



# Exupéry Volcano Fast Response System

## WP3 Database and GIS

[www.exupery-vfrs.de](http://www.exupery-vfrs.de)

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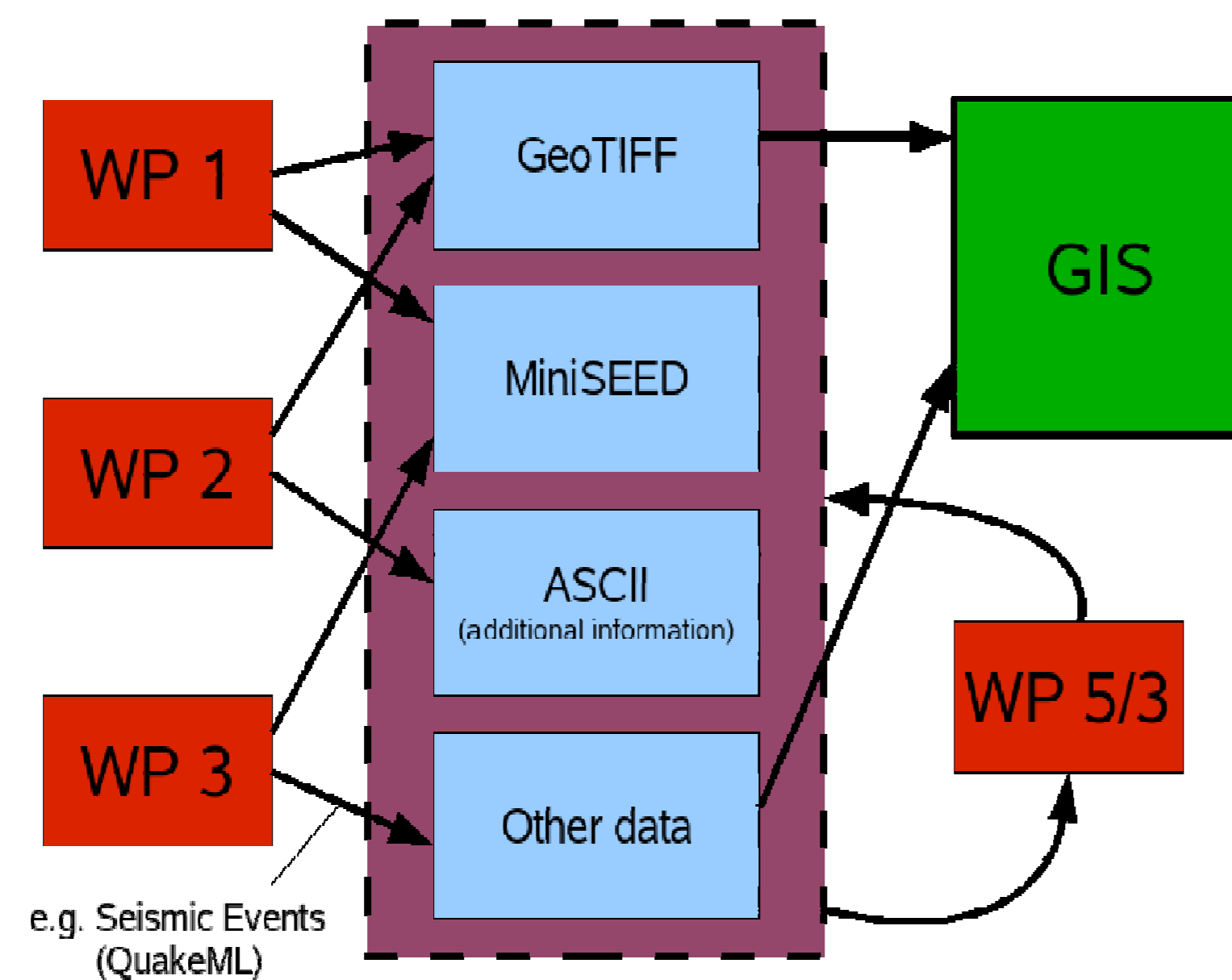
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### Data Overview

The main data formats of the data delivered or produced by the different work packages are GeoTIFF and MiniSEED. For every data, a link and a XML metadata template will be stored in the Exupéry data base.

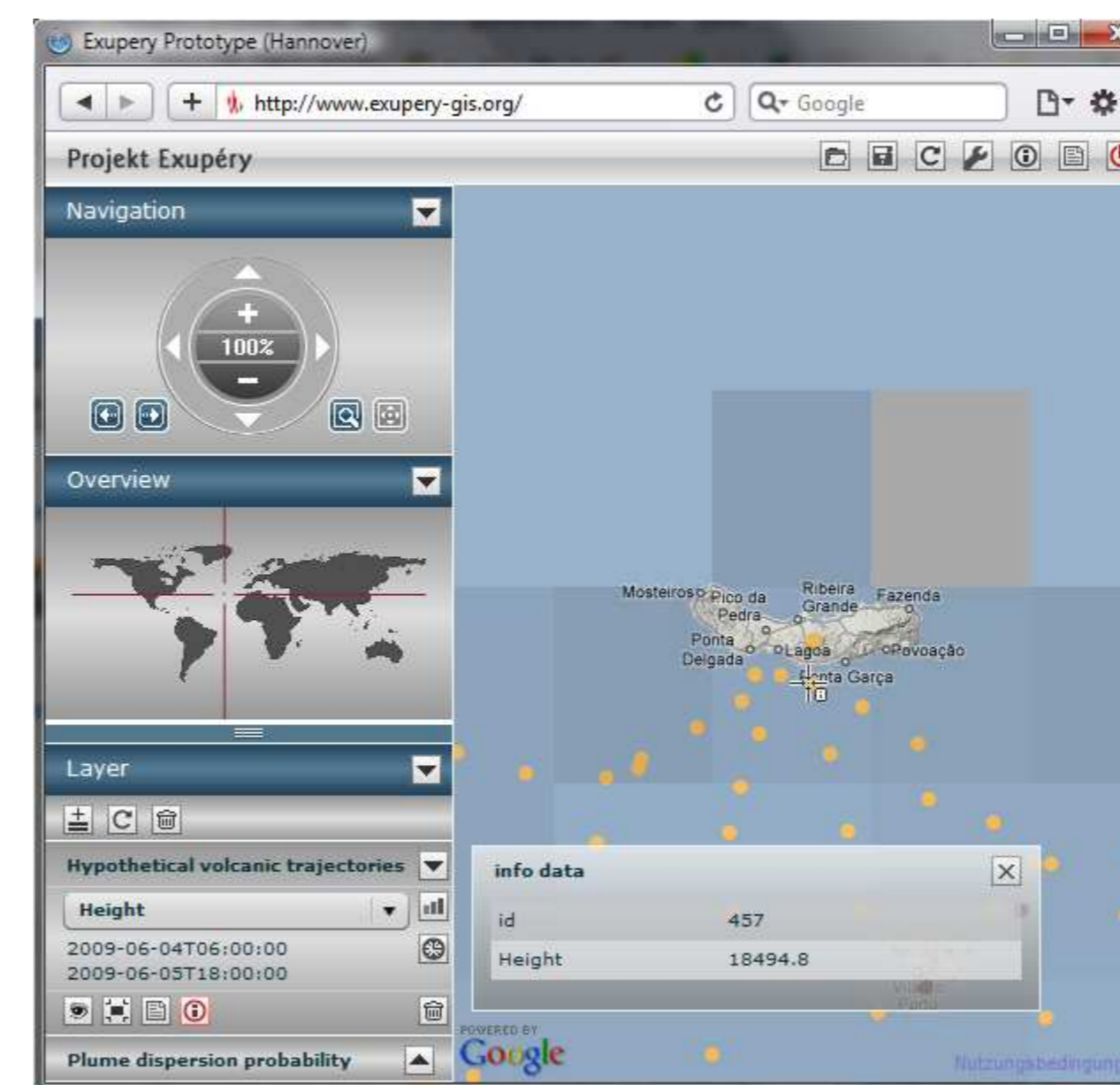
Users can access the final results via the GIS interface. In addition, some subprojects will deliver further data in form of ASCII files. These will be used by work packages 5 and 3 (subproject „Automatic alert level estimation“) to run various models and are accessible via web services. The results of work packages 5 and 3 will also be stored in the data base.

Take note that the following figure is a simplification and does not show all delivery or usage of data.



### GIS

The GIS user interface is a Flash - Web - Application that displays and handles various layers (maps) on top of Google Maps data. The maps are generated and styled by Geoserver, an open-source map server. (To meet our requirements we implemented new functionality into the Geoserver) The data for the maps is requested from the Seishub database.



#### Key Features

- Google Maps Integration
- Display various layers on top of each other
- Time series imaging
- Generate maps in different styles
- Detailed information for certain points on the maps
- Display diagrams for certain layers
- Save & Load
- Set up different projects

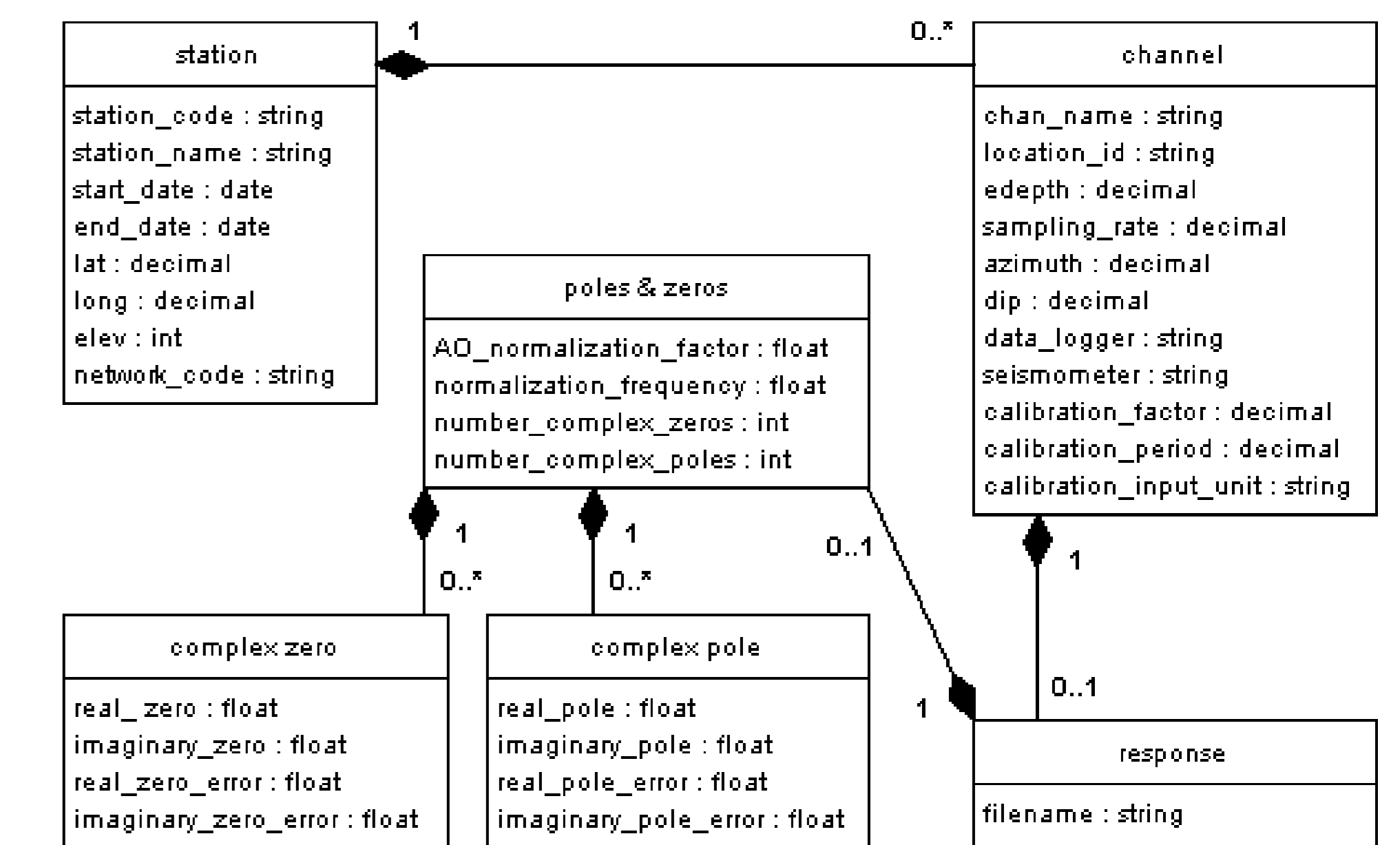
Screenshot situation: Two layers are displayed on top of Google Maps. Detailed Information for the point under the cursor is displayed.

[www.exupery-gis.org](http://www.exupery-gis.org)

### ABSTRACT

The up to date standard in monitoring volcanic activity is to utilize multi-parameter data sets. Multi-parameter data sets by themselves result in high-dimensional, complicated data streams, which needs a flexible database and analysis system to handle these data. The special requirements of an easy to extend database not restricted only to seismology, which is additionally able to work in a multi-user, multi-institutional environment, leads us to adopt a new database called Seishub. As a first step raw or already processed data formats, parameter and meta-data delivered or produced by the different work packages were already identified. This led to a couple of data formats which will be supported by the Exupéry database (GeoTiff, SEED etc.). Another important point to be addressed by WP 3 is the visualization of results and data product through an easy to handle, slim, license free and platform independent GIS.

### Data Model of Seismic Data



The figure above shows how the meta-data for stations will be stored in the Exupéry database.

The waveform data will not be stored in the database itself. However the database will contain a link to every waveform data file along with some meta-data (see the figure on the right).

waveform
station_name : string
chan_name : string
pathid : string
relative_path : string
start_date : date
start_time : time
end_date : date
end_time : time
record_number : int
record_size : int
hswap : int
offset : int
dataflags : int

The event data will be stored in a derivate of QuakeML:

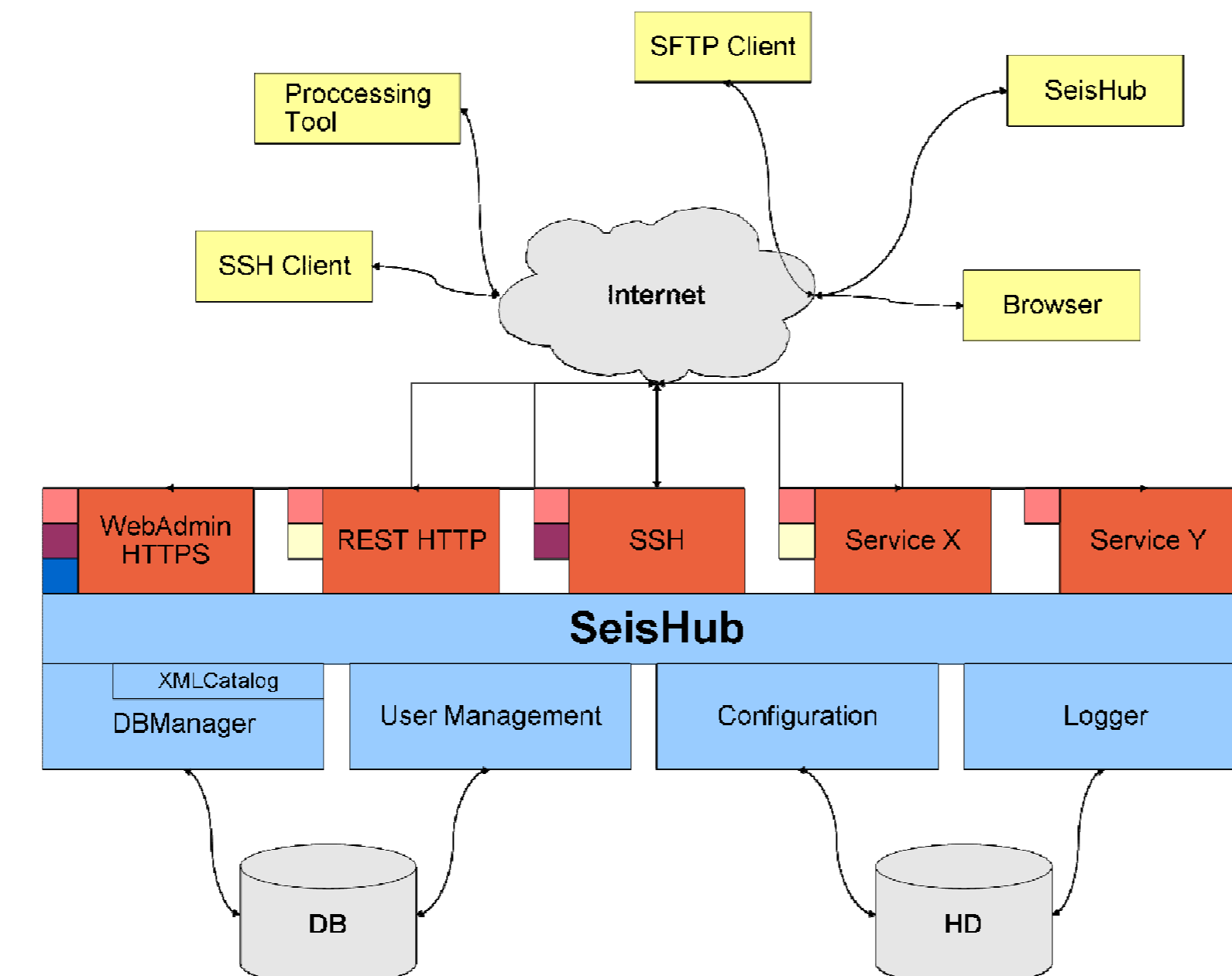
[www.quakeml.org](http://www.quakeml.org)

### ACKNOWLEDGEMENTS

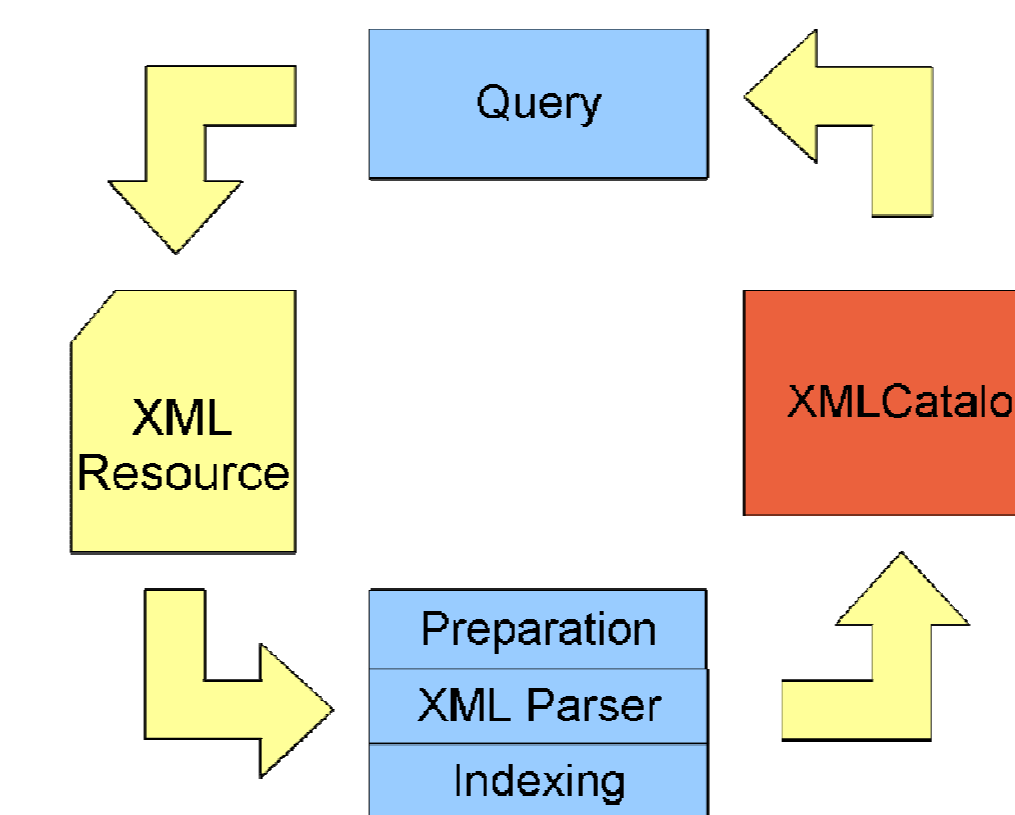
The project is financed in the frame of the Geotechnologien project by the BMBF in Germany.

SeisHub is a novel web-based database approach created for archiving, processing, and sharing geophysical data and meta data, particularly adapted for seismic data. The implemented database prototype offers the full functionality of a native XML database combined with the versatility of a RESTful Web service. The XML database itself uses a standard relational database as back-end.

This sophisticated structure allows for the usage of both worlds: on the one hand the power of the SQL for querying and manipulating data, and on the other hand the freedom to use any standard connected to XML, e.g. document conversion via XSLT or resource validation via XSD. This flexibility of the XML/SQL mixture introduced above enables the user to include parameters or results as well as meta data from additional or yet unknown monitoring techniques at any time. Additionally, SeisHub offers various access protocols (HTTP/HTTPS, SFTP, SSH), an extensible plug-in system, user management, and a sophisticated web-based administration front-end.



### SeisHub



The SeisHub database is an open source project and the latest development release can be downloaded via the project home page.

[www.seishub.org](http://www.seishub.org)

### Outlook

- Add the possibility to interactively set up the parameters in the alert level.
- Introduce the system it to the volcanologists.
- Completing the documentation of the interfaces and communication streams

