

HABIT-CHANGE

Action 3.2.6 – part 1 Concept for Web-GIS tool

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1. Introduction

This report documents the technical concept of the WebGIS - Output 3.2.6 and is therefore regarded as part 1 of the respective output. The technology at EURAC is ready, further development is related to the adaption of the design to the HABIT-CHANGE website and filling the WebGIS with data. Since data will be available only in the scope of running activities in WP4 and WP5 the completion of the WebGIS is expected at the end of WP5 Output 5.2 in November 2012. The complete WebGIS including documentation will be than output 3.2.6 part 2.

WebGIS can be considered as a major advancement in cartography for dissemination. The process of implementing and visualizing maps on the World Wide Web over WebGIS makes it easy for everyone, to use and evaluate the given products (e.g. mobile maps on mobile phones). Furthermore, they provide an easy and cheap solution to integrate new geodata, personalize the map content and sharing of geographic information.

1.1. Goals

The WebGIS Tool will be the bridge between WP3 and WP5. It will connect the assessed qualitative information out of WP3 with the spatial decision support system (DSS) of WP5. The results will in this way been harmonized with explicit spatial information in order to be considered by external public as dissemination. Furthermore, detailed assessments gained out of the project partners contributions will be implemented as synthesis, contributing so to the support of the CAMPS

The Output will consider two elements:

- WebGIS as spatial component to provide paneuropean information for the DSS
- Synthesis of the gained spatial analysis for the CAMPS

2. Methodology

With a WebGIS tool it is possible to handle spatial data, like habitat-information, in an interactive way. You can explore, navigate within the map, reveal additional information, link to other resources, and much more via the Internet. Technically, it is achieved through the combination of geospatial software and frameworks (see 2.2 Technology).

Web maps can easily deliver up-to-date information. If maps are generated automatically from databases, they can display information in almost real time. They don't need to be printed.

There are no license fees, since the software is Open Source. The Implementation is also based on open standards, so the operating system and browser do not matter.

Regarding the HABIT-CHANGE Project this static map (Figure 1) shows the protected areas of Central Europe. The same content could be visualized with a WebGIS in an interactive user-friendly Interface accessible via the Internet. Additionally layers could be Elevation model, Population density, Climate data etc.

The next Chapter 2.1 explains the Components of a WebGIS more in detail.

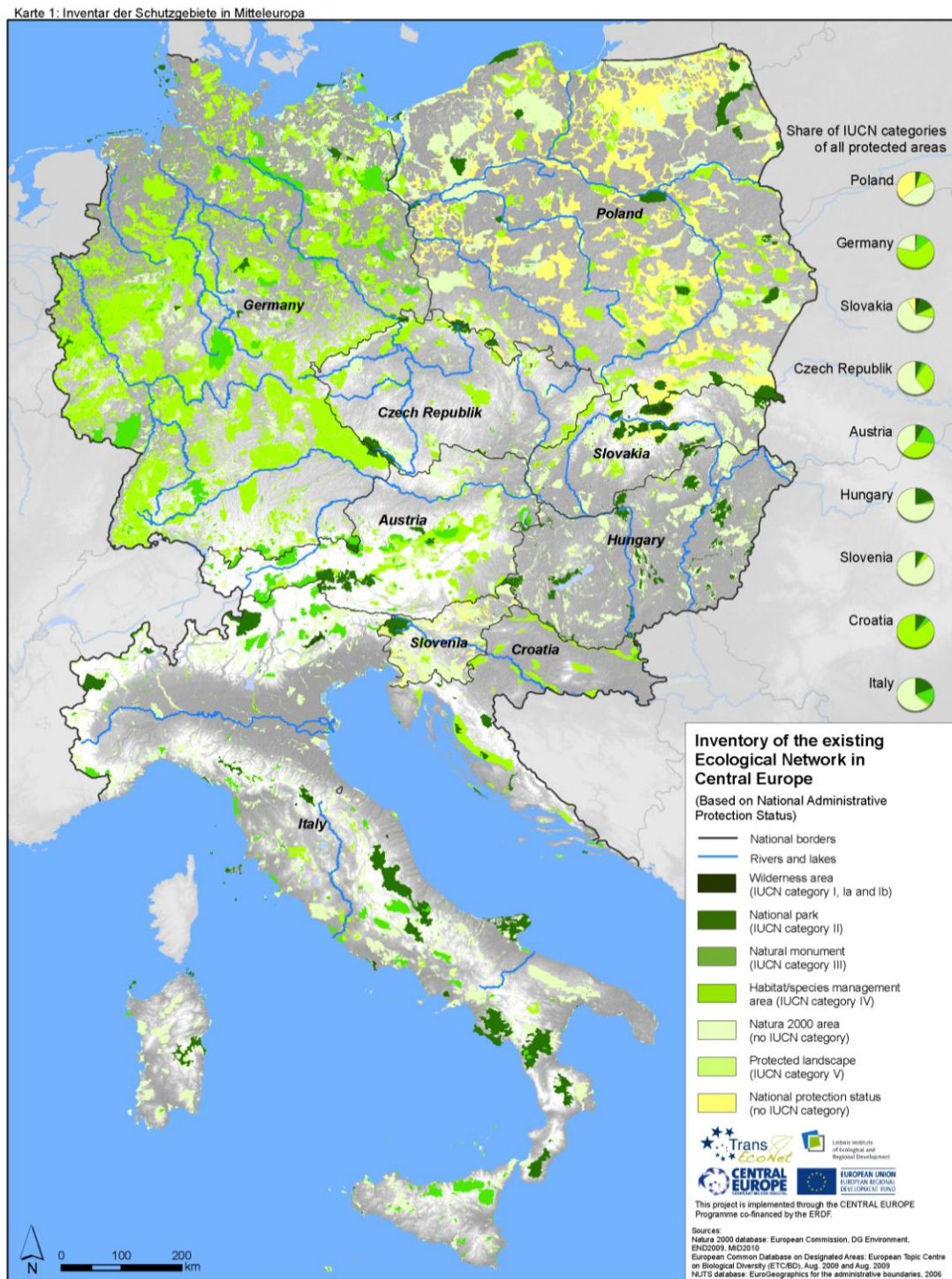


Figure 1: e.g. Protected areas in central Europe

2.1. Components of a WebGIS

The components of a classic web mapping application are shown as Example in the picture below

It is a screenshot taken from the latest project at Eurac research, Institute of Applied remote sensing. A WebGIS about Solar Radiation and Photo-Voltaic Potential covering the city of Bressanone.

- (1) Overview map
- (2) Layertree
- (3) Legend
- (4) Main map window with various functionality:
 - (5) Query
 - (6) Selection
 - (7) Navigation

Additional features are possible to integrate (Search, Diagrams etc...).

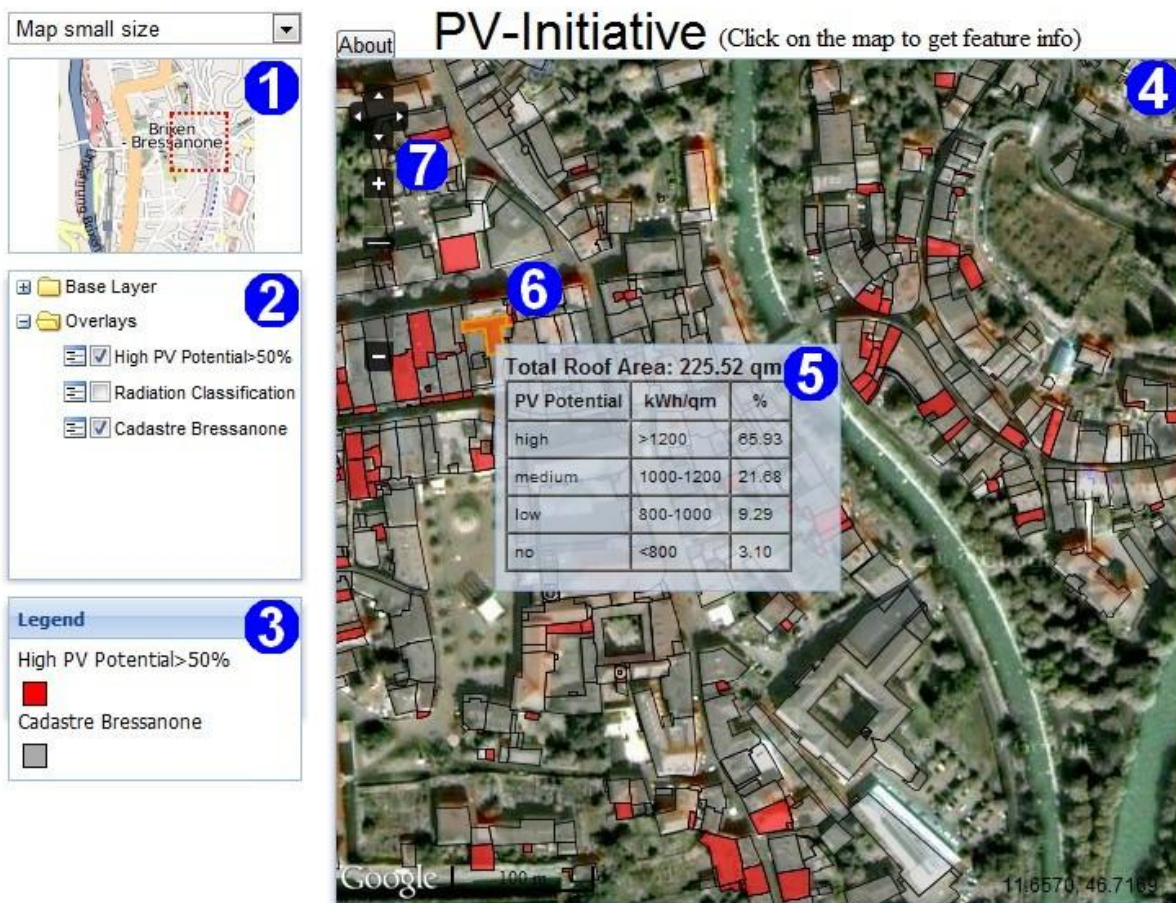


Figure 2: e.g. PV-Initiative WebGIS (Eurac, 2011)

2.2. Technology

The technical implementation is completely done with Open Source GIS Software / Frameworks.

It makes use of a set of five contiguous components, each fulfilling a particular functional role:

Database:	PostGIS / PostgreSQL spatial database
Application server:	GeoServer map/feature server
Application cache:	GeoWebCache tile cache
User interface map component:	OpenLayers
User interface framework:	GeoExt / ExtJS

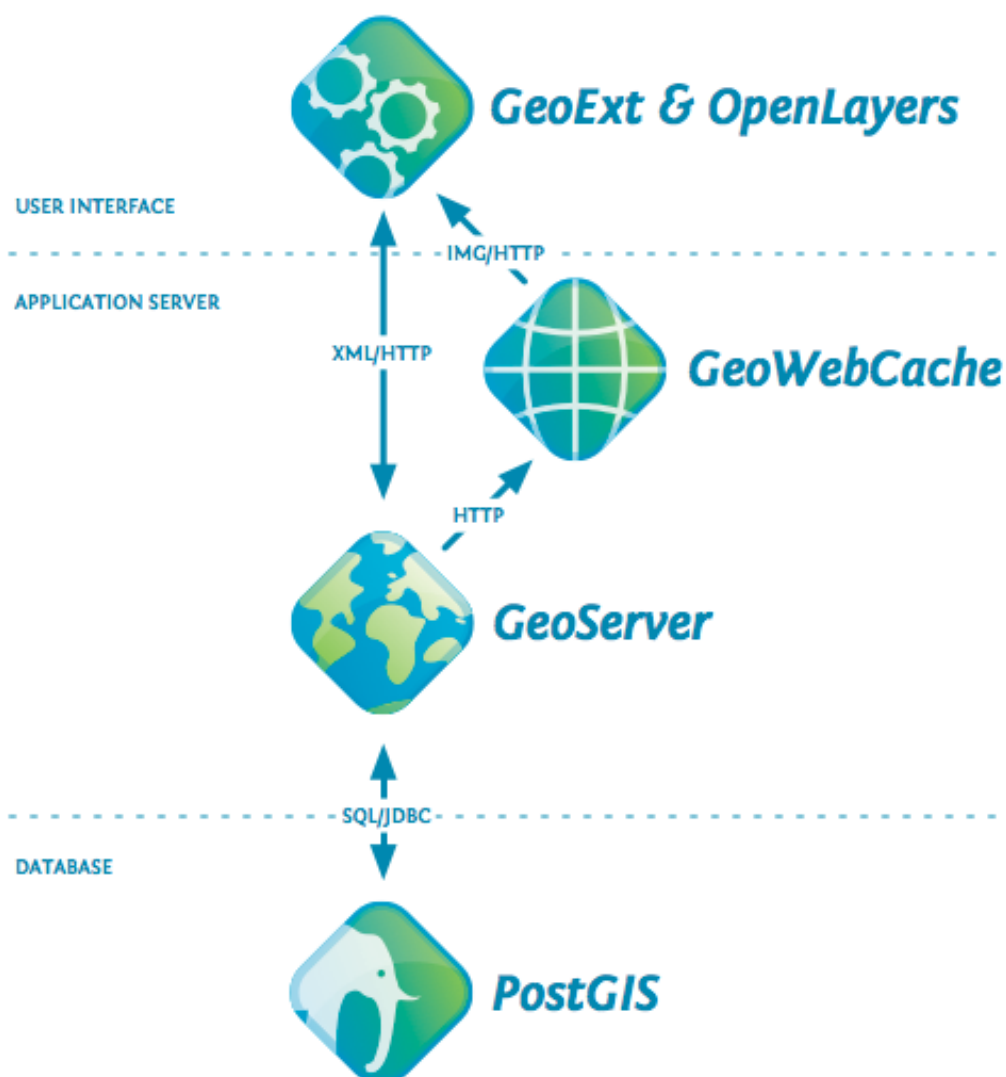


Figure 3: Component part of an Open source Geospatial Stack (OpenGeo, 2009)

At the bottom there is a database (PostGIS) or file-based storage system, there are application servers in the middle (GeoServer and GeoWebCache), and there is a user interface layer on the top (OpenLayers and GeoExt).

The database and application servers interact via SQL over a network protocol (usually abstracted away with JDBC or ODBC). The applications servers and user interface layers interact via standard web encodings (XML, JSON, images) over an HTTP transport.

First layer (Database):

PostGIS is a spatial extension to PostgreSQL, and inherits all the features of the underlying database. In addition, PostGIS adds types, functions and indexes to support the storage, management, and analysis of geospatial objects: points, linestrings, polygons, multipoints, multilinestrings, multipolygons and geometry collections. So the PostGIS database is able to answer spatial queries as well as standard attribute queries. Depending on the projects complexity (amount of data, query scenarios), a Database is highly recommended but not necessary.

Second layer (Application Server):

Because GeoServer can read from multiple data sources. Tables in a database (PostGIS) or just GIS files on a hard drive, (e.g. ESRI Shapefiles or GeoTIFF images). The Geoserver map/feature server presents these spatial data as feature collections, and allows HTTP clients to perform operations on those collections to retrieve maps and information. Such as Web Map Service (WMS) for retrieving cartographic images or Web Feature Service (WFS) for querying and retrieving vector feature collections.

The GeoWebCache tile server sits between tiled mapping components (like OpenLayers) and rendering engine in GeoServer, and can intelligently store and serve map tiles. It caches the results for performance. GeoWebCache receives tile requests, checks its internal cache to see if it already has a copy of the response, returns it if it does, or delegates to the rendering engine (GeoServer) if it does not.

Third layer (User interface):

OpenLayers is a generic mapping component, designed to consume spatial data and maps from numerous sources and display that data in a web browser. It can display maps from e.g Google, and also display custom maps generated by rendering engines like GeoServer. In addition to map display, Openlayers provides tools for data editing and capturing (digitizing, altering, and moving features)

The GeoExt/ExtJS interface framework includes standard UI components, including pre-built components for lists, panels, tables, dialogues and so. Further GeoExt adds some functionality to bind basic ExtJS UI components to the spatial features of OpenLayers. For example, a GeoExt "selection manager" which looks like a table in the user interface is bound to the set of selected features in OpenLayers.

(OpenGeo, 2009)

3. Referencing and Citation

OpenGeo (2009): White Paper: The OpenGeo Architecture

<http://opengeo.org/publications/opengeo-architecture/>

EURAC (2011). <http://webgis.eurac.edu/pvinitiative/>