

Environmental SDI in Tuscany: state of the art and future developments



Regione Toscana
Diritti Valori Innovazione Sostenibilità



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*SIRA (Tuscan Regional Environmental Information System)
ARPAT – Firenze (Italy)*

What, Why and How

- Our experiences with INSPIRE and actual developments
- Reporting the 'state-of-the-art' of environmental information in Tuscany, focusing on the Regional Environmental Agency contribution
 - Data collection and environmental indicators
 - Data dissemination (network services and smart GeoUI to enhance user experience)
- Looking towards new opportunities in both data and energy policies granted by affordable environmental indicators

Our mission

- Multi-user dissemination on environmental information:
 - Internal users:
 - Support to environmental monitoring and controls activities
 - External users (Policy Makers, Citizens)
- 'Two-ways' interface:
 - Regional Node ('Focal Point') of the National Environmental SDI managed by ISPRA
 - Node of the Regional SDIs for spatial information:
 - [SITA](#) - Cartography, photos & SDI supervision
 - [SIRA \(ARPAT\)](#) - Environmental monitoring/control
 - [LAMMA](#) - Weather and environmental modeling
 - [CFR](#) - Weather monitoring and alerts

Environmental Data Access: how?

- Since about ten years (2004-2013), our data portal <http://sira.arp.at.toscana.it> delivers information related to the Regional Environmental Agency (ARPAT) activities:
 - **Monitoring and modelling** (Water/Air quality/Low & High frequency EM fields/Noise/Environmental emergencies (i.e. 'Costa Concordia's relic nearby coastal monitoring))
 - **Controls:**
 - Industrial/Soil pollution/Waste management
- Key professional competencies involved in data collection/management/dissemination:
 - **IT professionals** (Network/data administration & software development)
 - **GIS/DB professionals** (Data management and reporting)

INSPIRE at SIRA - our history (1/3)

- 2004-2006: metadata
- 2007-2008: impact studies and various OSS test
- 2009-2010: internal benchmarking and service strategies developments
- 2011-2012: slippy map clients/smart UIs prototyping
- 2013-(ongoing): standardization of geodata dissemination services and UIs

While INSPIRE full compliancy has not been achieved yet, we strongly engage ourselves in following the directive key principles:

Openness – Standardization – Interoperability – Affordability

**Data Formats
Protocols**

**UIs Usability
AJAX**

INSPIRE at SIRA - our history (2/3)

- Problems:
 - Too much technologies and standard to practice by IT and non-IT personnel
 - XML/GML/WMS/WFS/WCS/WPS/CSW.....
 - Poor network services usability (high latency times for big datasets due to network bandwidth's constraints)
 - Lack of user-friendly tools at reasonable budgets for data dissemination by non-IT professionals
 - (Initially) forced to use a custom Metadata language translation due to lack of official one
 - Differences between INSPIRE and national Datasets' categorization (INSPIRE vs. 'well-known' categories)
 - Must comply with INSPIRE IT policy on RDBMS & systems
 - Oracle RDBMS/0.5 TB Disk Space/PHP5.x

INSPIRE at SIRA – Our history (3/3)

- Opportunities:
 - 'Good-old' techniques for fast network access (tiling) have been brought to new life thanks to the wide use of web maps
 - Many GFOSS tools are now available with good support (and good training budget have been available for 5 years!)
 - Web 2.0 improvements in user experience (AJAX/slippy maps)
- Our INSPIRE policy:
 - **Specific optimizations for few big vector/raster datasets**
 - Raster dataset preprocessing and caching
 - Vector data access limitations by extent/feature number
 - Use of regional SDI services whenever possible
 - **Rich UIs with content and spatial browsing/filtering** ('web-based' optimization)

Focus on Technologies (1/2)

- View Service
 - TMS for large raster datasets (cached data)
 - Supported EPSG SRS: 4326 (3003: coming soon)
 - Lightweight WMS for small geodatasets (Point datasets)
- Download Service
 - REST download services with custom filtering interface and feature number limitations (formats: JSON/CSV)
- Catalogue Service
 - Geonetwork schema (+ UI for metadata offline editing)
 - Custom XML search (coming soon)
- See poster '*From small to medium and large datasets: technology pitfalls and smart solutions for affordable INSPIRE services in web 2.0 applications*'

Focus on usability

- Easy datasets access
 - By data portal
<http://sira.arpat.toscana.it/sira/inspire/inspire.php>
 - By corporate website
<http://www.arpat.toscana.it/datiemappe/banche-dati>
 - By Android/IOS apps (coming soon)
- Multiple datasets categorization (metadata keywords)
 - Users can find datasets by category filtering (INSPIRE and national/regional)
- Geodata preview:
 - Slippy map preview
 - Metadata preview
 - Download with filtering

Access by data portal (1/2)

- <http://sira.arp.at.toscana.it/sira/inspire/inspire.php>

Geographic
Preview

Download
Page

Metadata
Preview

INSPIRE
categories

SIRA Sistema Informativo Regionale Ambientale della Toscana

REGIONE TOSCANA ARPAT

SIRA RSS Banche Dati Report Mappe In evidenza Progetti PFR

Novità

26/10/2012
Impianti di gestione dei rifiuti: disponibili nuove modalità di ricerca e download dei dati.

14/09/2012
Annuario dei dati ambientali 2012: pubblicato l'annuario nella versione PDF con segnalibri.

24/08/2012
Stagione balneare 2012: aggiunta la sezione sperimentale di consultazione dei dati.

Accesso ai dati INSPIRE

Da questa pagina è possibile accedere ai dati ambientali di interesse prioritario ai fini della pianificazione territoriale definiti dalla direttiva INSPIRE del Parlamento Europeo (Direttiva 2007/2/EC del 14 marzo 2007).

III.7. Impianti di monitoraggio ambientale

- Rete di monitoraggio della qualità dell'aria
 - Apri la mappa
 - Scarica i dati
 - Consulta la documentazione
- Indicatori 2007-2011 qualità dell'aria - media annuale NO2
 - Apri la mappa
 - Scarica i dati
 - Consulta la documentazione
- Indicatori 2007-2011 qualità dell'aria - superamenti NO2 (soglia 200ug/mc - media oraria)
 - Apri la mappa
 - Scarica i dati
 - Consulta la documentazione
- Indicatori 2007-2011 qualità dell'aria - media O3
- Indicatori 2007-2011 qualità dell'aria - superamenti O3 (soglia informazione 180ug/mc - media oraria)
- Indicatori 2007-2011 qualità dell'aria - superamenti O3 (valore obiettivo 120ug/mc - numero di giorni)

Access by data portal (2/2)

Geographic Preview

Metadata Preview

Archivio mas - METADATI

Data	2010-05-04T11:19:35
Standard	ISO 19115:2003/19139 versione 1.0
Riferimento	EPSG: 3003
Titolo	Monitoraggio degli obiettivi di qualita' ambientale dei corpi idrici superficiali
Sottotitolo	ACQ_MAS (Monitoraggio della qualita' delle acque superficiali)
Abstract	L'archivio contiene i dati risultanti dai monitoraggi effettuati sui corpi idrici superficiali significativi ai fini della verifica degli obiettivi di qualita' ambientale.
Contenuto	L'archivio contiene i dati raccolti in base alle prescrizioni del Dlgs. 152/99 (parametri base e addizionali), oltre alle indicazioni derivate dal Dgr 225-2003 e dal Piano tutela acque (DELIBERAZIONE del Consiglio Regionale del 25 gennaio 2005, n.6)
Limitazioni	no conditions apply
Scala	10000
Estensione	Toscana (Estensione WGS84: Ovest: 9.65, Est: 12.39, Sud: 42.22, Nord: 44.49)
Tipologia	Dati geografici puntuali, lineari e poligonali relativi alla identificazione e caratterizzazione dei

Sistema Informativo Regionale Ambientale della Toscana

Cerca strada o località

Temi

- Sfondo
 - Limiti amministrativi
 - Foto aeree 1:10.000 anno 2010
 - Grafo ITER.NET - Strade
 - Catasto ADT - Edifici
 - Reticolo Idrografico - Corsi d'acqua
 - Carta Tecnica Regionale 1:10.000
- Overlay
 - Monitoraggio della qualita' delle acque superficiali

Misure: Ricerca stradale: servizio Nominatim (su dati OpenStreetMap)

Archivio mas - DATI

comune
 corpo_idrico
 Selezione

anno
 Selezione

parametro_tipo
 Selezione

CSV (testo delimitato)
 Tabella HTML
 JSON

Time filter

Spatial filter

Category data filter

Download Page

How we keep them all together

- Single configuration JSON file ('metadata-driven' application)

```

{
  "inspire": {
    "categories": [
      {
        "name": "III.7. Impianti di monitoraggio ambientale",
        "datasets": [
          {
            "name": "aria",
            "label": "Rete di monitoraggio della qualità
dell'aria",
            "baseUrl":
"http://sira.arpat.toscana.it/apex/apex_rest.getReport?app=113&page=1&rep
ortid=DATI_ARIA_WEB&output=json&parmvalues=",
            "metadataId": "16",
            "x": "EST_GB",
            "y": "NORD_GB",
            "geom": "",
            "geoUrl":
"http://sira.arpat.toscana.it/apex/apex_rest.getReport?app=113&page=1&rep
ortid=aria_map&output=json",
            "styleUrl": "aria.sld",
            "bdManager": "Marco Bazzani",
            "mapManager": "Cinzia Licciardello"
          }
        ]
      }
    ]
  }
}

```

INSPIRE categories

datasets

REST url (download)

Geometry Fields

Geodata url (JSON/CSV via REST)

SLD Style

Access by corporate website

- <http://www.arpat.toscana.it/datiemappe>

The screenshot displays the ARPAT website interface with several filter sections on the left and a list of search results in the center. The filters include:

- TERRITORI:** Firenze (3), Pisa (1)
- TIPO DATI E MAPPE:** Banche Dati (1), Bollettini (0), Dati (2), **Mappe (4)** (checked)
- TEMI AMBIENTALI:** Acque marine e costiere (4), Acque sotterranee (1), Aria - qualità (1), Emergenze ambientali (1), **Rumore (4)** (checked)
- ANNO DI PUBBLICAZIONE:** 2007 (3), 2008 (1)

The search results section shows:

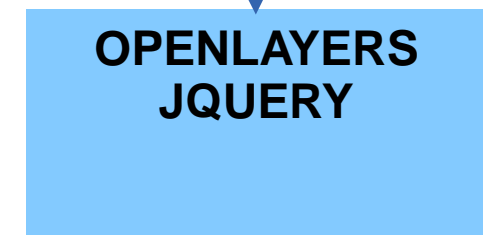
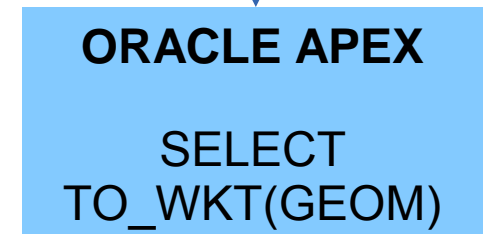
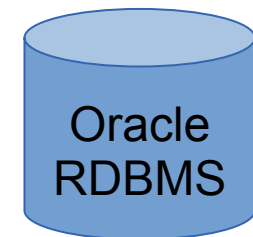
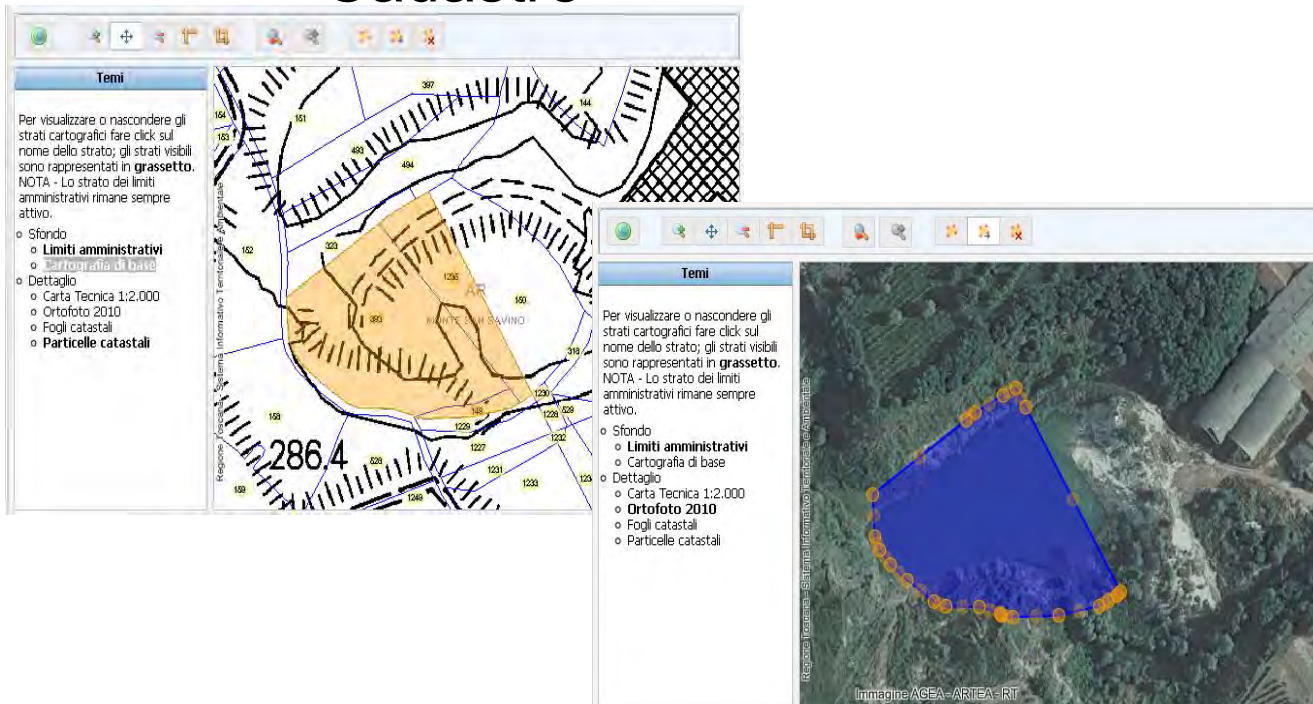
- RISULTATI PER PAGINA:** 5
- Mappa del rumore - Pisa:** ARPAT - 30/04/2013 11:55. Mappatura acustica della città di Pisa. [Leggi il resto](#)
- Mappa del rumore stradale - Firenze:** ARPAT - 29/04/2013 15:55. Mappa del rumore stradale - Firenze. [Leggi il resto](#)
- Mappa del rumore ferroviario - Firenze:** ARPAT - 29/04/2013 15:20. Mappa del rumore ferroviario - Firenze. [Leggi il resto](#)
- Mappa del rumore aeroportuale - Firenze:** ARPAT - 29/04/2013 14:40.

Annotations with arrows point to the filters:

- Data type filter:** Points to the 'TIPO DATI E MAPPE' section.
- Publication Year filter:** Points to the 'ANNO DI PUBBLICAZIONE' section.
- Thematic filter:** Points to the 'TEMI AMBIENTALI' section.

Data aggregation use cases (1/2)

- Soil contamination management system (SisBon)
 - Regional SITA services as digitizing support at small scales:
 - Aerial Photos (1:10.000)
 - Cartography (1:10.000 + 1:2.000)
 - Cadastre



new OpenLayers.Format.WKT

Data aggregation use cases (2/2)

- Cellphones' and TV's Transmission nodes (Circom)

Dynamic content filtering

Radius-based nearby search

Per visualizzare l'elenco delle postazioni e la relativa mappa, selezionare una provincia (obbligatorio), impostare eventuali altri filtri (opzionali) e poi premere il pulsante "APPLICA FILTRI". I filtri impostati vengono applicati anche al report IMPIANTI accanto alla mappa. Per azzerare i filtri premere il pulsante "RESET FILTRI"

Provincia: Comune: Tipo Gestore: Gestore (rag. sociale):

Localizzazione Impianti

Refreshed: Tue Jun 25 2013 09:31:19 GMT+0200 (CEST)

Ragione Sociale Gestore	Tipo Gestore	Nome Postazione	Comune	Indirizzo	Località	Tipologia postazione	Gb Est	Gb Nord	Servizio
RADIO ONDA BLU SAS	RTV	CASE DI LIGNANO	AREZZO	-	LIGNANINO	palo	1734337	4810523	radio FM
Telecom Italia s.p.a	RTV	BADIA PRATAGLIA RAI	AREZZO	LOC POGGIO DELLA CESTA	-	traliccio in ferro	1732262	4851741	portante di
Centro di Produzione S.p.A.	RTV	Alpe di Poti	AREZZO	loc. Alpe di Poti loc. Alpe di Poti	ALPE DI POTI	palo	1740851	4817314	radio FM
FONDAZIONE TSD COMUNICAZIONI ONLUS	RTV	STUDI TSD	AREZZO	PIAZZA S.DOMENICO, 7	PIAZZA S.DOMENICO	edificio	510952	8306	ponte radio
HOME SHOPPING EUROPE BROADCASTING S.P.A.	RTV	SAN ZIO	AREZZO	-	SAN ZIO	-	1724576	4815193	diffusione televisiva analogica

1 - 5 di 170

Cliccando su un marker della mappa si impostano le coordinate su report IMPIANTI a destra della mappa e premendo il pulsante "VISUALIZZA/AGGIORNA IMPIANTI" si ottiene l'elenco degli impianti presenti in un certo raggio (default 5000 m) e la mappa viene zoommata al raggio impostato (modificabile). E' possibile azzerare le coordinate e il raggio e tornare alla visualizzazione della mappa iniziale premendo il pulsante "RESET VISUALIZZAZIONE".

MAPPA E REPORT IMPIANTI

Mappa

Impianti

Impianti nel raggio di metri intorno al punto di coordinate (GB): Est Nord

Righe visualizzate:

righe 1 - 5 di 109 [Successivo >](#)

Distanza (m)	Codice Facoltativo Postazione	Ragione Sociale Gestore	Tipo Gestore	Cositing	TIPLOGIA	Nome Postazione	Indirizzo	Comune	GB Est	GB Nord	Quota s.l.m. (m)	Servizio	Portante (MHz)
0	AR83	Telecom Italia Spa	SRB	-	palo	AR VILLAGGIO ETRURIA AR	STRADA SETTEPONTI C/O ROTATORIA nd STRADA	AREZZO	1731932	4817946	10	UMTS	-

What you can find

- 20 INSPIRE Annex III datasets:
 - ✓ III.6 - Utility and governmental services (25%)
 - ✓ III.7 - Environmental monitoring Facilities (50%)
 - ✓ III.8 - Production and industrial facilities (10%)
 - ✓ III.11 - Area management / restriction / regulation zones & reporting units (5%)
- Most of core ARPAT activities' datasets are categorized in III.7 and III.8 (60%)
- Other datasets relevant for ARPAT's core activities are categorized in III.6 and III.11 (40%)
- Indicators

What we are going to do

- Lightweight WMS test (GDAL-based+PHP vs.QGIS mapserver)
- Build INSPIRE services for dissemination of internal geodata not covered by annex III directive
- Use external INSPIRE services for:
 - Map mashups in GIS clients
 - Coordinate transformation
 - Geocoding
- Long term datasets' organization and standardization with INSPIRE schema
- Better integration between corporate website and data portal via INSPIRE catalogue service
- Automatization of indicators' building via INSPIRE WPS services

Opportunities for Environmental policies

- Following european guidelines, regional environmental policies are becoming more and more integrated with energy ones
- One key objective of next Environmental and Energy Policy Plan (PAER) is to enhance all regional geodatasets availability for policy makers
- INSPIRE could play a great role in many fields:
 - Network services' standardization
 - Easier data aggregation from various network nodes
 - Smart indicators' representation to policy makers

Our contribution in indicators' representation

- ARPAT plays a great role in environmental indicators' publishing (former yearly environmental state reports)
- Since last year ARPAT media sector has tried to improve indicators' representation quality and usability for policy makers and citizens with the annual publication of the environmental data report (see [2012 environmental datasets report](#))
- Our contribution should be:
 - Indicators' geodataset generation by INSPIRE service
 - Smart user interfaces for indicators' geodataset browsing and downloading

Environmental Indicators (1/2)

- Coming soon: Development of a smart UI for easier indicators' access and browsing:
 - Browse by category ('well-known')
 - Filter by field value/range
 - Map View/Data View integration
 - CSV/JSON/KML data download

Filter by attribute value

Filter by position



Environmental Indicators (2/2)



Value < 40



Feature hovering (map)

Towards a regional environmental SDI for policy makers

- Things to do:
 - Better infrastructure performances (network speed/reliability and IT optimizations)
 - Data collection planning focused on indicators' generation (temporal/spatial/numerical resolution)
 - Cooperation between all regional INSPIRE datasets' responsible parties for higher technical and semantic interoperability
 - Higher usability of aggregators and data miners for policy makers
- Key competencies:
 - Policy makers/Public managers
 - IT and data managers/IT and data professionals

Inspire ROI: who wants to be 'inspire(d)'?

- Open data: it's time to use them!
 - Time to finalize IT and GIS professional hard work in data dissemination
- Towards a more 'scientific' approach in environmental policies
 - 'data-aware' policy makers and public managers needed
 - citizens has the right to know
 - State of the environment
 - What can be done (and what not!)
 - How much does it cost
- What did INSPIRE has meant to us:
 - easier data access and internal organization improvement in geodata management and dissemination

Surfing INSPIRE networks

'If a man does not know to what port
he is steering, no ~~wind~~^{data} is favourable
to him'

(The Younger, Seneca, Epistulae Morales ad Lucilium, 71, sett. 13)