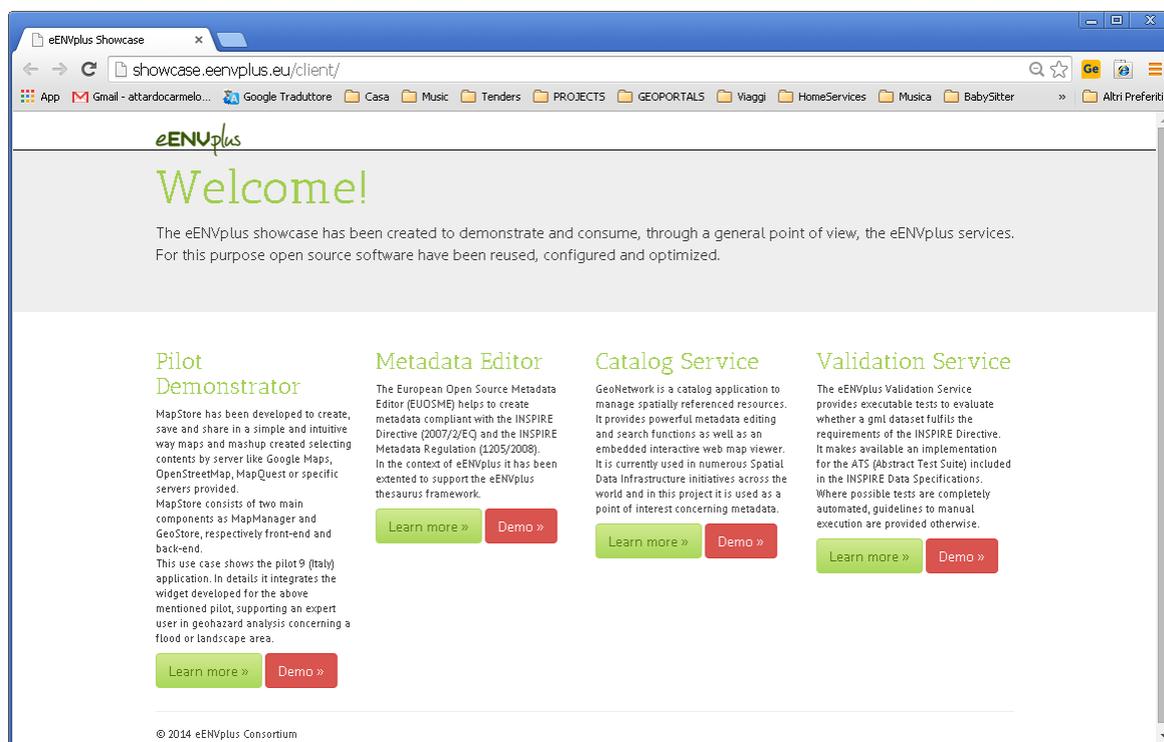


Figure 2 - eENVplus Showcase

3. Advanced Thesaurus Framework

The content of the Thesaurus Framework, namely LuSTRE, has been advanced for a more efficient framework covering different data themes for the Environment. It is based on other available multilingual vocabularies (e.g. EARTH, ThiST, AGROVOC, GEMET, etc.) and by establishing semantic interoperability between them.

In particular, the Thesaurus Framework contents is characterised by multilingual vocabularies covering different themes (e.g. Geology, Air Quality, Protected Sites, etc.) by the interconnection between vocabularies within the TF or between external vocabularies (e.g. those available in the LOD Clod AGROVOC, GEMET, EUROVOC, DBPEDIA).

IMPACT: It will be easier to use and reuse data supporting multilingual and multicultural issue. In particular it will allow to share and consume metadata which in turn will facilitate the widespread adoption of open data for digital content in the environmental area.

4. A set of Thesaurus Framework Exploitation Services

It will include services permitting the Thesaurus Framework exploitation for data access activities (e.g. providing added value web services to editing metadata, searching and discovering geographic resources).

Thesauri framework services are applied for:

- Metadata Compilation/Editing:** To ensure compilation of homogenized metadata by the members of the project which guarantees the discoverability of these metadata based on the right search criteria;
- Data Discovery:** To be able to find all the data related to a certain keyword, the search engine must be enhanced by the knowledge of the semantic meaning of that keyword. With the use of this approach, the resources would be discoverable, as long as they address the same thesauri concept, i.e. have the same semantic meaning, regardless of which terminology is used and in which language the keyword is defined;
- Semantic Explorative Search:** The user will then be able to browse through the concept hierarchy and fine-tune his selection, for instance by going through the more general concept(s) or finding his precise concept under the narrower concepts of the abstract concept, or also checking related concepts;

IMPACT: It will provide homogenization in the data description and advanced search for accessing and re-using the harmonised dataset against the linguistic barrier.

5. Harmonisation and Validation Toolkits

Datasets and metadata harmonisation toolkit:

represents a project deliverable that provides guidance for data and metadata harmonization.

The guidance is given by means of procedures, tools and examples of data and metadata harmonization processes, to be applied to transform existing datasets/metadata according to the technical requirements of the applicable Implementing Rules and Technical Guidelines of INSPIRE.

The deliverable is intended as a living document, which will be updated according to new/updated available procedures, tools and examples.

January 2014 version 3.0 (previous version 2.0 released on 29.11.2013):

- the extension of the sub-section 4.2.2, containing now a new part relevant to the use of the groovy scripts, allowing an even more flexible and customised use of the HALE tool;
- the addition of a new section sub-section 4.2.3 “eXows”, presenting a new harmonization tool, of particular interest thanks to its capability to perform transformations directly at service level, extensively used by the partner ISPRA in the context of its transformation activities related to Geology datasets;

Datasets and metadata validation toolkit:

represents a project deliverable that provides guidance for datasets and metadata validation.

The guidance is given by means of procedures, tools and examples of datasets and metadata validation processes, in order to claim the conformance of transformed datasets/metadata to the requirements of the applicable Implementing Rules and Technical Guidelines of INSPIRE.

The deliverable is intended as a living document, which will be updated according to new/updated available procedures, tools and examples.

IMPACT: Thanks to the use of the procedures and examples provided in the toolkits, the users are able to self transform and self validate (with respect to the schema) their own datasets/metadata.

6. eENVplus Training Framework

It is being designed as a cornerstone of the project to make available existing knowledge and transfer developed skills to the target groups of users. In this context, training activities will strictly complement and support dissemination and exploitation, fostering Capacity Building. Training is implemented through an open source e-learning platform offering a training package based on specific and thematic vocational training curricula and different learning paths (based on results from the Training Needs Survey) aiming at maximising the re-use of existing tools and training materials successfully tested in the frame of previous EU funded projects.

IMPACT: It will provide to the National/Regional Environmental Agencies the advanced skills (in the form of training modules) required to cope with the INSPIRE implementation process, knowledge related to the new ICT dimension of the environmental data (e-environment) and the documentation and the necessary means to interact, benefit and adopt the eENVplus Infrastructure.

The Training Package (a complete training Module description - metadata) is available through project web site (section "[Training & Community](#)"). The Training Modules are accessible upon registration.

The Training Package is organised in the following levels with the following Modules available so far:

Level 1: Background Knowledge *Knowledge on Directives/ Technologies*

- Introduction to INSPIRE
- Basics of INSPIRE Data Specifications
- Basics of INSPIRE Network Services
- Procedures for Data and Metadata Harmonisation
- Towards the ICT implementation of SEIS
- Good Practices for Environmental Management
- *and 3 more under development*

Level 2: Thematic Knowledge *Knowledge on specific related knowledge areas*

- Water Directives
- *and 4 more under development*

Level 3: The eENVplus Infrastructure *Knowledge on the technical outcomes of eENVplus*

- Examples of Data Transformation
- Metadata and Data Validation for INSPIRE
- *and 5 more under development*

Level 4: eENVplus scenarios *These modules will be available in a later stage of the project.*

If not stated differently, all eENVplus training Modules are licensed under a [Creative Commons Attribution-ShareAlike 3.0 Unported License](#).

7. Pilot Applications

In order to exploit the implementation of the eENVplus outcomes in a variety of situations with different user needs, the aim is to implement 9 environmental scenarios in 10 pilots (see the project web site). The pilots with their scenarios will allow to better streamline the tools available to the project into the main flow of INSPIRE compliance, with evident implications on interoperability among existing or planned applications.

All the pilots are under development, as well as the related services. Here below the planned services for the use cases of each pilot are indicated.

IMPACT: Demonstration of the eENVplus outcomes implementation; geographical coverage (10 Countries and 2 of them are cross-border); the different INSPIRE Data Themes demonstrated, able to address with an increased access different kinds of stakeholders.



EP01 (Belgium): Implementation of a SEIS for Air Quality Data

Through this pilot, a system for INSPIRE compliant e-reporting is developed to serve data in accordance with a data-model (cf. <http://aqportal.eionet.europa.eu>) which was developed for the implementation of the new “Implementing Provisions for Reporting (IPR – 2011/850/EU)” under the Air Quality Directive (2008/107/EC).

Starting with the collection of regional data, which is centralised into a national data infrastructure, the pilot focuses on the harmonisation, validation including official approval by regional authorities (except for the up-to-date data flows), serving air quality data and indicators to the European Commission and by extension to all other interested parties, including the public at large.

Use Cases:

- The Reporting Service
- Validation and Official Submission
- Providing Useful Open Services Derived from the Same Data

Infrastructure components/services:

Pilot in-house:

- Metadata xml files
- Web-based mapping client (WFS&WMS) - Java Script
- Mapping client for smaller devices (Mobil App) - Cordova/Phonegap
- Visualization of features and time series (Web Viewer)
- Transformation and validation service (ETL-Tools)
- Integration in the INSPIRE infrastructure (WFS, WMS)

eENVplus:

- Thesaurus Framework
- Discovery service (CSW)



EP02 (IT): Implementation of a SEIS for Air Quality Data

Through this pilot, a system for INSPIRE compliant e-reporting is developed to serve data in accordance with a data-model (cf. <http://aqportal.eionet.europa.eu>) which was developed for the implementation of the new “Implementing Provisions for Reporting (IPR – 2011/850/EU)” under the Air Quality Directive (2008/107/EC).

Starting from the Regional nodes, the National node collects the regional validation reports and GML files into National Repository where datasets and metadata are aggregated into national dataset according to the schema established by the EEA (ref. extended INSPIRE AM data theme corresponding to AQD schema). Such national GML file is ready to be transmitted to the EU node.

Use Cases:

- National Collection of Reporting Data
- Official Submission of National Reporting

Infrastructure components/services to be implemented:

Pilot in-house:

- custom code - python (data harmonisation) - already developed
- Web application form (Authentication and database Upload) in JavaScript

eENVplus:

- WPS for aggregation and integration
- Notification service
- WPS for topological QA/QC on extended AM DT
- WFS exposing extended AM DT
- Validation of extended AM DT

- Web application form (WPS requests part) in JavaScript



EP03 (BE): Providing INSPIRE-compliant Access to Utility Services: the case of the sewage networks in Flanders

During this project, the intention is to make our sewage database INSPIRE compliant. This will be done by harmonizing and validating processes. With respect to the harmonizing process, the database will be made compliant with the INSPIRE US theme data model.

When the harmonizing processes are finished, the database will be disseminated to the public. This will be done using WMS- and/or WFS services, implemented in a geoportal. Next to that, it will be possible for specific users (e.g. the sewer managers) to edit the database. Therefore, there will be a Joint Management Tool included in the web interface. Before the edits get ingested in the sewer database, the edits have to be validated against the INSPIRE schema rules. The content of the edits has to be validated by VMM. Once the validation is finished, the updates can be integrated into the sewage database.

Use Cases:

- Consulting the sewage database for the expansion and maintenance of the sewage system and waste water treatment infrastructure
- Joint management tool for the sewage database
- Dissemination of information on sewage system to all stakeholders

Infrastructure components/services to be implemented:

Pilot in-house:

- GeoNetwork (CSW)
- WMS support for browser-based mapping client
- WFS support for browser based mapping client
- INSPIRE Compliancy
- Data harmonisation
- Sewage database mistakes or errors reporting
- Sewage database map client error handling
- User rights for the sewage database map client
- User management of the sewage database map client

eENVplus:

- Thesaurus Framework
- Ingestion service for sewage networks data in Flanders
- Validation service



EP04 (CZ/SK): CSpire (Everyday life issues connected to environmental aspects in Czech Republic and Slovakia)

The aim of the pilot is to remove barriers which potential end-users have in obtaining information needed to solve “every day-life” situations. CSpire will be created as an easy to use decision support system providing end users not only with information but with relevant guidance as well - in a form of georeport. The system will combine spatial (INSPIRE related) as well as non-spatial (statistics, and indicator based reports) data with other relevant information (legislative context, required administrative procedures etc.) and suggestions of further steps and/or contacts to relevant experts. The system will be able to share and provide information from Czech and Slovak data sources.

The eENVplus infrastructure will act as a wrapper to CENIA services, it will collect the parameters from the clients, send it to CENIA interface and wait for the resulting PDF file.

Each georeport is composed from one or more geoprocessing services, which are running from the original spatial data. There is a process model for each georeport mapping all possible combinations of results, which is being used as a cornerstone for building the geoportal template. Based on location inserted, the geoprocessing tasks are run for that place; the results are taken over by the georeport engine that uses it as an input for further set up of the georeport.

Use Cases:

- I want to cut a tree down on land which is under my ownership (outside of the forest)

- I want to use water from underground sources in a quantity greater than 500qm/day (build a well and draw water)
- I am seeking a quiet and clean place to build a cottage

Infrastructure components/services to be implemented:

Pilot in-house:

- 2x WPS - application server ArcGIS Server (internal part of CENIA georeport infrastructure, 2 georeport templates are ready)
- WMS-INSPIRE - application server ArcGIS Server
- WFS-OGC - application server ArcGIS Server
- client interface - ready for both languages

eENVplus:

- Catalogue Services (CSW)



EP05 (FR): Natural Areas INSPIRE Compliance Toolbox

The final result of the Pilot will be an end-user application, useful for several purposes. Besides making available INSPIRE compliant datasets in the process, a method for producing INSPIRE compliant data will be shared with other potential data providers.

Once the user has downloaded the developed mobile application, the user position is determined. The user can know if he is into a natural area (within INSPIRE thematic) or near one. Afterwards, he can access details about this natural area. After observing a species, he can enter this information into the application which will tell him if there are other occurrence of this species around him (buffer around his position). Afterwards, he can access details about this natural area.

Use Cases:

- Determine if the user is in or near a Protected site / a bio-geographical region or a Habitat / a biotop zone
- I have seen a species - is there other around me?

Infrastructure components/services to be implemented:

Pilot in-house:

- CSW - GeoNetwork 2.10.3
- WFS-INSPIRE - GeoServer 2.4.0
- WMS-INSPIRE - GeoServer 2.4.0

eENVplus:

- 3D Visualization Support Service
- Crowdsourcing Service
- Mobile App



EP06 (EL): Forest Fire Management

EP06 pilot application aims at supporting Decision Making among Civil Protection Operators, Public Administrations and Forest Fire experts during the four life cycle phases of forest fire management. Additionally, the application will make use of already existing web services, which are necessary to calculate the Fire Access Time map. To make this possible the user will have to set several parameters.

Use Cases:

- Awareness Phase, data acquisition, pre-processing and preparation
- Emergency phase

Infrastructure components/services to be implemented:

Pilot in-house:

- Interface for ingestion service input
- Interface for view service
- Interface for access all data - static and dynamic
- Interface for processing service input

eENVplus:

- Ingestion service
- View service
- Feature data access service
- Processing service for FAT (*Fire Access Time*)



EP07 (HU/SK): Window on the Protected Areas - Mobile Conservation Map

Pilot application provides users with possibility of easy comprehension of nearby environmental situation (relative to user's actual position) via map and augmented reality visualisation. User is provided with "classic" 2D map for overall orientation in broader space on one hand and with augmented reality "window" into local environment on the other hand. Information provided to users through this pilot application are focused on environmental theme i.e. protected sites, protected monuments, public caves, present species distribution (crowdsourced), hiking trails and other possible point of interest for typical hiker. In addition, pilot application makes user involved in collecting data about species distribution within his actual location via easy to use crowdsourcing form. Intended target user group of pilot application is broad non-professional hiking public.

Use Cases:

- Mobile Conservation Map (MCM) Application

Infrastructure components/services to be implemented:

Pilot in-house:

- INSPIRE View service - GeoServer 2.3.2
- INSPIRE Download Service - GeoServer 2.4.0

eENVplus:

- Discovery service (CSW)
- Advanced Visualization Service
- Crowdsourcing service
- Mobile App



EP08 (IS): INSPIRE Geoportal

The Pilot will provide a mobile application able to consume services according to INSPIRE implementing rules. A user, using the mobile application, must choose what he/she is going to report by choosing one of the following categories: Road Obstacles, Natural Objects, Damage to Nature or the Surface Type. After choosing a category, a user will be presented with some choices within the category, i.e. what kind of Road Obstacles he/she wants to report (a washout, a river crossing, a locked gate, a rockslide, an avalanche, a snow drift, a flood or a traffic incident) or what Natural Objects he/she wishes to report (a waterfall, a spring, a hot spring, a mountain peak or other).

The user's location would be recorded using a geo-located picture of his/hers mobile device. Where possible (reporting Natural Objects and Damage to Nature), a user can extend his/hers reporting using a description box within the App. A picture of an object, taken by a user can also be uploaded with the reporting.

Use Cases:

- Discover and viewing, INSPIRE compliant services for nature conservation purpose
- Crowdsourcing on environmental objects in Iceland

Infrastructure components/services to be implemented:

Pilot in-house:

- INSPIRE View Service - GeoServer 2.4.0
- INSPIRE Download Service - GeoServer 2.4.0
- INSPIRE Catalogue Service - ESRI Geoportal 1.2.2

eENVplus:

- Crowdsourcing app (Android, iOS)
- Crowdsourcing service
- INSPIRE view service support for mobile client



EP09 (IT/SI): Geological Map Harmonisation

The pilot application aims at supporting an expert user in geohazard analysis concerning a certain area. In the pilot application fundamental part is the geological harmonised map, which is available at two different scales (the generic one uses INSPIRE GE Data model, and the other one uses GeoSciML extension). The user, in a single integrated widget that supports all the procedure, can select the two UC. After the user has selected in sequence: Geohazard, bbox extension and geological layer; a geohazard probability/susceptibility map will be produced to be analysed by the users. In the pilot, the user in several steps can manipulate parameters to better re-fine the results.

Use Cases:

- Environmental risk (geo-hazard): landslide susceptibility map
- Environmental risk (geo-hazard): analysis of flooding phenomena

Infrastructure components/services to be implemented:

Pilot in-house:

- OGC WMS - ArcGIS 10.1 + Exows and Geoserver 2.5 + Exows
- OGC WFS - ArcGIS 10.1 + Exows and Geoserver 2.5 + Exows
- Geoportal Server (metadata)
- Grid (Raster GDB)
- Client Widget - Java Script/HTML

eENVplus:

- Thesaurus Framework
- Client Widget Integration
- INSPIRE GDB - Deegree DB
- WCS - Geoserver



EP10 (PT): INSPIRE'd Land Use Planning Dynamic Indicators to Improve Planning Achievements

The pilot application aims at supporting an expert user in analysing the evolution of urban growth and air quality and its relation with human activities. Moreover, the application aims at evaluating the fitness-for-purpose of various available official datasets that deal with urban landscape evolution. The datasets cover multiple time periods and include the legal classification of land use and thematic land cover maps.

Use Cases:

- Access to data and definition of study area
- Evaluate urban and rural growth
- Evaluate and document data accuracy
- Evaluate spatial planning impact on urban growth
- Evaluate the impact of urban growth

Infrastructure components/services to be implemented:

Pilot in-house:

- Interface for ingestion service input
- Interface for view service
- Interface for Feature data access service
- Interface for processing service input

eENVplus:

- Ingestion service
- View service
- Feature data access service
- Processing service for land cover