User stories and Reference Implementation

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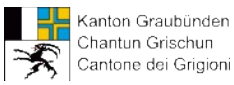


User stories and Reference Implementation

Executive summary

This doument describes the functionalities needed for the Reference Implementation deducted from user stories.

Based on these identified user needs, this document presents the architecture and functionalities of the Reference Implementation.

Introduction

The FreeGIS.net project has as one of its main results the development of a reference implementation to handle, manage, publish and document geographic data and make it available to a larger public in a standard format and with standard open data licenses.

In this report the needs of two public institutions are described in order to assess which functionalities are needed for the reference implementation.

Target

The target of this report are FreeGIS.net project members and partners and possible iusers of the results of the project.

User needs

Public administration

The main target of the FreeGIS Reference Implementation is public authorities.

First of all, considering the INSPIRE directive, public authorities that manage spatial data are supposed to publish them following the INSPIRE specifications. This means that they need to setup OGC compliant web services, they need to diocument their data with metadata

Obviously, a centralized WebGIS is a big opportunity for authorities operating on a territory: the integration of spatial data exposed from different organisations enables the authority to have a complete and integrated view.

Going through details, public authorities needs the following features:

1. Publish data following INSPIRE and OGC standards
2. Manage spatial data in a centralized SDI
3. Use services from other data providers together with own data
4. Edit and update data
5. Provide different WebGIS applications, with different tools, based on user roles
6. Integrate WebGIS functionalities with internal procedures
7. Offer simplified online procedures to citizens and enterprises based on spatial data
8. In the case of South Tirol or Kanton Graubünden all these aspects must be provided in a multilingual environment.

All these functionalities shall be provided with a graphical interface in order to let users accustomed to desktop GIS to create easily WebGIS applications.

Protected Area

A protected area is a good example of an advanced user of a GIS System. There are many types of information which an authority managing a protected area must handle, and which all have a geographic dimension:

- boundaries which define the extent of the protected area;
- management zones, where different protection levels apply;
- touristic routes and attractions, important to enhance the recreational use of the area
- fauna and flora species distribution;
- geological, vegetational, hydrological, morphological maps;
- land ownership.

All this information requires accurate documentation, good communication with stakeholders, clear workflows for the activities in the area, clear conservation and management strategies.

A WebGIS instrument satisfies most of the needs, since it allows to store all data in one place, it allows to define and enforce access rules, it is very easily extendible to all involved stakeholders.

The required functionalities for the Web-GIS application were listed merging togheter typical Desktop-GIS applications functionalities with server ones.

The required functionalities are:

- data import and export from modst commonly used formats
- Ability to store and manage raster and vector data in different coordinate systems
- Possibility to easyly configure and expose webservices with all relevant data;
- A client to view the data, query the information, support different languages, support mobile devices;
- interoperability with other authorities and organisations in the area: ideally protected areas should only manage the data under their responsability and link to datasets from other organisations through standardised web services
- editing possibilities: tools to enter, update and modify managent areas,
- metadata management tools, to edit and manage all information on the different data layers;

The reference implementation should allow all these possibilities and provide the park authorities with a framework to manage all their geo-referenced information.

The Reference Implementation

The FreeGIS Reference Implementation will satisfy the following needs:

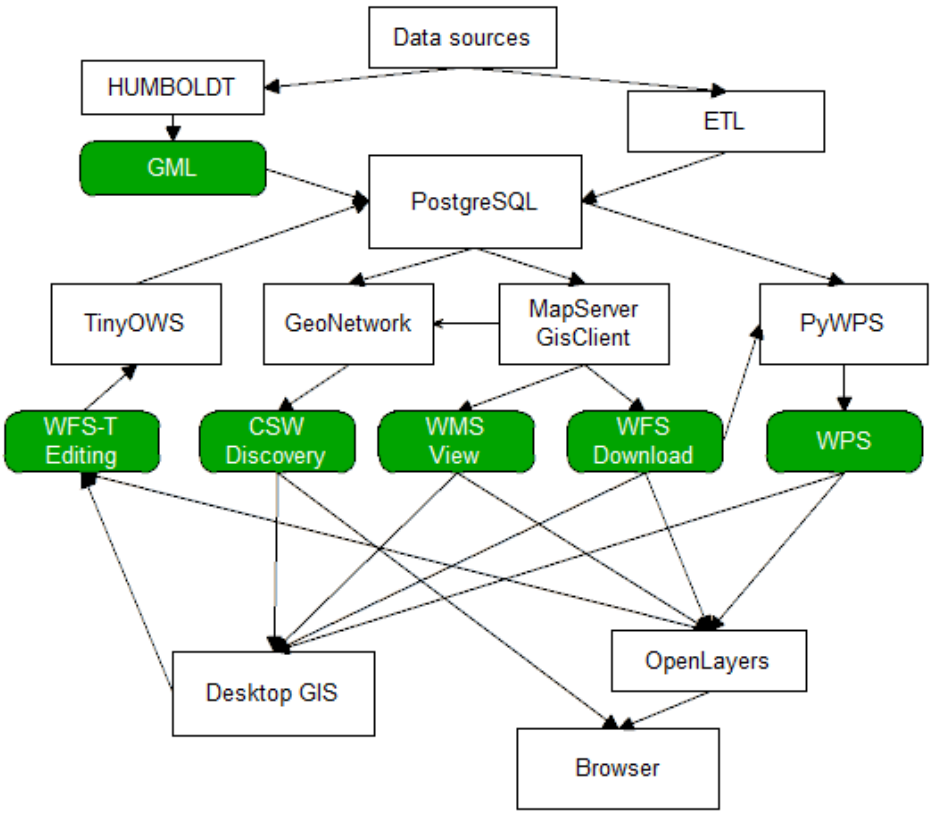
- Publish data through standard web services, like WMS, WFS and CSW
- Publish data following the INSPIRE directive and implementing

rules
- Edit data using the WFS-T standard
- Store data in a FOSS spatial DBMS
- Transform data from different data sources to standard formats and INSPIRE data specifications both with one-time transformations and automatic, on-the-fly transformations
- Offer geoprocessing functionalities on published data

Software

After evaluating the FOSS GIS software available, we chose the architecture described in the diagram below.

Green elements are OGC and/or INSPIRE standards, used for integration.



The following software will be involved in this implementation:

- The **HUMBOLDT** framework (http://community.esdi-humboldt.eu/)
  HUMBOLDT is a European project that aims to contribute to the implementation of a European Spatial Data Infrastructure,

caring about the data harmonisations processes.
The framework includes different software packages, covering almost all of the geodata transformation and harmonisation needs.

- **PostgreSQL** (http://www.postgresql.org/)
  It is the most advanced open source DBMS.
- **PostGIS** (http://postgis.refractions.net/)
  It adds support for geographic objects to the PostgreSQL DBMS, following the OpenGIS Simple Features Specification for SQL
- **MapServer** (http://mapserver.org/)
  It is the most used web mapping software.
- **GisClient** (http://www.gisclient.net/)
  It provides a GUI to configure MapServer and a feature-rich webGIS application.
- **PyWPS** (http://pywps.wald.intevation.org/)
  It implements the WPS standard, providing geoprocessing functions.
- **GeoNetwork** opensource (http://geonetwork-opensource.org/)
  It is a catalog application to manage spatially referenced resources.
- **OpenLayers** (http://openlayers.org/)
  It provides a Javascript API to easily put dynamic maps in any web page.

Description

Starting from the different data sources, the user will be able to transform data using the software provided in the HUMBOLDT framework or custom ETL processes.

HUMBOLDT software can both transform data and provide transformation rules to be used in a WPS service. The output of this process is a GML file, that can be imported in a spatial enabled DBMS (like PostgreSQL) or directly in web mapping software (like MapServer or Deegree).

The user will be then able to configure a webGIS application, eventually compliant with the INSPIRE specifications, using GisClient for WMS and WFS and GeoNetwork for CSW.

The editing functionalities will be provided by TinyOWS, using the WFS-T protocol.

The geoprocessing functionalities will be provided using pyWPS. It gives the possibility to use functions from GRASS, R and, if needed, custom defined functions.

From a client perspective, the services provided will be available using a Desktop GIS standard compliant application (like gvSIG, GRASS or QGIS) or a web browser (like Firefox or Chrome).

In the browser case, the map functionalities will be provided by the OpenLayers Javascript library.