GEOGRAPHIC INFORMATION SYSTEM ARCHITECTURE APPLIED TO OCEANOGRAPHIC DATA ACQUISITION SYSTEMS

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Abstract - In this work a Geographic Information System Architecture for Oceanographic Data is presented. This has been designed by the Unidad de Tecnología Marina to be used into an Oceanographic Data Acquisition System implemented on board research vessels as a complete Service Layer integrated in the real time data services and also in to the archive data retrieval procedure. The main objective was to use opensource solutions and to follow the directives of the Open Geospatial Consortium in order to implement the different data services.

I. INTRODUCTION

The Geographic Information System developed by The Unidad de Tecnología Marina (UTM) from the Consejo Superior de Investigaciones Científicas (CSIC) has as a main goal to give facilities to access and work with the data acquired at research oceanographic vessels BO Hesperides", "BO Sarmiento de Gamboa", "BO García del Cid" and Antarctic Station "Juan Carlos I" in Livingston island.
This system is easy scalable to accept more platforms and data sources like automatic sub-aquatic stations, buoys and new vessels, where the information with important spacial and temporal components are relevant.
This solution set its developed over Open Source projects and follows the OGC (Open Geospatial Consortium) standards in order to guarantee the interoperability of the data and the offered services.

II. ARCHITECTURE

The system is designed for provide a geographic data access service layer to the acquired data. It is developed using the Data Service Layer Model implemented in the Data Acquisition and Operation System for Oceanographic Ships developed by the UTM.
We have identified and implemented four principal components for this service layer (Fig. 1):

Georepository

This component stores the information of the system and guarantees the persistence of the data. It manages all the spatial and thematic information or at least maintains a reference to the thematic information. We have chosen PostgresSQL as a relational data base with its spatial extension POSTGIS.
The upload data procedure can be in real time, using a specific data service that writes information of incoming data from the different sources to a central repository, and later it is distributed to a central node that has data from all platforms.

Geographic information server

This component publishes data as a map service using WMS, WFS and WCS following the OGC standards [1]. We have chosen Geoserver server for its flexibility and overall capabilities to implement this task. This has been deployed over GlassFish application server and it is capable to integrate heterogeneous data sources like ArcInfo shape files, PostGIS and MySQL databases, KMZ files, GML files and more. Geoserver can do tiling over the visualization layers with cache preload of the cells around of the one that is displayed.

Web client

This component is the user front end to display data, using the WMS and WFS services from GeoServer, and sends geographical queries to the server. It has been implemented as a web client and developed using the Javascript Framework: OpenLayers [2]. With this, it is possible to offer an easy data access and a simple 'first tool' to work with this data: it's possible to calculate areas, distances, select and edit different data layers and print maps in pdf format. It also provides access to numerical data associated to each element in a layer.

Thin client

This component is a desktop multiplatform GIS client application. It is developed using Java with custom plugging over the Kosmo [3] Open Source project. This client has the most common functionality for this environment.

2.1 Persistence

All the data are saved in a central server in two different ways depending on the data source and the final use of the data:
• Raster and Vector files in their different formats that system is capable to store in an ordered directory structure.
• In a relational data base. The information is stored in the relational data base PostgresSQL with the PostGIS extension that gives support to geographic objects using a Geometry data type column for the the the geographic information. The system uses DBA Managment Server as a web administration and monitor tool for the data base server.

2.2 Data Services

Once the data is stored in the georepository it is served with OGC Web Services. OGS services are the integration of different OGC specifications, focused on geoprocessing (WMS, WFS, WCS, WTS, etc..), ussing XML and HTTP technology.
The geographic information server, Geoserver, offers the following services:
• WMS: A georeferenced map served as an image using jpeg, gif, png, svg, pdf, kml, kmz, that is generated dynamically, and accessible using a web browser through standard Uniform Resource Locators requests.
• WFS: Equal to WMS but it allows the interaction with the server map using a Geographic Markup Language, a derivation from XML.
• WCS: A geospatial data set in coverage format. As a difference with WMS this service provides the data in original semantic making possible to work directly with it and it's not only an static representation of it.

2.3 Data Acquisition

Two different ways for feeding data to the systems have been implemented:

In real time

The different sensors generate User Data Protocol (UDP) telegrams with the data that we want to integrate in the data base. These UDPs are processed and integrated as a register in a table of the database where a Trigger shoots in the INSERT to update this registry with the geographic information defined. In this case, the geometry column is calculated with the longitude and latitude data fields of the registry as follows:

UPDATE "public"."posicion" SET geometria=GeomFromText('POINT(' || longitud || ' ' || latitud || ')', 4326);

Deferred

The data can be loaded to the system from heterogeneous sources to the georepository uploading the raster and vector files to the server to load them in the Geoserver.
Several applications can do this job working directly with the georepository, like DXF_to_PosGIS. With this last application is possible to import directly from DXF files (the AutoCAD file format commonly used in several GIS environments) files to PostGIS. Other applications like Udig are suitable for working with multiple layers of heterogeneous data sources and with them, it's possible to add and modify geometries in the layers.

2.4 Data Visualization

The use of publication map services: WMS, WFS and WCS makes possible an easy access to all the information in two ways: Directly with a web browser (Firefox) or from a GIS desktop application like Kosmo, ESRI, QGIS or gvSIG for example. In figure 2 we can see the data selector layer in the top right corner and it also shows the display of the navigation line of BIO Hesperides vessel that is used to access to other acquired data by using their acquisition time relationship.

3 Future Improvements

The UTM is working in a oceanographic survey editor. This application is focused on geologic, biologic oceanographic campaigns and others and it will be possible to work with a web browser drawing sampling points and navigation lines. It works with WFS and the vector layers with the points and lines are exportable

to GPX, making possible to open this with the main navigation program used by ship's crew.

There are these basic work entities:

• sampling points.
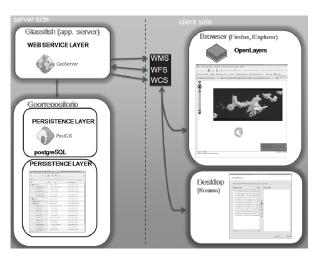• sampling group points.
• Navigation lines.
• Group navigation lines.

The navigation lines and the separation between them will be generated manually or automatically with the depth and another parameter.

REFERENCES
[1] Open Geospatial Consortium Standards.
http://www.opengeospatial.org/standards/common. Last visit 15/06/09
[2] J. OpenLayers. http://openlayers.org/. Last visit 15/06/09
[3] J. Kosmo. http://www.opengis.es/. Last visit 15/06/09

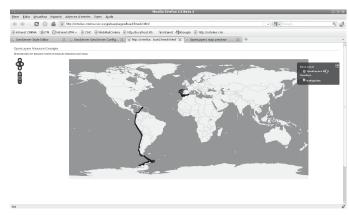*Figure 1: The four principal components of the service layer*

Figure 2: Data display of last 1 year data acquired by BIO Hesperides vessel (navigation track). This map frontend can be used to display data associated at each ship navigation point.

SCIENTIFIC INFORMATION RESOURCES AND BIBLIOMETRIC INDICATORS FOR THE RESEARCH PERFORMANCE ASSESSMENT

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I. INTRODUCTION:

This publication pretends to introduce the researchers and users of bibliographical databases to the bibliometric information resources and the indicators measuring scientific production.

Academic, institutional and corporate scientific production and research is in constant evolution; the Research Centers are every time more competitive, the research paths are more diverse and often requiring multidisciplinary collaboration between authors who furthermore, must take into account the scientific actuality within their own field of study.

The companies providing information resources collecting the scientific production published in journals, congresses and other sources, are aware of this dynamic situation and offer products integrating several added value databases and customization of all services.

II. EXPOSED RESOURCES:

Companies like Elsevier with their database Scopus, or Thompson Reuters supporting Web of Knowledge are leading competitors, regarding the management and commercialization of main research scientific information sources.

The platforms use their own metric tools to analyze and evaluate the scientific production hosted in their databases. Users can get information about, amongst others, number of quotes pointing a specific article, the Impact Factor of a publication during a certain period, the position of a publication according to its thematic field, the Immediacy Index in which an article is quoted, the influence of a journal and/or article within its field.

III. CONCLUSIONS:

Bibliometric indicators can provide with data on impact and visibility of publications, they can show collaborations between authors and their individual productivity, they also can establish which the trends are in scientific research.

REFERENCES
UPC. Bibliotecnica: la Biblioteca digital de la UPC [on line]. Barcelona: UPC, 2009 [Retrieved 22 September 2009] Available on: http://bibliotecnica.upc.edu/
SCImago Research Group. SJR: SCImago Journal & Country Rank [on line]. Granada: University of Granada, 2007-2009 [Retrieved 22 September 2009] Available on: http://www.scimagojr.com/
Thomson Reuters. Web of Knowledge: Journal Citation Reports [on line]. New York: Thomson Reuters, 2009 [Retrieved 22 September 2009] Available on: http://www.accesowok.fecyt.es/jcr/

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