The technical implementation and integration of the INSPIRE services in Italy.

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INSPIRE Conference 2013 - Firenze
Background

The National implementation of the INSPIRE Directive (Italian Legislative Decree 32/2010) identifies ISPRA as the authority in charge to progressively integrate environmental datasets in the frame of the *Italian Environmental Information System* (developed by ISPRA) and through its *Network*.

Public *(Mainly Regional)* Authorities make available to ISPRA the informative elements (metadata) to ensure interoperability of environmental datasets and associated services.
How to access Regional Resources?

- Italy is a federal country composed by 20 Regions and Autonomous Provinces.
- Several Italian Region already implemented their SDI and expose different catalog interfaces (CSW ISO, ebRIM, Deegree, SoS,...).

**Need** to broker different and heterogeneous regional available resources in a sustainable way!!

*In a brokering approach, interoperability is achieved by implementing mediation rather than imposing a “common or federal” set of standards (Nativi et al, 2012).*
The discovery service has been implemented by the combination of two technologies:

Esri, through its Geoportal (www.geoportale.isprambiente.it), provides the public web interface and enable metadata editing;

Gi-cat broker catalog (CNR) provides interoperability between a multitude of environmental catalogs on the basis of System of Systems approach, enabling, thus, a distributed metadata search (http://193.206.192.216:8080/gi-cat).

Also, the Geoportal has been adapted to be compliant with the Italian metadata profile, and to make this profile compliant with INSPIRE. It accesses the discovery broker via a standard discovering interface (i.e. OGC CSW), whereas the broker works on harvesting to the other (Regional and/or National) catalogs.
The broker approach offered many benefits
(a) lowers barriers to participate in distributed systems for both users and resource providers;
(b) minimal burden or cost impact on existing systems;
(c) accelerates interconnection of disparate systems;
(d) facilitates sustainability, reusability, extensibility, and flexibility of the infrastructure;
(e) enhances multi-disciplinary interoperability by new capabilities across multiple domains;
(f) remove need to impose common (e.g. federal, “top-down”) specifications and software components enabling a more adaptive “bottom-up” evolution of the infrastructure.

…and one concern
(a) The main concern deals with the complexity of developing and maintaining the “broker”. CNR supports the development of the SW. ISPRA provides user side feedbacks for the improvement of the SW.
The discovery and download services of ISPRA

ESRI Geoportal

User interface

Gi-cat Broker - intermediate users interface
Network of catalogs: architectural schema
Network of metadata catalogs: state of implementation

- CSW-ISO
- CSW-ebRIM
- Catalog interface not exposed
- WMS-WFS
- Deegree
- Ongoing implementation of a catalog interface
- Access through other catalogs
Through the ISPRA catalogs it is possible to:

(a) discovery request distribution in an asynchronous way and mediation among the different metadata models as well as the adaptation among the heterogeneous discovery and inventory protocols;
(b) tagging and clustering of most of the heterogeneous results returned by the many brokered systems;
(c) ranking of results matching a distributed query;
(d) extension of the discovery clauses by using semantic relationships.

Presently, there are 44 brokered resources, each one provided and autonomously managed by Regional or National Authority or a research institute. Each resource service is the entry point for other datasets and services that GI-cat can discover and access through a set of intermediation software modules (accessor) that have been fine-tuned for this purpose.
View services

- ISPRA, together with Esri Italia, implemented an SDI to offer INSPIRE services

- The goals to achieve are:
  - Flexible and fault tolerant architecture
  - Powerful Web viewer for non GIS expert
  - Services available through REST and WMS interfaces
  - INSPIRE View services for data themes managed by ISPRA (e.g. Hydrography)
  - Reduced development effort and cost (< 30 days)
GIS Software used

- **ArcGIS for Desktop**
  - For authoring maps based on INSPIRE Geodatabase
- **ArcGIS for Server**
  - For publishing INSPIRE View services
- **ArcGIS for INSPIRE**
  - For creating INSPIRE Geodatabase and INSPIRE View services
- **Data Interoperability Extension**
  - For creating ETL transformations from legacy to INSPIRE Geodatabase
- **GeoViewer**
  - Based on Flex, to consume maps services and discover metadata
Links between discovery, view and download services

Geoviewer
http://geoviewer.isprambiente.it

– The Flex Geoviewer can be used by non GIS expert
– It allows discovery through Geoportal
– WMS, WFS, REST and WMC

Geoportal
http://geoportale.isprambiente.it
• Hydrography
  – ISPRA Water department had hydrography data already available and downloadable
  – The INSPIRE Hydrography Physical Model was chosen

• Data conversion
  – The ETL is a mixture of Model Builder and Data Interoperability

• Model enrichment
  – Several relationships were created and added to the INSPIRE base model
Difficulties encountered

sharing metadata: some regions adopted IT proprietary technologies exposing a not properly standard catalog interface. Response: Support by ISPRA and CNR to fix problems related to catalog services (GetCapabilities, GetRecord, DescribeRecord and DescribeRecordById). The activity is still ongoing.

Inspire Compliance: Some metadata are not compliant with the European Standard (metadata compiled with ISO 19115 profile are present in the catalogs Network because they were compiled before the publication of the Directive). Response: Activities are ongoing to convert them. ISPRA and CNR support compliancy tests.

DataConversion: ISPRA Hydrography DB model is richer than INSPIRE, so an extra effort was needed to add more relationships to the model in order to avoid information loss.

Costs

SDI Infrastructure: 30 days of development and external assistance (about 600 Euros/per day);

3 ISPRA personnel (half time) for maintenance.

1 CNR personnel (1 m/m per year) for maintenance.
www.geoportale.isprambiente.it

..thanks!