
Project Acronym: eENVplus
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ANNUAL TECHNICAL PROGRESS REPORT

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Annual Technical Progress Report:

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PUBLISHABLE SUMMARY

Project Objectives

The eENVplus project 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 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.

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 activities (January – December 2013) covered:

- ☐ Collection of the pilots' scenario Use Cases (UCs) and their systematic analysis;
- ☐ Definition of user requirements using the Redmine tool (www.redmine.org);
- ☐ Analysis of datasets and metadata used by the partners in the different Use Cases;
- ☐ Definition of system requirements;
- ☐ Definition of system architecture of the eENVplus Infrastructure;
- ☐ Updating of the eENVplus Vision;
- ☐ Identification and analysis of potential sources of misalignments between GI standards;
- ☐ Analysis of the last version v3.0rc3 and v3.0 of the Data Specifications of the applicable INSPIRE data themes;
- ☐ Release of the Harmonisation and validation toolkits;
- ☐ First steps in datasets and metadata harmonisation procedures;
- ☐ Release of a set of recommendations regarding the set up and integration of the transformation and validation services;
- ☐ Survey of available thesauri/terminologies to be integrated in the Thesaurus Framework (TF);
- ☐ Analysis of the methods for the assessment of the interlinking between thesauri and evaluation about the link quality in order to identify an approach to be employed in the project;
- ☐ Identification of a technology for the reengineering of the TF developed in the EU project NATURE-SDIplus, in order to improve its scalability in the web;

- ☐ Identification of a list of services for the TF exploitation to be specified and developed within the project;
- ☐ Definition of the service deployment plan;
- ☐ Setting up of the central hardware infrastructure (the physical infrastructure where data and services of the eENVplus platform will be centrally hosted);
- ☐ Identification of the WPS (Web Processing Services) and discussions on their technical specifications;
- ☐ Development of an overall conceptual model for the Pilots applications development;
- ☐ Analysis of training needs and training curricula creation;
- ☐ Analysis regarding the training content;
- ☐ Definition of the Training Framework structure;
- ☐ Organization of training actions;
- ☐ Creation of project web site (www.eenvplus.eu);
- ☐ Definition of a dissemination plan;
- ☐ Publishing of awareness material (Project Fact Sheet, Newsletter, Proceedings, Public Deliverables);
- ☐ Communication with National, Local, Regional Environmental Authorities, and Thematic Communities;
- ☐ Invitation of representatives of EC, EEA and JRC to participate in project Committees (PMB, AC);
- ☐ Establishing a strong link with the experts of JRC (Joint Research Center), who are interested in looking at the harmonization and validation experience/results to be done within the project;
- ☐ Establishing a strong link with the CEN/TC 287 (the European Standardization Body in Geographic Information);
- ☐ Organisation of 3 eENVplus Workshops

Main Results Achieved

The main results, so far (public reports are highlighted in bold):

- ☐ **Use Cases:** overall 30 use cases were collected from 10 pilots and detailed in unified structure in the report “**eENVplus Use Cases**”;
- ☐ **User Requirements:** over a hundred user requirements were defined based on thorough analysis of the use cases; reported in “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);
- ☐ **Collection of detailed 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, the existing/foreseen workflows and processes to be run in the different Use Cases, details about eventual IPR issues; reported in “**Project Requirements**”;
- ☐ **Security requirements:** definitions of them were generated from the analysis of user requirements as well as from issues highlighted during the system architecture definition; reported in “**Security requirements**” and in some parts in the above mentioned Project Requirements;
- ☐ **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 deliverable “**System Architecture**”;
- ☐ **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:** INSPIRE Network Services with respect to the correspondent OGC/ISO versions (some of the OGC/ISO specifications have been extended by INSPIRE) and INSPIRE Guidelines for Observations and Measurements with respect to ISO 19156; reported in “Standards/regulation implementation gaps report”;

- ❑ **Analysis of INSPIRE Data Specifications:** thorough analysis of the version v3.0rc3 and v3.0 of the Data Specifications of the applicable INSPIRE data themes;
- ❑ **Review of harmonisation and validation tools:** the tools available for spatial datasets and metadata harmonisation and validation; reported in “**Datasets and metadata harmonisation toolkit**” and “**Datasets and metadata validation toolkit**”;
- ❑ **Datasets and Metadata Harmonisation and Validation:** Some Pilots have already started this procedure;
- ❑ **Recommendations:** reducing the manual steps to be done during the harmonization and validation processes that will be executed using the transformation and validation services to be designed, implemented and tested in the eENVplus platform; compiled in “Recommendations for WP5 and WP6”;
- ❑ **Thesauri survey:** collection of terminological resources available on the web and identification of a candidate list according to the project application perspective; definition of the approach to identify existing thesauri for the Environment and related to the INSPIRE data themes covered by the pilot domains; analysis of methods to evaluate the quality of 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 Exploitation Services:** the identification of the services to be developed (exploitation services for metadata compilation and data discovery);
- ❑ **Plan for Services Deployment:** it was designed based on the analysis of user requirements and project requirements together with additional enquiries on pilots' infrastructures. The development is divided into different deployment modules that are described in detail in the document "Service Deployment Plan", including as well a timeline for the deployment of the different modules;
- ❑ **Services Technology Platform:** setting up of the central hardware infrastructure that is the physical infrastructure where data and services of the eENVplus platform will be centrally hosted;
- ❑ **Processing services:** enquiries were made on the details of the processes and examples of input and output datasets;
- ❑ **Harmonisation of existing services:** the establishment of a common view regarding the number of virtual machines and how the components of the system architecture have to be distributed in order to improve performances and scalability of the system;
- ❑ **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**”;
- ❑ **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 deliverable “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 Training Modules, detailed in the meta information included in the Training Package, and the Training Package. In the first year, the eLearning platform has been established and the list of the training modules that will be part of the training Package has been defined, on the base of the Training curricula.
- ❑ **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:** 2 issues are 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:** 3 WSs were organized (proceedings are available on the project web site)
 - eENVplus Workshop: organized on June 24th, 2013 at the INSPIRE Conference in Florence (Italy);
 - eENVplus National Workshop (BE): organized on September 18th, 2013 in Leuven (BE);
 - eENVplus National Workshop (IT): organized on November 7th, 2013 at the ASITA Conference in Riva del Garda (Italy);
- **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 (314) and future SMEs members of the smeSpire Network will be constantly updated about the eENVplus progress.

Final Results, their Impact and Use

1. eENVplus Infrastructure

eENVplus creates a working environment that includes scalable services for harmonization of environmental data and of environmental spatial data infrastructures at a wider scale (e.g. cross-border), therein considering multilingual context through shared multilingual thesauri.

eENVplus exploits the available base services exposing data and metadata, available through National Environmental Agencies, after harmonizing them according to current standards and integrating them with value-added services resulting by the EU funded projects and experiences.

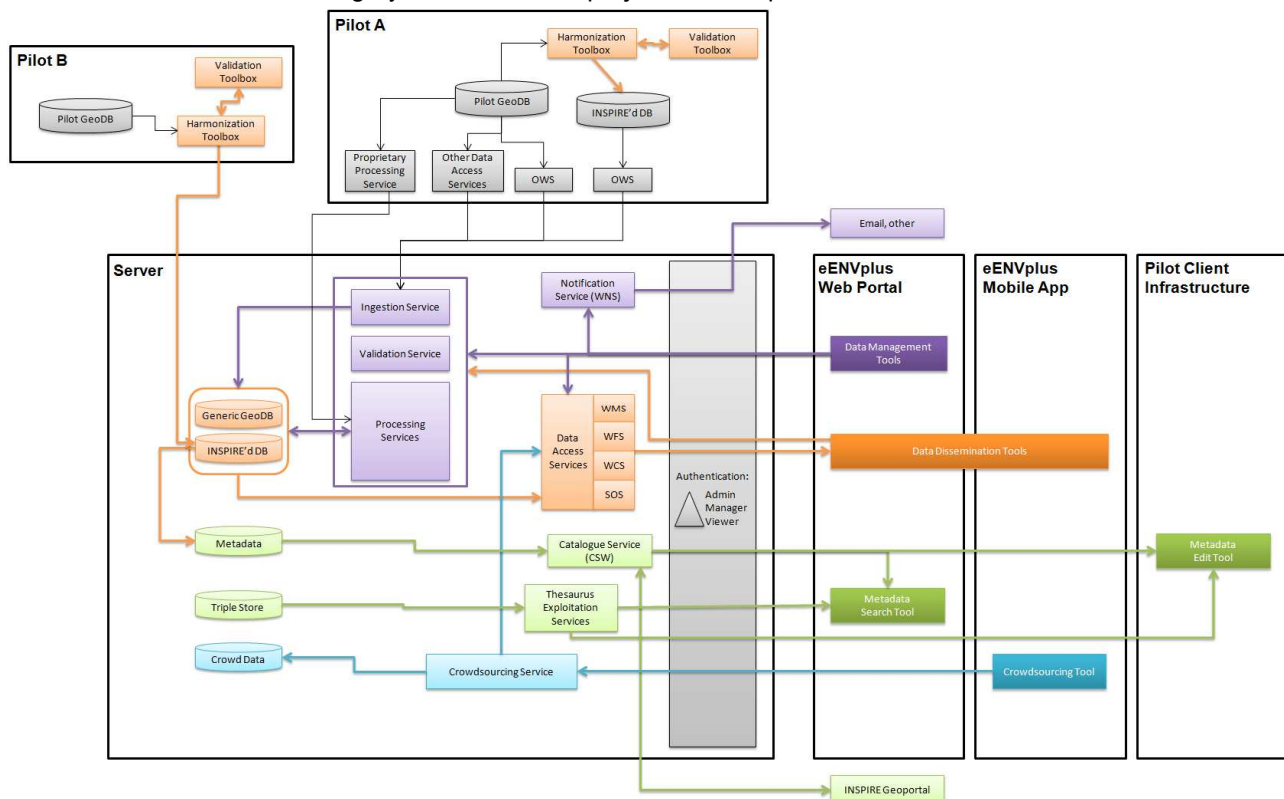


Figure 1- eENVplus Infrastructure

The harmonization of these set of services will bring an interoperable operational infrastructure and, being all the resources delivered as open and re-usable components, it will result in the deployment of an operational IT toolkit that can be integrated to existing infrastructure or that can be used to instantiate new nodes of the infrastructure.

The entire eENVplus architecture 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.

2. eEnvironment Services and Applications

The following services/toolkits are foreseen:

Web Map Service (WMS)	Ingestion Service
Web Feature Service (WFS)	Notification Service
Web Coverage Service (WCS)	Validation Service
Catalogue Service for Web (CSW)	Mobile App Support Service
Sensor Observation Service (SOS)	3D Visualisation Support Service
Web Processing Service (WPS)	Thesaurus Exploitation Services
Common Catalogue Service	Harmonisation Toolkit
Crowdsourcing Service	Validation Toolkit

IMPACT: As above at point no. 1.

3. Advanced Thesaurus Framework

The content of the thesaurus framework will be advanced for a more efficient framework based on other available multilingual thesauri (although after the first year of interaction with the consortium expert community it was extended to code lists, taxonomy, etc.) and by establishing semantic interoperability between them.

IMPACT: It will be easier to express, expose, 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 advanced thesauri services

To be able to utilize the available thesauri in other applications/services, the Thesaurus Framework should be extended with implementation of a series of Thesaurus Exploitation mechanisms.

Currently two main mechanisms are envisaged:

- Simple Access Search: To facilitate querying the Thesaurus Framework simply by the use of basic lexical information (e.g. terms, synonyms, broader and narrower terms, etc.).
- Semantic Explorative Search: To facilitate a selection of the keywords for query, for example, a hierarchical tree view would be generated based on the thesaurus structure, their relationships and interlinking with the external sources. This mechanism would enable user to fine-tune the query by refining and extending the chosen keywords.

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

5. Harmonisation and Validation Toolkits

In terms of harmonisation, a set of tools and examples has been made available (and will be updated until the project end) to the eENVplus stakeholders, enabling them to run data and metadata remodelling processes, performing a remapping from the single different data/metadata source schemas to the respective target schemas.

In terms of validation, a set of validation services will be made available in the eENVplus infrastructure, enabling the users to run data and metadata validation processes necessary to claim the compliance against the applicable specifications.

A set of recommendations was issued to reduce the manual steps to be done during the harmonization and validation processes that will be executed using the transformation and validation services to be designed, implemented and tested in the eENVplus platform.

Harmonisation and Validation Toolkits were published serving as guidance for datasets and metadata harmonisation and validation. The guidance is given by means of procedures, tools and examples of datasets and metadata harmonisation and validation processes, to be applied to transform existing datasets/metadata according to, and in order to claim the conformance of transformed datasets/metadata to the requirements of, the applicable Implementing Rules and Technical Guidelines of INSPIRE.

IMPACT: Thanks to the use of proper validation reporting templates, the users are able to iteratively run the validation service after fixing the validation errors reported until a full compliance is achieved.

6. eENVplus Training Framework

It will be 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 will be implemented through an open source e-learning platform offering a training package based on specific and thematic vocational training curricula and different learning paths 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.

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.

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.

Pilots in Belgium and Italy 	Scenario: Implementation of a SEIS for air quality data	Pilot in Belgium 	Scenario: Providing INSPIRE-compliant access to utility services: the case of sewage networks in Flanders	Czech-Slovak cross-border pilot 	Scenario: CSspire
Pilot in France 	Scenario: Natural Areas INSPIRE Compliance Toolbox	Pilot in Greece 	Scenario: Forest Fire Management	Hungary-Slovakia cross-border pilot 	Scenario: Window on the Protected Areas – Mobile Conservation Map (WMA MCM)
Pilot in Iceland 	Scenario: INSPIRE Geoportal	Italy-Slovenia cross-border pilot 	Scenario: Geological Map Harmonization	Pilot in Portugal 	Scenario: Ecological land use planning indicators to monitor good urban planning practices