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Project coordinator name, title and organisation:

Giorgio Saio, Geographical Information Systems International Group (GISIG)

Tel: +39 010 8355588

Fax: +39 010 8357190

E-mail: g.saio@gisig.it

Project website address: www.eenvplus.eu

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 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
- Initial Operating Capacity (JUL 2013 – DEC 2014): results in an interim version of the „eENVplus infrastructure“
- Validation (DEC 2013 – DEC 2015): results in an interim version of the „eENVplus infrastructure“
- 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 using the Redmine tool (www.redmine.org);
- Definition of 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 v3.0rc3 of the Data Specifications of the applicable INSPIRE data themes;
- A review of the tools available for spatial datasets and metadata harmonisation and validation;
- Identification of the thesauri to be included in the Thesaurus Framework (TF) as well as the analysis of tool and technology to be employed for the TF reengineering;
- Identification of possible services for the exploitation of the Thesaurus Framework to be eventually developed in the project.
- Analysis of training needs;
- Creation of project web site (www.eenvplus.eu);
- Creation and dissemination of Project Fact Sheet;
- Creation and dissemination of electronic Newsletter,
- 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);
- 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).

Main Results Achieved

The main results, so far:

- **eENVplus Use Cases**: overall 30 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;
- **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:** it will cover all the aspects related to the structure and behaviour of the system from the application level to the data level of its three levels Service Oriented Architecture (SOA). 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 is reported in the deliverable **"System Architecture"**;

- **Analysis of misalignments between GI standards**: it covered potential sources of misalignments between GI standards i.e. some tests to be applied to WFS 2.0 download services, as specified in the Draft Technical Guidance for INSPIRE Download Services and in ISO 19142; it will be reported in the forthcoming deliverable **"Standards/regulation implementation gaps report"**;
- **Analysis of INSPIRE Data Specifications**: A thorough analysis of the last version v3.0rc3 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 on-going activity; it will be reported in the deliverable **"Datasets and metadata harmonisation toolkit"** and **"Datasets and metadata validation toolkit"**;
- **Training User Needs Survey**: Through a questionnaire, the survey 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"**;
- **Thesauri survey**: It covered identification of the thesauri to be included in the Thesaurus Framework (TF) as well as the analysis of tool and technology to be employed for the TF reengineering; It will be reported in the future deliverable **"Survey on (multi-lingual) environment"**.
- **Thesaurus Exploitation Services:** identification of possible services for the exploitation of the Thesaurus Framework to be eventually developed in the project; it will be reported in future deliverable **"Specification document for thesaurus exploitation services"**;

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

- **Project web site** (www.eenvplus.eu);
- **Project Fact Sheet**: available on project web site in several languages;
- **Electronic Newsletter**: available upon subscription on the project web site;
- **eENVplus Workshop**: organized on June 24th, 2013 at the INSPIRE Conference in Florence (Italy); proceedings are available on the project web site;
- **eENVplus National Workshop (BE)**: organized on September 18th, 2013 in Leuven (BE); proceedings are available on the project web site;
- **eENVplus National Workshop (IT)**: organized on November 7th, 2013 at the ASITA Conference in Riva del Garda (Italy); proceedings are available on the project web site;
- **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;

Final Results, their Impact and Use

1. eENVplus Infrastructure

The overall eENVplus infrastructure will result by the set of nodes publishing harmonized and interoperable services. It is based on a mixed infrastructure based on SOA (Service Oriented Architecture) and linked data. Each service provider involved into the project will be a node of the infrastructure:

- the National Environmental Agencies and the other involved data/service providers
- the infrastructures and the related services exposed by EU funded projects

- the eENVplus cloud infrastructure exposing the harmonized and interoperable added values services including a portal to describe, manage and access the exposed services.
- Data/service providers which will use the eENVplus project outcomes to expose proper data and services
- other User Portals which will exploit the eENVplus added value services and will integrate them into proper portal to configure, manage and customize the eENVplus services to expose specialized interoperable applications (in the project these are represented by the pilot applications).

The harmonized specialized services delivered by the EU funded projects will be integrated into the eENVplus cloud infrastructure contributing to expose the added value components of the infrastructure (eENVplus server). This server side is exposed in a cloud infrastructure to guarantee the availability and the affordability of the overall infrastructure.

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. eENVplus Services

The following services are foreseen:

Harmonisation Toolkit and Validation Toolkit	Sensor Observation Service (SOS)
eENVplus Catalogue and Connection	Web Processing Service (WPS)
Thesaurus Framework (TF) for Metadata Compilation	Orchestration Service
TF for Data Discovery	Reporting Service
TF for Semantic Explorative Search	Crowdsourcing Service
Web Map Service (WMS),	Validation Service
Web Feature Service (WFS),	Ingestion Service and Work Flow
Web Coverage Service (WCS)	3D Visualisation Support Service
Catalogue Service for Web (CSW)	Mobile App Support Service

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 (e.g. resulting from existing project outcomes) and by establishing semantic interoperability between them.

IMPACT: It will be easier to express, expose, share and consume semantic 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

It will include services permitting the thesaurus framework exploitation for data access activity (e.g. providing added value web services to index, search and access geographic resources).

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 transformation services will be made available in the eENVplus cloud infrastructure, enabling the users to run data and metadata remodelling processes, performing a remapping from the single different data/metadata source schemas to the respective target schemaa, which for the datasets are the INSPIRE gml application schemas and for the metadata are the INSPIRE metadata profiles, relevant to the specific data theme concerned.

In terms of validation, a set of validation services will be made available in the eENVplus cloud infrastructure, enabling the users to run data and metadata validation processes necessary to claim the compliance against the applicable specifications. In particular, for the validation of the metadata and data encoding, the following steps are covered:

- Schema Validation: validation of the metadata or data document (xml or gml, respectively) against the corresponding XML schema
- Schematron Validation: the validation of non-syntactic requirements using semantic rules defined in Schematron.

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