Building Open Source and Interoperable SDIs with GeoServer, GeoNetwork and MapStore

Ing. Simone Giannecchini
Ing. Nuno Oliveira
Quick Facts

- Founded in late 2006
- Expertise
  - Image Processing, GeoSpatial Data Fusion
  - Java, Java Enterprise, C++, Python
  - JPEG2000, JPIP, Advanced visualization
  - Web Based Mashups, Mobile Solutions
  - OGC, ISO, INSPIRE Standards
- Supporting/Developing FOSS4G projects
  - MapStore, GeoServer, GeoNetwork
  - CKAN, GeoNode
- Clients
  - UN FAO (CIOK, FIGIS, NRL, FORESTRY, ESTG), UN WFP, World Bank, DLR, EUMETSAT, JRC, ARPAT, NATO CMRE
  - Private Companies all over the world
Clients

Geographical distribution of our customers

<table>
<thead>
<tr>
<th>Country</th>
<th>Customers</th>
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</thead>
<tbody>
<tr>
<td>Italy</td>
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<tr>
<td>United Kingdom</td>
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<td><strong>Total</strong></td>
<td><strong>120</strong></td>
</tr>
</tbody>
</table>

Italy* includes UN FAO departments, UN WFP, NATO CMRE, JRC

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Team – Key Members

- 20 Staff Members, 16 Software Engineers
  - Ing. Simone Giannecchini
    - Founder, GeoServer PSC, GeoTools PMC, ImageIO-Ext Architect, JAI-Tools founder
  - Ing. Alessio Fabiani
    - Founder, GeoServer PSC, GeoTools Committer, MapStore Committer
  - Ing. Andrea Aime
    - GeoServer PSC, GeoTools PMC, JAI-Tools Lead, ImageIO-Ext committer
  - Ing. Emanuele Tajariol
    - GeoServer Committer, GeoTools Committer, GeoNetwork PSC
  - Ing Mauro Bartolomeoli
    - GeoServer Committer, GeoTools Committor, GeoBatch Committer, MapStore2 Architect
Offer
Our Offer

- **Enterprise Support Services**
  - Bug Fixing, Support, Customizations & New Features
  - 5 packages → different types of needs
- **Deployment Warranty**
  - Deploy with confidence, we monitor and fix when needed
- **Professional Training**
- **End-To-End Projects (Integration)**
  - Tell me what you need, I’ll put it together for you
- **We take our core products and**
  - Bend them, twist them, embed them
  - Hammer them to make clients happy
- **FOSS4G Software is core for us**
  - Not simple use but develop and support

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Professional Support Services

- 5 Plans
- Consulting/Mentoring
- Deployment Expert
- Development
- Covering all products
- Fixed SLA
- Ticket Portal

http://www.geo-solutions.it/enterprise-support-services

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Deployment Warranty

http://www.geo-solutions.it/geoserver-warranty

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Custom Tailored Training

- GeoServer, GeoNetwork, MapStore, GeoNode
- Remotely and on site (All over the world!):
  - Italy, US, UK, Germany, Austria, Egypt, Pakistan, Vietnam, Buthan, Suriname, Ghana, Mozambique, Madagascar, South Korea, Spain, Finland…

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Products
Our Products Combined

- CKAN
- MapStore
- GeoNode
- GeoNetwork
- GeoServer
- GeoWebCache

Metadata
Maps & Data
Tiles & KML
Metadata
Data & Styles
WMS
Ingest & Preprocess

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GeoServer

- GeoSpatial enterprise gateway
  - Java Enterprise
  - Management and Dissemination of raster and vector data
- Standards compliant
  - OGC WCS 1.0, 1.1.1 (RI), 2.0.1
  - OGC WFS 1.0, 1.1 (RI), 2.0.0
  - OGC WMS 1.1.1, 1.3.0
  - OGC WPS 1.0.0
  - OGC CSW 2.0.2
- Google Earth/Maps support
  - KML, GeoSearch, etc..

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GeoWebCache

- Tile Oriented Geospatial Cache
  - Java Enterprise
  - Maps Acceleration (10x to 100x)
- Standards compliant
  - OGC WMS 1.1.1, WMTS 1.0
  - TMS
  - WMS-C
- Google Earth/Maps support
- Stand-Alone or Integrated in GeoServer

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MapStore 2

- Create, Manage, Share Maps
- Embed in portals or use as complete solution
- Mobile First & Responsive
- OpenLayers 3 OR Leaflet OR Cesium
- ReactJS + Bootstrap + Redux
- Pluggable L&F

http://mapstore.geo-solutions.it
GeoNetwork

- (GeoSpatial) Catalog
  - Registry of Metadata
  - Repository
  - Enterprise Search Appliance

- GeoPortal
  - SDI entry point
  - Information Broker

- Metadata Editor

- Standards Based (CSW, OAI-PMH, etc..)

- Implemented with Java Enterprise technologies

-Http://geonetwork-opensource.org

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GeoNode

- GeoSpatial CMS
- Discover, Visualize, Download
  - Upload shapefiles and geotiff
  - Style data
  - Create Metadata
  - Create Map
- Open Source from the ground up
  - Django
  - GeoServer
  - OpenLayers
- Standards Based ➔ Interoperable
  - WMS
  - WFS
  - CSW
- [http://geonode.org](http://geonode.org)

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Comprehensive Knowledge Archive Network (CKAN)

- [http://ckan.org](http://ckan.org)
- OpenData Catalog & Portal
- Discover, Visualize, Download
  - csv, json, xml, rdf
- Open Source
- Widely Used
  - data.gov.uk
  - data.gov.us
  - dados.gov.br
  - dati.gov.it
  - and more
- Modular and Extensible
  - [http://extensions.ckan.org/](http://extensions.ckan.org/) has 167 extensions
  - some are our own 😊
These products can be used to implement INSPIRE compliant SDIs

- GeoNetwork for Discovery Services
- GeoServer for View and Download
- GeoServer INSPIRE extension
  - Download Services
    - OGC WFS 2.0 and GML 3.2.1
    - OGC WCS 2.0.1 (to be checked)
  - View Services
    - OGC WMS 1.1.1, 1.3 and OGC WMTS 1.0.0
    - Scenario 2 is not supported
INSPIRE Compliance

- GeoServer INSPIRE extension
  - Transformation Services
    - WPS gs:Reproject process
    - Not fully INSPIRE compliant
  - Invoke Spatial Service Services
    - OGC WPS 1.0.0
- GeoServer enhancements
  - WMTS RESTful API, better interoperability
  - Workspaces isolation:
    - Multiple virtual services for the same namespace
    - Publishing the same complex feature multiple times
  - Bugs fixes:
    - WFS NULL namespaces
    - Many Performance and Scalability improvements
- GeoServer Support
- Enhancements to Services and rendering
- Priority Bug Fixing
- INSPIRE Guidance & Enhanced Support
- INSPIRE Discovery with GeoNetwork CSW
- TEST-Prod Installation
- Fully Customised Metadata Editor
- Switch to GeoNetwork 3 is ongoing
HISTALP – Historical Instr. Climatological Time Series Of The Greater Alpine Region

- >200 stations grouped in Coarse Resolution Subregions (CRS)
- database consisting of monthly homogenised temperature, pressure, precipitation, sunshine and cloudiness records
- longest temperature and air pressure series extend back to 1760!
GOAL: Expose HISTALP data as INSPIRE Download and View Services

- Station and sensor data mapped to INSPIRE EF data specification – Environmental Monitoring Facilities

- Measurements data modeled according to INSPIRE Specialised Observations schema (based on O&M and SWE OGC specs)
- SQL views created in the source DB to make structure compatible with App-Schema
- HALE: mapping between DB tables and target INSPIRE schemas
- GeoServer App-Schema plug-in for HALE: creation of App-Schema DataStore in GeoServer to serve mapped data
- INSPIRE Download Services ➔ GeoServer WFS 2.0
  - Pre-defined dataset download services via Stored Queries
  - Direct Access download services via regular WFS
- INSPIRE View Services ➔ GeoServer WMS 1.3.0
- Several enhancements committed to GeoServer:
  - StoredQuery support for App-Schema layers backed by database (GEOS-7306)
  - Enhanced GML encoding capabilities for xs:anyType elements (GEOT-5251)
  - Usability improvements (GEOS-7226)
LaMMa

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LaMMa

- Ingestion and preprocessing of
  - 3 Meteorological model 2 times a day (00 & 12 UTC)
    - WRF-ARW @ 12km over MED with ECMWF initdata
    - WRF-ARW @ 12km over MED with GFS initdata
    - WRF-ARW @ 3km over Italy with ECMWF initdata
    - GFS @ 50km from ECMWF
  - MeteoSat 2nd and 3rd generation data every 15 minutes
  - Radar data every 5 minutes
- Meteorological model
  - Acquire via FTP after each run
  - Transcode from Grib1 to a series of GeoTiff
  - Mosaic with support for time
  - Publish in GeoServer
  - Prepare metadata and register in GeoNetwork
LaMMa

- Life+IMAGINE project
  - Evaluate and analyse landslides in a specific pilot area in Tuscany
  - ~14,000 observed landslide events in ~19,000 hazard areas
  - Output: INSPIRE compliant data sets for INSPIRE Download Services

- Harmonisation toward INSPIRE GE and NRZ schemas
LaMMA

- Vector datasets containing diverse kinds of data
  - Soil Morphology
  - Land Cover classification
  - Landslides (activity, type of movement, event time, ...)
  - Record of critical events with ex-ante and ex-post survey information
  - Hydrogeological Management Plan (PAI map): defines and classifies hazard areas (levels from 1 to 4, 1= no hazard, 4 = very high hazard).
- Maintained by different institutional bodies
- Different formats
  - File: SpatiaLite 3.x / 4.x, SHP
  - Database: PostGIS
- **GOAL:** harmonisation toward INSPIRE application schemas

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- INSPIRE schemas are based on Complex Features
  - **Simple features**: flat structure, single valued attributes, no relationships
  - **Complex features**: arbitrarily deep nested structure, multi-valued attributes, relationships between types
  - App-Schema extension – complex features for GeoServer

![Diagram showing simple and complex features]

- **Strength** – use simple features as Lego bricks to build complex ones
- **Weakness** – Manual configuration is tedious and error-prone

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- **HALE - The HUMBOLDT Alignment Editor**
  - visual, easy to use tool for defining and evaluating conceptual schema mappings
  - ensure logical and semantic consistency
  - transform geodata based on mappings

- **Extensions developed by GeoSolutions**
  - Spatialite 3.x / 4.x support (since HALE 2.9.3)
  - GeoServer App-Schema plug-in for HALE (since HALE 2.9.4)
    - Export alignment as GeoServer App-Schema mapping configuration
    - Direct creation of WFS services via GeoServer REST API

**LaMMA**

**GeoSolutions**

your one-stop-shop for geospatial open source software

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CKAN + GeoNetwork (CSW)
Harvest multilingual (IT/DE) metadata from OGC CSW
Link existing resources contained in OGC CSW Metadata records (i.e. maps, data, etc.)
Integration with the existing security subsystem based on Shibboleth and LDAP
Customized L&F
http://dati.retecivica.bz.it/it/
Trento OpenDATA Portal

- CKAN + GeoNetwork (CSW)
- Customized Harvesting
- Link existing resources contained in OGC CSW Metadata records (i.e. maps, data, etc.)
- 6000+ Resources constantly updated
- Integration with the existing security subsystem based on Shibboleth and LDAP
- Customized L&F
- [http://dati.trentino.it/](http://dati.trentino.it/)
Private Cloud Deployment

GeoServer + GeoWebCache

Custom Ingestion Engine

EO Data (multi-mission) + MetOc

Sentinel Support in Progress

Multiple OGC Services
  - WCS, WFS, WMS, WMTS

OSM based basemaps
• Products Visualization Platform
EUMETView Current Deployment

Web Server
- GeoServer
- GeoWebCache

App Server
- CineSat
- GDAL

Database Server
- PostGIS

Load-balancer

GPFS Shared filesystem

200 concurrent users and 800 concurrent requests
Keep up to 5 days of products

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- Ingestion and preprocessing of EUMETSAT data
- Rolling Data Archive
  - 1W of Data retained
  - Automatic ingestion and decommissioning of data
- GeoServer Cluster + Integrated GeoWebCache for caching
CKAN Based OpenData Portal
- Harvesting from various sources
- Geospatial and alphanumeric data
- Integration with MapStore for Map Viewing
World Bank Support

- Development of Core GeoNode Features
- Community Support
- Countries Support
  - Madagascar, Afghanistan, Uganda, Mozambique
- Deployment Support
  - Madagascar, Afghanistan, Nepal, Sri Lanka, Malawi, Tog, Dominica, Vietnam...
  - Rapid deployment of per-project GeoNode instances
  - Private Cloud hosted on OVH
  - Docker + Rancher
World Bank Support

A propos

Welcome to the Afghanistan Disaster Risk Info
A public platform for creating, sharing and accessing geospatial data and maps of climate, disaster, risk

OGC Member

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World Bank Support

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CSI Piemonte - GeoPortal

- [http://www.geoportale.piemonte.it/cms/](http://www.geoportale.piemonte.it/cms/)
- GeoNetwork as the core catalog and CSW
- OpenLayers based mapping engine
- Harvest metadata from other local authorities
- RNDT Metadata Profile
  - Italian Standard catalog interface to the INSPIRE GeoPortal
  - Redefines the use of internal metadata codes to create a hierarchical dependency among metadata records
  - Schema Plugin
CSI Piemonte - SIRA

- Visually publish complex models
  - Publish your models and mappings to GeoServer
  - Use HALE Export to App-Schema to Configure a new Store
  - Publish your layers as Complex Features

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**CSI Piemonte - SIRA**

- Visually publish complex models
- Use your published Complex Features through GeoServer WMS / WFS OGC protocols

**INSPIRE Conference 2017**
Visually publish complex models
- Build a WebGIS UI on your Complex Features through configuration
- Query Builder on Feature attributes (also nested ones)
- Query Results table
- Show Cards using JSX templates from a Complex Feature tree
That's all!

Questions?
info@geo-solutions.it

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