WFS SIMPLE: THE WELTERWEIGHT DATA ACCESS STANDARD

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ABSTRACT

WFS Simple: the welterweight data access standard

"In most sports that use it, welterweight is heavier than lightweight but lighter than middleweight" -- Wikipedia

Recently, OGC completed an interoperability project in the US state of Kentucky that required environmental data from more than ten different government databases to be accessed and delivered in a uniform manner. We needed a simple, consistent way to query all these databases.

Our first thought was to use an existing standard, such as Web Feature Service (WFS) or Web Coverage Service (WCS). However, we encountered a problem with this strategy. The nature of environmental data collection is that you don't get have uniform, evenly spaced collection points -- making WCS a bad fit. Also, the databases focus on the environmental readings, such as water salinity, pH, etc. -- not on the geographic aspects of the data, so using WFS, which requires GML as output wasn't a good fit either.

The solution -- WFS Simple -- was to devise a new standard interface that combined the best of WFS and WCS but provided the freedom in output formats we needed. A primary goal is to encourage databases with basic location information (like lat/long coordinates), to support location-aware queries. Most mainstream Web systems, like blogging engines and standard PHP/MySQL setups, should be able to easily add WFS Simple functionality by supporting two standardized parameters, BBOX and TIME, in queries.

The primary differences between WFS and WFS Simple are:

- GML is not a required output format
- There is no HTTP POST encoding of a WFS Simple request
- There is no Filter query option

This talk will discuss how WFS Simple will be important for not only scientific data access, but also mashing up Atom+GeoRSS feeds -- in essence a standards-based Yahoo! Pipes.

I will also present the open source Java library for building a WFS Simple service that is coming out of the project.

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A FEW MOUSE CLICKS AWAY: CONFIGURATION OF DEEGREE WCS, WFS AND WMS WITH OPENJUMP

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ABSTRACT

Providing information in a spatial data infrastructure (SDI) poses a special challenge for the service provider. Conceptual and technical conditions pose high demands on the involved participants. Publishing geospatial data in a Web Map Service (WMS), Web Feature Service (WFS) or Web Coverage Service (WCS) often depends on in-depth knowledge of the configuration for the respective server application. Software packages like the deegree framework are designed for all kinds of possible use cases and to comply to as many relevant standards as possible. Thus, they hold a fairly high threshold when it comes to providing a simple WMS and the need for a simple to use tool has emerged. The new deegree Configuration Tool supplies a graphical user interface which is embedded into OpenJUMP as a plug-in to configure the main Web Services of the deegree service family.

OpenJUMP functionality provides the possibility to load Shapefiles and create thematic maps. Thanks to the plug-in, the OpenJUMP styling information can be saved as SLD (Styled Layer Descriptor) and both map (layer) and style can now be published in a Web Map Service at the push of a button. It is also possible to save MapInfo files as WMS layer and export the MapInfo style information into an SLD. Thus, existing data can easily be published in a WMS. Another possible use for the Configuration Tool is editing existing WMS layers. Together with their style definitions any layer can be loaded from the service into OpenJUMP, and after changing them locally, these layers can again be published in the WMS. Existing geospatial data in either PostGIS or Oracle databases can be handled to create WFS feature types, which then can also be displayed in WMS layers.

In short, the Configuration Tool allows for map based publishing of geospatial data in a WMS, as well as providing a data access to services like the WFS or the WCS. Geospatial data can be loaded, edited and styled to be published on a deegree WMS, WFS, or WCS in an instance. After successful configuration OpenJUMP automatically loads the respective map from the service to allow a final check. The complete software set consists of the following open source components:

- OpenJUMP with configuration plug-ins
- deegree WMS for map presentation
- deegree WFS and WCS for providing vector or raster data
- PostgreSQL/PostGIS as a database to store vector data (connection to an Oracle database is also possible)

The additional Configuration Service even allows to start and stop web service instances and includes a user management to enable multi-user service administration environments. After a one-time installation the tool can be technically supervised by administrators and used by experts.

Therefore the complete deegree Configuration Tool provides SDI administrators as well as GIS experts with a desktop based tool to provide GIS resources via standardised interfaces within no time. Acknowledgement: the described Configuration Tool was developed for and enabled through projects for the Cities of Hamburg, Bonn and Wuppertal and the Federal Ministry of the Interior (all Germany), as well as the Province Limburg (Netherlands).

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PROJ4JS - COORDINATE SYSTEM TRANSFORMATIONS IN THE BROWSER

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ABSTRACT

Proj4js [1] is a JavaScript API to transform point coordinates from one coordinate system to another, including datum transformations. Enabling these transformations in the browser allows geographic data stored in different projections to be combined in browser-based web mapping applications.

The library is a port of both the Proj.4 [2] and GCTPC [3] C libraries to JavaScript. Proj4js is one of the member projects in the recently formed OSGeo MetaCRS working group to address coordinate reference systems issues.

The presentation will show an overview of the library, how to install and configure it and several live demonstrations of its use in applications.

[1] http://proj4js.org/

[2] http://proj.maptools.org/

[3] http://edcftp.cr.usgs.gov/pub/software/gctpc/

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COORDINATE SYSTEMS: PROJ.4, EPSG AND OGC WKT

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ABSTRACT

A practical review of how to identify and specify coordinate systems for applications built on PROJ.4, use of EPSG codes or use of OGC Well Known Text. Detailed examples will be given for a variety of coordinate system, including examples of how it would be used with applications such as MapServer, GRASS, GDAL/OGR, and PostGIS. However, the techniques should apply to any application built on the same representations.

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AN OPEN SOURCE MODEL FOR THE SIMULATION OF GRANULAR FLOWS: FIRST RESULTS WITH GRASS GIS AND NEEDS FOR FURTHER INVESTIGATIONS

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ABSTRACT

Granular flows like avalanches or debris flows pose a major threat to communities and infrastructures in mountain regions all around the globe. The runout behaviour of granular flows is an important determinant for the degree of hazard connected to such processes. Some physically-based runout models do exist on the market, but they are either expensive or difficult to handle and therefore not widely used. No freely available, user-friendly full capability software for physically-based modelling of granular flows does yet exist.

The major goal of the study presented here is to fill this gap. It was decided to use the Savage-Hutter (SH) model, which is based on a system of differential equations for the conservation of mass and momentum.

A solution developed for simple topographies was implemented into GRASS GIS as a raster module named r.avalanche. The model output was tested for simple artificial topographies as well as for real catchments in the Argentine Andes. The results were promising, but there is need for more research, in particular:

- the present implementation only yields reasonable approximations for simple topographies without pronounced horizontal curvature of the flow channels. An appropriate extension of the Savage-Hutter theory for arbitrary topography has to be worked out and implemented into GRASS;
- the entrainment of particles (snow or soil, respectively) may play a prominent role for the runout length and for the volume deposited and shall therefore be included;
- it shall be taken into account that granular flows are often two-phase flows (solid and liquid fractions).

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KNOWLEDGE MANAGEMENT AND HUMANITARIAN RESPONSE TO COMPLEX HUMANITARIAN EMERGENCIES

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ABSTRACT

Complex Humanitarian Emergencies occur over various timeframes and engage a wide range of actors. This requires a variety of analytical approaches and a structure to communicate relevant information and mechanisms to engage actors who have varying levels of connectivity to the community of practice that is addressing either relevant categories of expertise or specific types and locations of such emergencies.

The Humanitarian Information Unit (HIU) was established by the U. S. Department of State to act as a node for the exchange of information between agencies of the U. S. Government and the broader humanitarian community. It also promotes “best practices” in the use of information, particularly of a geo-spatial nature, in addressing complex humanitarian emergencies worldwide.

The HIU has developed a business model that links customers and partners in the dissemination process. HIU services are organized based upon a “knowledge map” that identifies key actors, information products, and situational awareness regarding a specific complex humanitarian emergency. The paper will present HIU’s response to the Sichuan Earthquake of 2008 as a case study for this approach. This model may be adapted by other organizations in their efforts to address emergencies as well as establish information exchange mechanisms for a range of other issues.

The HIU uses an approach toward situational awareness in order to address the various phases of emergency response. A general outline of situational awareness will be presented along with examples of analytical geospatial products that address the various levels of situational awareness as they relate to complex humanitarian emergencies.

As part of the strategy to promote best practices in the use of geo-spatial information, the HIU, other offices within the U. S. Department of State, other U. S. Government agencies, academia, and non-governmental organizations have engaged African experts and institutions on structures to increase collaboration in the use of geo-spatial sciences in support of sustainable development. This was based upon a series of field visits to sub-Saharan Africa and a conference, which was held in Cape Town in March of 2008. Several of the resulting collaborative activities that emerged from this conference will be presented.

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INTEGRATING GIS INTO FOSS DISASTER MANAGEMENT SYSTEM

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ABSTRACT

Sahana is a Free and Open Source Disaster Management system that began as a response to the 2005 Tsunami in Sri Lanka and has since been deployed in many disasters around the world. It is a web based collaboration tool that addresses the common coordination problems during a disaster from finding missing people, managing aid, managing volunteers, tracking camps effectively between Government groups, the civil society (NGOs) and the victims themselves. Members of the Sahana Open Source Disaster Management System will present the infrastructure for incorporating GIS into a FOSS Disaster Management System. This presentation will talk about software and standards that enable the integration of GIS as a component of a much larger system. This talk will emphasize the existing FOSS software and the standards that are leveraged in order to reduce the effort in expanding Sahana to utilize spatial data effectively. This will focus on work done by members of the Sahana GIS team and Google Summer of Code Students over the last two years.

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REBUILDING A CITY THROUGH COMMUNITY PARTICIPATION, NEOGEOGRAPHY AND GIS

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ABSTRACT

The City of New Orleans is undergoing fast, and often unchecked reformations. Following Hurricane Katrina, the citizens were forced to evaluate and rebuild. However, pulling together disparate sources of information, freeing government data, and understanding the situation was difficult.

Individual organizations began to use readily available tools to capture and collect data. Flickr photos of historic buildings, online spreadsheets of demolition permits, collaborative mapping of citizens to discuss rebuilding neighborhoods and problem areas.

Through a mixture of awareness, coworking sessions, and the applications of higher-level tools, the various groups were able to pull the geospatial information together for advanced analysis and community planning.

This presentation will discuss the various emergent and coordinated processes that are used in the city to engage citizens and government. Through utilization of existing consumer services as well as lightweight geospatial tools and more complex GIS analysis the city is gaining understanding and the ability to move forward together.

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PUBLISHING WEB MAPS WITH QGIS MAPSERVER

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ABSTRACT

QGIS MapServer is an open source software implementing an OGC WMS compliant map server on top of the QGIS core library (http://karlinapp.ethz.ch/qgis_wms/index.html). It is a FastCGI application written in C++ that parses network requests, creates QGIS objects according to the requests and invokes libqgis_core.so to create the map in an offscreen buffer. QGIS MapServer supports requests with HTTP GET and SOAP.

Several other open source MapServers already exist. In the JAVA tribe of open source GIS, Code sharing is already done between desktop GIS and serverGIS with the GeoTools project. In the C/C++ tribe, code sharing is only done at the level of data access, not at the level of map symbolisation and drawing. The QGIS MapServer project therefore tries to maximize code reusability between desktop and server software. New functionality that is implemented into the QGIS core library will automatically be available for desktop and server users.

The so-called 'publish to web' plugin allows for an easy export of QGIS desktop projects to the server. One major advantage is that, as QGIS MapServer and desktop use the same GIS and rendering engine, the output of the server will look the same as it did on the desktop before export (perhaps with the small exception of image compression).

Another nice property is that the configuration language of QGIS MapServer is SLD (Styled Layer Descriptor). Therefore, server administrators who are familiar with this broadly accepted standard are already able to write server configuration files by hand or automate it with scripting. Inside the server code, this has the advantage that SLD in the server configuration and SLD sent by the user can be handled by the same piece of code. This is a major facilitation for code mainenance compared to the situation where server configuration language is different to SLD.

Future plans of the project include an improved publish to web plugin, better documentation and support for sensor data access.

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MAPFACES : A RICH CLIENT MAPPING FRAMEWORK BUILD ON TOP OF JSF

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ABSTRACT

MapFaces is a cartographic framework built on Java Server Faces (JSF) which tightly couples Javascript and Java code in order to provide a rich client cartographic interface with both synchronous and asynchronous elements. The project's principal objective is to propose a tight coupling between the JavaScript and Java languages in order to exploit the technical strengths of each. JavaScript offers elaborate and interactive elements which can offer the user an ergonomic and intuitive user interface. Java offers high performance computation on data. MapFaces uses JSF to link its JavaScript user interface elements to a Java based cartographic 'renderer' so the computationally intensive cartographic rendering is done in Java on the server side. This enables MapFaces to provide rich and complex cartographic data while limiting its resource consumption to a reasonable level on the client machine. The structure also enables the system to scale readily on the server side as a MapFaces based web service grows in complexity. MapFaces draws on several projects for its JavaScript elements such as Scriptaculous, EXT.js and Dojo while the Java code is largely based on the GeoAPI and Geotools projects. The MapFaces framework currently integrates:

- a map view component comprised of a client JavaScript MapPane coupled to a server Java Renderer
- a content management component to manage the rendering context in the map viewer based on the EXT.js TreeTable component.
- a Timeline component to manage the temporal selection on content elements which follows the ISO 19108 Temporal Schema specification.
- a Style management element to specify the representation of content elements which is integrated within a Portrayal Service which follows the ISO 19117 Portrayal specification and the OGC Symbology Encoding and Styled Layer Descriptor specifications.

MapFaces will eventually provide:

- a content serialization layer both allowing the definition of contents and render context within the standardized XML definitions of the WMS and OWS-Context specifications and enabling the marshalling and unmarshalling of these elements to Java,
- a federating proxy to integrate data from multiple web services (WMS, WFS, WCS, SOS, or CSW),
- a WMSC/TMS system to cache distributed data sources to reduce the load on the distributed services and ensure quick responsiveness despite network latencies,
- a stateful renderer to generate WMS compliant maps which integrate WFS and WCS data while providing a responsiveness approaching that of desktop applications,
- a client for on line Portrayal Services for use of standardized on line portrayals, and
- converters to transform data described in GML and SLD into SVG or VML enabling MapFaces to manage vectorial data comprised of enormous numbers of vectorial entities.
- a converter for joint GML and SLD layers to KML/KMZ to enable data presentation in GoogleEarth or Virtual Earth.

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GOOGLE EARTH POWERED BY MAPGUIDE OPEN SOURCE

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ABSTRACT

Google Earth has generated a tremendous amount of excitement in the geospatial industry due to its easy to use 3D visualization capabilities. This presentation will show you how to bring your live geospatial data into Google Earth using MapGuide Open Source without requiring a line of custom code. The geospatial data can be in any format supported by the Feature Data Objects API including SHP files, image files, and even PostGIS databases. Using the extrusion capabilities of KML you'll also see how to turn your flat 2D data into a dramatic 3D visualization. Going beyond the basics of simple visualization, you'll see how to use the MapGuide Open Source API from PHP to perform geometric analysis and visualize the results in Google Earth.

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FROM THE CHART TABLE TO THE BROWSER: DEPLOYING HISTORICAL MAPS AT SCALE

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ABSTRACT

Many large research libraries have thousands and even hundreds of thousands of map images locked away in physical archives. Modern technology permits the distribution of these images as zero marginal cost, but how to best leverage the tech to meet the needs of libraries, librarians, and the general public?

We will examine how one large public institution is meeting the challenge of getting its map archive online, and look at the fine points of setting up a scalable tile cluster suitable for delivering images both to the web (e.g. OpenLayers) and to the desktop (e.g. Google Earth). We will also at F/OSS tools for crowdsourcing the necessary but labor-intensive process rectification, collaring, and alignment of scanned map images. We will consider metadata and cataloguing solutions for making the tile sets visible to the world.

Finally, we hope to show that the F/OSS tools developed for this purpose, taken together, form a replicable pattern that can be reused by libraries across the world.

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REASONS FOR THE NON-USE OF FOSS GIS DURING THE RECONSTRUCTION AND REHABILITATION PROCESS AFTER THE TSUNAMI 2004 IN NANGGROE ACEH DARUSSALAM, INDONESIA OR CALL FOR A STRONGER LOBBY FOR FOSS GIS IN DEVELOPING COUNTRIES

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ABSTRACT

The earthquake and the following tsunami on December 26th, 2004 which hit the coast of Sumatra, not only led to a vast amount of deaths and victims but also to changes in the topography of the area and to destruction of much of the infrastructure. During the reconstruction and the still ongoing rehabilitation phase geospatial information is an essential and valuable good. According to the experience of three organisations working in the geoinformation sector during the reconstruction and rehabilitation process in Nanggroe Aceh Darussalam (NAD) there is a strong demand for the lobbying of FOSS GIS in developing countries.

After the tsunami, the first up to date geoinformation was gathered by the use of satellite images and aerial photographs. Vectorial geoinformation was then derived in a concentrated exertion and disseminated by the Aceh and Nias Reconstruction and Rehabilitation Agency (BRR) to the many national and international aid organisations present in NAD. In order to conduct this work and also for the further processing of this data 'tsunami immediate aid'-licenses with a one year maintenance were made freely available by proprietary software vendors. Hence, local stuff was trained extensively for using this software as in the beginning only little knowledge about the use of GIS and almost no software/infrastructure was present in the region. The providing of the free licenses was clearly a generous step and led to quick results as also the national and international trainers were familiar with the software, but this approach nevertheless also meant a step into illegality for many NGOs and governmental agencies. Today, more than three years after the tsunami, almost everybody working with geospatial software in NAD still uses proprietary software and although many international organisations paid for licenses after the immediate aid licenses expired, it is unlikely anybody is going to pay for the extension of licenses after those organisations will have left; which is at the latest by the end of this year.

In terms of FOSS GIS it has to be admitted that there are some promising approaches both by GOs/NGOs and the provincial government: FAO, for example, used GeoNetwork to publish data and metadata, the new Aceh Geospatial Data Center (AGDC) also uses GeoNetwork and as internet access becomes faster and also more affordable first map server applications are planned and set up in the province. Nevertheless, no open source desktop applications are in use.

Recently, the provincial governor started a program for the implementation of IT-centres in all provincial government agencies. This offers a new chance for the promotion of open source software as in most agencies only limited IT-knowledge and experience is available, hence, the common barrier of switching to open source is non existent. Furthermore, knowledge about open source is limited and even the difference to proprietary software is often blurred as the cost argument, still one of the most effective, is hardly present. Complete piracy GIS-licenses or proprietary operating systems cost less than 2 US$ and are available everywhere. According to Business Software Alliance Indonesia (BSA) 85% of the used software was running illegally in 2006.

Starting with findings and examples of actual FOSS GIS in NAD, the presentation would like to deliver input as a case study for the discussion about the use of FOSS4G and Open Source in general in developing countries.

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WEBGIS PLATFORM - A COMMERCIAL SUCCESSFUL OPENSOURCE-BASED CONCEPT IN SCANDINAVIA

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ABSTRACT

In a few months we have managed to start several commercial projects based on the same OpenSource-components (PostgreSQL, PostGIS, GeoServer, OpenLayers and extJS) in a SOA-based OGC-compliant system environment called WebGIS Platform. The projects uses country-wide databases, including e.g. advanced map symbology and high-resolution ortho photos, which implies high demands on client-side session handling, caching techniques and server scalability to achieve acceptable performance for public use. Security for Web clients and web services is achieved by using session token techniques. Advanced spatial analysis is implemented using functionality available by ESRI and FME servers and accessed with WPS-like interfaces. All projects are developed using agile development methods, mainly Scrum. The most important projects are:

* Vindtjänsten (Wind Service) is a prototype implementation hosted by the Swedish government. Vindtjänsten was developed to meet the very fast growing demand for relevant geographic data when planning wind mills in Sweden. A rich WebClient has been built, including tools for editing and also displaying relevant data from WMS services, such as background maps, nature reserves, existing wind mills and average wind velocity. Vindtjänsten is not a complete web application. Instead it is delivered as a set of components intended to be integrated in a case management system.

* GP2008 (GIS Platform 2008) is the production server platform for the largest forest company in Sweden, StoraEnso. GP2008 is a modern open SOA architecture for spatial and non-spatial databases and web services, communicating with all kinds of enterprise clients. It replaced a traditional GIS platform. A web service translator ensures compability between the web services. The "old" web service interfaces are thus logically preserved in the new platform, meaning that no existing clients needs to be updated.

* KUAS will be the new web interface for the Denmark heritage, planned for completion in January 2009. Three levels of users (museum staff, researchers and public) can manage and view all aspects of heritage sites in a geographic Web 2.0 community context, using a very rich WebClient. Heritage sites will be accessible using all kinds of information, such as images, GeoRSS, site relations and wikis. Advanced interfaces for search and update functionality will combine the strengths of extJS GUI components and OpenLayers WFS database integration. A detailed usability design is included in the project.

* MinSkog (MyForest) will be the new web application for private forest owners in Sweden, planned for completion in October 2008. The forest owners can manage their own forest data and apply for cuttings to the government. At least 10 000 cutting applications are expected every year. Demands for advanced editing and spatial searches require streamlined GeoJSON data exchange between GeoServer WFS and OpenLayers. MinSkog integrates with the government's internal case management system. MinSkog and the internal system can thus use the same spatial and non-spatial databases when needed. A detailed usability design is the basis for the project.

Several other projects are in the pipeline and are expected to be started during 2008. We are in the middle of a surprisingly fast transition from traditional GIS systems to OGC and OpenSource-based systems which has a more open and flexible system architecture. These systems can, when needed, relatively effortlessly be integrated with enterprise systems. GIS is finally really integrating with the web-based IT world of SOA, AJAX and REST.

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TAPPING INTO OPENSOURCE

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ABSTRACT

Johannesburg Water is currently using commercial software for displaying and dissemation of data. A decision was made to move over to OpenSource software for the Internet/Intranet data dissemination.

THis presentation focuses on the move from commercial to OpenSource software, indicating how the transition was done and sharing practical experiences during the whole process.

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TRANSITIONING TO FOSS4G AT NORTH WEST GEOMATICS

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ABSTRACT

North West Geomatics (NWG) is a leading mapping company in North America located in Calgary, Canada. The core business is aerial image and LiDAR acquisition (6 aircraft with 4 ADS40-SH52 and 1 ALS50 sensor). But NWG also offers image / LiDAR distribution through its fully owned subsidiary Valtus Imagery Services and does in-house development of software to support the processing work flow. NWG collects on a good flying day approx. 4TB of raw data. A flying season can lead to hundreds of TB of imagery. Due to the large volume of imagery NWG has built a state of the art IT infrastructure including 200 TB of high performance storage, 450 TB staging space, redundant archiving and a 10 gig network.

The processing work flow includes data ingestion, image quality control, automatic point matching, bundle adjustment, ortho-rectification, image mosaicing, radiometric processing. Although most software is tied to image processing and supplied by the sensor vendor Leica Geosystems, many other software modules are used, such as ESRI products, Inpho's OrthoVista, Global Mapper, etc. Unfortunately, the vendors of these products are not able to keep up with the fast moving developments on the hardware side. Also, using this patchwork of software creates many compatibility issues that require explicit importing and exporting of data. Another challenge that is not fully addressed by the proprietary vendors is data management. To remedy the issues NWG has invested into a development team to replace most of the proprietary software listed. The development is currently focused on high throughput processing tools built on Linux and Windows OS systems.

The image / LiDAR distribution has been developed completely independently of the image processing and already deploys FOSS4G, most prominently OpenLayers, Geotools and Geoserver. But also here the company is tied to proprietary systems such as Oracle SDE.

NWG is planning to investigate the deployment of FOSS4G in the processing software as well as extending the use of FOSS4G on the distribution side. The main goals of this transition are: better leverage of existing software and algorithms, independence of vendor lock in, cost savings, better paid support, adherence to standards that are establishing themselves in the geospatial industry, central data management. NWG is willing to work together with the Open Source community and contribute source code.

The development team is familiar with the use of FOSS with libraries such as boost, log4ccx and many others. The first steps using FOSS4G, that have already started, are deploying libraries such GEOS and shapelib. NWG is planning to start first tests with PostGIS in the summer of 2008 as a central data storage, but also as the replacement for the current Oracle back end. By leveraging the same technologies on the processing and the distribution sides of the business the existing gap can be narrowed significantly. Another huge benefit is that the central DB allows to build data management tools easily to audit the work flow and streamline the processing chain.

PROMOTING OPEN ACCESS TO ENVIRONMENTAL DATA USING OPEN SOURCE SOFTWARE

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ABSTRACT

The Science, Technology, Research & Innovation for the Environment (STRIVE) Programme has been allocated funding of approximately 100 euro million for the period 2007-2013. The purpose of the STRIVE Programme is to protect and improve the natural environment by addressing key environmental management issues by the provision of world-class scientific knowledge generated through a vibrant, competitive programme of research developed supported and co-ordinated by the Irish Environmental Protection Agency (EPA). It is expected that very large volumes of raw and aggregrated geospatial data will be generated by research projects funded by STRIVE. Publicly-funded research data are recognised as a valuable, long-term resource which has value within and beyond the lifetime of the STRIVE programme. "Alongside human capital and instrumental capital goods, digital research data are developing in to the third stream of scientific capital" (Schroder, 2003). However there are conflicting objectives between the mission of EPA/STRIVE and the scientific research community. The EPA/STRIVE seek the widest possible dissemination of research data (open access to the research data archive repository). On the other hand the research community perceive great risks with open access to their research data and third party usage of this data.

The Secure Archive For Environmental Research Data (SAFER-Data) is available at http://erc.epa.ie/safer and provides a web-based front-end to the EPA's environmental research data archive. SAFER is not just another "shiny front-end". Rather it is the physical implementation of the data management vision of STRIVE. SAFER is built exclusively using open source software. The core components are a backend metadata and administrative database using MySQL, application container is Apache Tomcat and our webserver is Apache HTTPd. Core end-user functionality is delivered using open source software such as OpenLayers Mapping API, Apache POI for generating MS Office format files, Apache Lucene as a high-performance full-featured text search engine library, and JfreeChart for dynamic image creation from the web-application. For the next major release of SAFER it is planned that SAFER will share the metadata database with a GeoNetwork node installed on our web-server. This will allow us to take advantage of GeoNetwork's implementation of various open interfaces with particular emphasis on the OGC Catalog Services and metadata harvesting.

This approach has yielded some very positive results and reactions both directly and indirectly. Vendor lock-in has been virtually eliminated by seeking open source software alternatives for various in-house data processing and analysis tasks. Updates of SAFER are released when they are ready and our user community are steadily becoming more proactively engaged in the testing and evaluation of new releases. Requests for new functionality and extensions to SAFER originate almost exclusively from our user-community. We continue to receive very positive feedback and encouragement from software developers, data managers, etc from other organisations both inside and outside the environmental science community who cite our "open data access and open software" approach as a very positive and forward looking position - one which should be noted by other public sector organisations. Other benefits include lower overall cost of ownership of software, great accessibility, and better prospects for long-term preservation of environmental research data from using open source software implementing proven open data exchange and storage standards. Our full paper will discuss the reaction from the scientific research community.

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MODUS OPERANDI OF A FOSS GIS PROJECT IN INDIA

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ABSTRACT

The paper presents our experiences and a prognosis for a wide scale adoption of FOSS GIS in a predominantly rural set up of southern Indian state of Andhra Pradesh. The state has, recently, set up a number of universities for higher education. A notable component of the education is a Masters programme in Geo informatics. The project imparted training in use of FOSS GIS tools for developing a GIS for the Parliamentary (Lower House) constituency of Rajahmundry in coastal Andhra Pradesh. The project is a first of its kind and was funded by a member of the lower house of the Indian parliament to show case the use of FOSS GIS to all stakeholders in the civic society .

At the outset, all the available sources of information from satellite data to vector data were collected and analyzed for possible inputs into the new GIS system to be built. The existing Free and Open source GIS software were assessed for their capability and easy acceptance by the students. A mix of software including, Open JUMP, ILWIS and GRASS GIS, were chosen to impart training to the researchers and students alike for implementation. Satellite imagery of the area of interest was used for digitizing road network, settlement parcels, educational institutes, banks and land use mapping. Freely down loadable SRTM data was used for generating geomorphology theme. The themes prepared were ground checked by students using portable GPS. The datasets prepared were populated with attribute information, following national standards. Attributes were also chosen based on societal needs and various scenarios such as impact of widening existing road corridors etc were assessed. Thus a complete inventory of social infrastructure for the Rajahmundry town was developed. The students of Geoinformatics were enthusiastic to work on a project of their city, and mapping their neighborhoods. Sustainability of future activities is assured as the data is within the reach of the Geoinformatics students as well as civic administrators. A demonstration of the GIS created to the city planners and administrators, has not only shown them the power of Open Source GIS, but also it's viability as no cost GIS.

The paper deals with the planning and execution phases of this endeavour, which involves both urban and rural areas, such that it can be replicated in other parts of India and elsewhere in the developing world. A detailed account supported by a flow-sheet of the project and a step by step account of various tasks like, raster analysis for land-use, vectorisation for rural and urban parcel mapping, digitisation of road networks, attribution after ground checks etc. The paper also shows how countries like India can create GIS data for effective planning in Sanitation, Health, Education, Policing, disaster management and allied fields and also help bridge the digital divide. The desktop GIS model so developed represents a win- win situation for law makers, civic authorities and student community apart from other stakeholders. The desktop model will be web enabled for an effective out reach, wide scale adoption, and a scope to PPGIS for sustainability.

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PROMOTION OF ACCESS TO SPATIAL INFORMATION USING WEB-BASED OPEN SOURCE GIS TO CAPE TOWN COMMUNITIES LIVING AT INFORMAL SETTLEMENT

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ABSTRACT

Spatial information is a key component in planning and decision making. Increasing access to spatial information to communities who live at informal settlements will create awareness and improve the living standards of people. In the past, the availability and use of spatial information has been limited to government and academic institutions, with ordinary members of the public especially at informal settlements not being able to access or make use of such information. The implementation of Access to Information Act in 2000 by the South African Government gave effect to the right to have access for any information, which is a right provided for in the Constitution of the country. The public, and in particular communities living in informal settlements, do not receive enough information regarding who to contact when they want to report, inquire, comment or submit requests for spatial information from the government, organisations and other institutions. Increasingly the internet is being used to disseminate spatial information. However, none or few systems allow the public to access spatial information and submit ideas on spatial problems to those in power.

The system prototype to be implemented will use the City of Cape Town Smart Cape project access points which use open source software and have connected computers at community libraries for bridging the digital divide. Using a combination of open source software, a web-based GIS system prototype will be developed with UMN Mapserver, PostgreSQL/PostGIS, Flexible Internet Spatial Template (FIST) and chatty. The system prototype will be tested at six Cape Town informal settlement community libraries being Langa, Gugulethu, Nyanga, Crossroads, Phillip and Delft.

The system prototype aims to assist the City of Cape Town relevant directorates as an option to be able to supply decision-making environments based around Geographical Information Systems (GIS) to the public across the internet, enhancing the two-way flow of information between the public and those governing them. Informal settlement users should be able to:

- access spatial information and metadata-information about the system
- interact with user interface easily.
- use basic map functionality
- follow instructions easily and would not need training as it will assumed that they have been using Smart Cape Access project commuter facilities.
- examine spatial data involved in the decision makings. They should achieve this by producing map session and manipulate the data to examine a number of complex "what if, else if or while" scenarios.
- interact with users from other informal settlements through discussion forums by using a chat program.

This research looks at promoting open access to spatial information easily and affordable using the web-based Open Source GIS technology under the general right of access to information.

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OPEN-SOURCE BASED MARKET INFORMATION SYSTEMS - ONE OPTION FOR DEVELOPING NATIONS

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ABSTRACT

The topic market price transparency has a dual implication: Buyers wish to pay the lowest while sellers seek to obtain the highest price possible. A market price information system with actual collected data is able to provide this information. At the same time observers will be able to deduce the availability of merchandise since the price is a direct function of supply and demand. Especially when dealing with perishable goods, i.e. vegetables, meat, fish, etc. timely and accurate information can be a great advantage for all market actors. This talk focuses on combined WebGIS, database and SMS technology which provides a maximum in flexibility for data acquisition and dissemination. All software in the system is Open Souce software and thus we see this as an option for developing nations. Why is information on market prices needed?

The aim of market price information systems is to aid transparency, i.e. which prices are current where. In many developing countries prices for staple foods are subject to severe seasonal and spatial variations, in general due to lacking up-to-date price information. The absence of this kind of information leads to high risks when investing into the marketing or storing of goods. The lack of market price transparency leads to enormous discrepancies between prices for producers and consumers. The variation in prices reflects a distribution problem. In some regions there is an acute shortage of food while on a national or regional level enough or even a surplus is being produced. From a developmental point of view a-ccurate and timely information on market prices is most important since this kind of information is the basis for efficient general and crisis management.

The aim of the software package is to employ modern information and communication technology to ensure a fast, reliable and cost efficient means of relaying market price information. Therefore, monitored prices are sent via e-mail to the systems database using local internet cafes. Where internet is not available couriers are used. Prices and other data is being disseminated via SMS (Short message Service) a text based format being offered from any mobile phoen provider. From the central database, market prices could be subscribed e.g. once a day containing the prices of the products and markets wanted. Users also are able to send a requesting SMS to the system and gathering market price information automatically from the system.

In addition market information is monitored and displayed via a web-based geographical information system (WebGIS). Market sites are entered via the WebGIS interface with the possibility of displaying and analysing market information in a geographical context. Furthermore the whole application is based on free and open-source software which facilitates easy transferal of the system to other countries.

Going back to 2004 such an information system was established in Benin and two years later under the project roof of "Resimao" also for whole Western Africa.

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CARIBBEAN PESTWATCH: AN AGRICULTURAL PEST MONITORING SYSTEM FOR THE CARIBBEAN UTILIZING OPEN SOURCE SOFTWARE

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ABSTRACT

A high capacity in data collection, reporting, analysis, and information delivery, both temporally and spatially, is critical to advancing Integrated Pest Management (IPM). Our project focuses on helping Jamaica, and eventually other Caribbean nations, build the capacity for dynamic spatial data acquisition and visualization through mapping pest presence or density/activity. The goal is to effectively collect, report, and analyze data on the locations, dynamics, and phenology of pest populations, and then quickly pass the information to stakeholders for decision-making. This capacity can advance regional IPM, quarantine programs, export agriculture, and local eradication programs; it also helps in protecting other countries from invasive pests, and the infrastructure built for these purposes has relevance to bio-containment. We envision this IT effort strengthening (i) the institutional capability of traceability programs that will increasingly be needed for agricultural export/import, and (ii) programs that deal with invasive species. Inadequate capacity in these areas places many developing countries at particular socio-economic risk. This is especially relevant to island nations, where invasive species are the most problematic, and where this capacity can help build communication among widely separated islands - thus, we have focused our efforts in the Caribbean.

Our model system for advancing this capacity is based on trapping for fruit flies, including the West Indian fruitfly (Anastrepha obliqua) but also including other fruitfly species, based on input from 13 island nations. The Jamaican Ministry of Agriculture has set up a nationwide network of trap locations, and data collection began in January 2008. Currently, data are being captured on hardcopy forms. The PestWatch system will provide a web interface for these data to instead be entered directly into the database. Users in the field will be able to enter the data from their cell phone or PDA.

Caribbean PestWatch utilizes postgreSQL with postGIS as the database, and Geoserver as the web mapping server. The prototype web mapping client has been coded in Adobe Flash; the final product may be done in Flex, which would make the software "stack" completely open source. The web client takes advantage of both the WMS and WFS capabilities provided by Geoserver: the base map (raster) is provided by the WMS, while the pest data (vector) are provided by the WFS. The web client parses the GML, classifies the pest count data, and sets up temporal arrays for each trap location so the data can be viewed on a map as a time-series animation. Users will be able to focus the data both temporally and spatially, also view trap data by factors such as trap type, plant host (mango, guava, etc.) and management practice (spray, organic, etc.) The user will also be able to choose various base map layers, such as elevation, rainfall, and land use.

The IT component of this project is being developed at The Center for Environmental Informatics at The Pennsylvania State University, which will initially host the system. A key goal of the project is to then pass the finished product, and most importantly the IT knowledge, to the Jamaican government so they can create their own mapping tools in the future.

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DAPPLE GLOBAL DATA EXPLORER

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ABSTRACT

Resource explorers today are faced with the significant challenge of finding relevant spatial data from the vast quantities of data available on the Internet and from within corporate and even personal data collections. An explorer needs to know what is available within a spatial context of interest, what it looks like, and what it is. To meet this challenge, Dapple has been created as an open an optimal global data explorer that includes a simple spatial and context text search, responsive visualization, metadata discovery and presentation, and data extraction in desired formats and coordinate systems. Dapple currently supports the discovery of data from Geosoft DAP servers, NASA tile servers, USGS tile servers, and the many WMS and ESRI ArcIMS and ArcGIS Servers that currently publish data on the Internet.

The Dapple project is an open-source activity sponsored by Geosoft and derived from the NASA World Wind open source project.

Objectives of Geosoft's open source development are to:

- Improve discovery and sharing of geoscientific, earth data around the world for the purpose of earth exploration.
- Contribute to the existing foundation of open, geospatial technologies through collaboration, sharing and reuse of software development.
- Improve our ability to innovate and quickly respond to exploration community needs through support of community development and standardization in data access.

The main idea behind these objectives is to provide explorers with a natural data experience that empowers them to explore the earth. Dapple is an excellent example of how these objectives can be manifested through the use of free and Open Source Software (FOSS). It is also possible to use Dapple in conjunction with other software (that may not be FOSS) to further enhance the empowerment of exploration.

In this presentation the following will be covered:

- A brief introduction to the needs of the global exploration community and some examples of problems faced when dealing with large volume earth science data.
- A demonstration of the Dapple Global Data Explorer and how it can assist in dealing with these problems in a natural way. This will also show how Dapple can be used in conjunction with a proprietary environment (Geosoft's Oasis montaj) to further enhance its usefulness.
- An overview of Geosoft's FOSS current and future strategy and how it fits into meeting the needs of the global geoscience community within our area of expertise - large volume earth science data.

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IMPLEMENTING WEB SERVICES FOR NASA'S TERRESTRIAL OBSERVATION AND PREDICTION SYSTEM

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ABSTRACT

The Terrestrial Observation and Prediction System (TOPS) at Ecocast, NASA Ames Research Center's ecological monitoring and forecasting lab, generates daily metrics of ecosystem conditions that have valuable applications in many areas, including studies in climate change, global carbon cycle monitoring, fire risk forecasting, and even vineyard irrigation and crop quality.

Ecocast has built a new OGC compliant WMS and WCS server, based on the open source Constellation project developed by Geomatys, to provide standardized access to the laboratory's huge archive of climate model data, gridded ground observation data, and MODIS imagery. The service, combined with a lightweight kaMap-derived Ajax client interface, called the TOPS Data Gateway, is being used by the U.S. National Parks Service to provide resource managers with the ability to quickly access and visualize near-real-time park conditions and compare them against historic trends and other supplemental data in order to identify, monitor, and respond to park disturbances.

We will present the TOPS Data Gateway and its underlying components, highlighting the particular demands which the scientific community makes of such a system. We will discuss the design necessary to achieve high level performance access to complex n-Dimensional data. We will show how we use modules from Constellation, such as the PostGrid indexation engine and its WMS/WCS WebServices, to give spatio-temporal management capabilities to data archives and achieve efficient I/O and image rendering through the use of Java Advanced Imaging, even for very large data sets.

The discussion will demonstrate the value of building web services on an open, component-based software stack designed around a standards-compliant architecture. We will show how Constellation's modular architecture, strict respect for accepted norms, and open source licensing have benefited our development process by encouraging system interoperability, flexible deployment, and evolution of the solution.

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USING FOSS AND PROPRIETARY GIS IN ASSESSING WATER USE BY ALIEN VEGETATION

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ABSTRACT

The Inkomati Water Management Area (WMA) has many competing demands for water and limited water resources. The water used by alien invasive plants could be diverted to other uses if these plants were eliminated. Developing a sound estimate of water use by alien vegetation is therefore an important step in a water-stressed area.

Both FOSS and proprietory technologies were used in assessing water use by alien vegetation in the Inkomati WMA. The initial field data collected and the analysis of remotely sensed imagery were carried out using proprietory systems, as these were established in the organizations that carried out these aspects of the work. FOSS GIS was used to monitor and manage the data collection phase, and in the subsequent analysis of water use and visualization of data.

This paper describes the assessment of water use by alien vegetation, drawing on remote sensed imagery and fieldwork. The roles of proprietory and FOSS software are discussed, advantages and limitations are noted and some conclusions are drawn regarding the future potential of FOSS GIS.

FOSS systems used in this project that will be discussed are listed below:

o MapWindow

o GRASS GIS

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FOSS BUSINESS MODELS IN THE SPATIAL REALM

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ABSTRACT

Software is an immaterial good but most business models do not take this into account yet. One reason why proprietary businesses have dominated the past 20 years was the lack of appropriate distribution media. With the emergence of ubiquitous connectivity this problem has been tackled, abundant examples prove this. Another problem is the public perception of where software business takes place.

Due to the economic success of highly scalable proprietary licensing models in the 90s there is a tendency to equate software business with the success of a few companies. Put into relation this turns out to be a misconception. IBM has 300k employees, Microsoft only 60k employees, Google less than 5k, ESRI (the GIS market leader!) not even that. But compared to the overall number of staff who installs, maintains, and most of all

uses the software and thus makes up a giant share of downstream software market business the "big players" are comparably tiny shops. In the spatial theatre we are talking about merely several thousand throughout the world.

Google is a good example to show how to make money by not selling software usage licenses but by providing "content" that is spread and made accessible using that software. Google has basically adopted this part of the Open Source business model but refrains from keeping all software development itself in the public (a lot of Google software is not Open Source yet). Another good example that shows how things are connected is Google's formal assignment of its KML copyright to OGC and the subsequent release of their KML library software (libkml) under an Open Source license.

But Google only scratches the surface of geospatial data, there is so much more information than dated aerial photography and street maps. Most of the geospatial data comes from tens of thousands of experts working with software every day. On a global scale this is by far the largest group of customers. From this perspective business does not lie in implementing software but in making it usable for people who can then raise their productivity, output quality and performance. This is the place where most of the real work is being done and this is the place where Open Source makes a a growing share of revenue - often with the aid of open standards.

This presentation puts things back into relation and introduces the emerging business models of the 21st. century. Proprietary business models only account for a fraction of the business potential inherent to software. Now it is time to realign the mindset and apply Open Source business models in day to day practice.

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POTIMART - AN OPEN SOURCE GIS PLATFORM FOR TRANSPORTATION

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ABSTRACT

POTIMART is an Open Source platform to deliver software solution for transportation, including transportation. It offers services such as multi-modal routing system, trip information, timetable.

The system integrates fully Open source software. An API makes it easy to integrate the system into existing Website.

The presentation will explain the basic architecture of the system and show several example of use in different cities.

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A DEEPER UNDERSTANDING OF TRADE AREAS AND TARGET MARKETS FOR GROWTH AND EXPANSION OPPORTUNITIES

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ABSTRACT

Choosing a retail site in the absence of sound trade area analysis forces a business to commit itself to a course in the absence of vital information such as store patronage, local market opportunities, competing businesses, and barriers that would dissuade consumers from visiting the site.

Geographic Information System technology is a fundamental tool for analysing retail trade areas today. The analytical approach removes site selection "blinders" because it identifies and illustrates the crucial factors for site selection within a geographic framework. We explore the methods and show how the application of external geographically enabled market data-sets and geo-demographic tools as well as internal client transactional data is utalised in order to scientifically optomise distribution and market reach.

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SPATIALITE: AN EXTENSION ENABLING SPATIAL PROCESSING ON SQLITE

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ABSTRACT

The SQLite database engine presents lots of very interesting features.

It is open source. It requires no administration at all. It is elementary simple and has an unbelievable small memory foot print. Actually the engine itself merely consists in a simple and very compact C library; a complete database is contained in a single file [cross platform portable].

Despite this minimalist approach, SQLite supports a wide part of the SQL 92 standard, this including atomic transactions.

Good news does not end here; SQLite is very fast as well, and is stable and reliable too. So, not at all surprising, SQLite has acquired a good reputation, and is quickly gaining a widespread diffusion. As claims SQLite's author Dr. Richard Hipp, may well be that today SQLite is the world's most widely deployed SQL database.

Regrettably SQLite lacks any kind of native support for Spatial data; so the SpatiaLite extension has been developed just in order to fill this gap, thus allowing to use SQLite for GIS processing as well.

This is technically possible because SQLite supports "extensions", i.e. can dynamically load shared libraries [DLLs on Windows] implementing further SQL functions; once such "extensions" are loaded, the SQL engine will then process these "extended" functions in the same identical way it will process the native ones.

So the SpatiaLite module uses the SQLite's own mechanism for extensions in order to implement OpenGis SQL Spatial functions, such as AsText(), AsBinary() and so on.

SpatiaLite is currently still under active development, but since now it supports any OpenGis 2D geometric class [POINT, LINESTRING, POLYGON, MULTIPOINT, MULTILINESTRING, MULTIPOLYGON and GEOMETRYCOLLECTION], can handle WKT and WKB notations, and supports a vast portion of OpenGis SQL Spatial functions, such as GeomFromText(), GeomFromWkb(), GeometryType(), SetSrid(), Srid(), X(), Y(), EndPoint(), StartPoint(), IsRing(), NumPoints(), PointN(), Envelope(), GLength(), Area(), Centroid(), ExteriorRing(), NumRings(), RingN(), NumGeometries(), GeometryN()

Direct support to import and export GIS data in the commonly used ESRI "shapefile" is supported as well by SpatiaLite, that also supports a PostGIS-styled transform() function in order to allow direct SQL access to PROJ4 features.

The goal of SpatiaLite is not to propose itself as a replacement or a competitor for others "unlimited strength" open source spatially enabled DBMS such as PostgreSQL/PostGIS or MySQL.

Most humbly, SpatiaLite simply intends to enhance SQLite in order to support GIS data storage and some basic kind of Spatial processing in an OpenGis compliant fashion.

Applications field where SQLite and SpatiaLite can advisably be deployed is the one of standalone GIS desktop apps, where a reliable and quite powerful support for SQL spatial data management is strongly needed, but where undesirable complexity [such the one deriving from installing, configuring and administering PostgreSQL or MySQL] may be a severe limiting factor.

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A NEW GRASS MODULE FOR COMPUTING VISIBILITY ON GRIDS

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ABSTRACT

This project presents a new GRASS module for computing the visibility map, or viewshed, of a point on a grid terrain: given an arbitrary point and a raster of elevations, compute the set of points in the raster that are visible from the viewpoint. This problem has multiple applications in GIS and beyond, ranging from path planning and navigation to placement of cell phone towers and radar sites. While several algorithms are known for computing visibility when the raster is small enough to fit in memory, the challenge is to develop an approach that scales up to very large inputs. Several users have pointed out, for example, that the current GRASS module to compute visibility, r.los, becomes slow for large rasters. The design of standard GIS software typically assumes that data is small enough to fit in main memory, and minimizes computation time. When working with large data, the transfer of data (Input/Output,) between main memory and disk usually constitutes the bottleneck, and requires algorithms specifically designed to optimize the number of Input/Output operations; simply adding a paging library without redesigning the algorithm is not sufficient.

Our module for computing the viewshed of a point is based on an algorithm that is provably worst-case I/O-efficient, and as a result is scalable to very large grids and low amounts of RAM. Preliminary experiments have shown it to be able to compute visibility on up to 4 GB terrains in less than 4 hours on a low-cost machine. Terrains of this size cannot be handled with GRASS equivalent module, r.los. Our algorithm is currently being ported to GRASS and pending a thorough analysis and comparison to current GRASS visibility modules, will be made available to the GRASS GIS users community as free and open-source software.

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USING SLD DEFINITIONS TO DISPLAY CHARTS IN A DEEGREE WMS

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ABSTRACT

The deegree framework provides, amongst others, the OGC reference implementation for Web Map Services and is capable of supporting SLD to allow for user defined style symbolization. According to OGC's SLD specification a point symbolizer referencing an external graphic needs to specify the URL to the symbol's image. References to a static image are no problem, but what happens, if you desire to display a chart which resembles the feature's properties?

A new web application has been designed for creating these dynamic chart figures. The user is able to generate charts by sending HTTP requests through the browser to a web servlet and receives images with the requested charts as a result. Chart type, appearance and data sources can all be determined using a given set of HTTP request parameters. The application can be used as standalone to display chart images for a given dataset. More interesting though, it can also be incorporated for displaying charts as symbols in a deegree WMS using SLD.

The major reason for having a special servlet rendering charts in deegree instead of using already available solutions is that it should be possible to use charts as point symbols within a map rendered by deegree WMS. The deegree WMS uses SLD for defining a layer style and so it should be possible to embed dynamically created charts without introducing deegree specific elements into an SLD document. A mechanism has been introduced to deegree that allows for accessing the properties of a feature - or rather: their values - to create a URL for referencing an external graphic within an SLD point symbolizer. The only thing you have to do to use charts as point symbols is to create an HTTP-Get call targeting the chart servlet with parameter values read from the features to be rendered.

The presentation will provide an in-depth explanation of the described mechanism and demonstrate the result in a deegree WMS.

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IMPLEMENTATION OF DISTRIBUTED SERVICE ORIENTED FRAMEWORK FOR 3D VISUALIZATION IN WEB-GIS CLIENTS

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ABSTRACT

3D visualization of geodata in Web-GIS clients has attracted wide interest recently. Most available solutions for 3D geodata visualization still require standalone applications that offer little flexibility in accessing of dynamic data from Web Processing Service (WPS) as a "browser-only" client solution. In this study, a new solution is implemented using various open standards that enable 3D visualization of geodata as Virtual Reality Modelling Language (VRML) or X3D model. The system offers a "browser-only" solution, wherein not only the existing data from distributed Web Feature Service (WFS) and Web Coverage Service (WCS) can be visualized but also dynamic results offered through Web Processing Service (WPS) can be accessed. The system was implemented based on a clearly demarcated Service Oriented Architecture (SOA) workflow consisting of Data Provider, Data Processing and 3D Rendering Services. First, the Data Provider service creates a web-service that publishes various spatial data source both of grid-based and vector data set. These services add a level of abstraction to the data that is extremely important in distributed computing environments. Second, the Data Processing service compliance with Web Processing Service (WPS) specification, which is also the Open Geospatial Consortium (OGC) proposed specification, is used to allow web-based geoprocessing for simply sharing of spatial analytical functionalities. The WPS specification defines a mechanism and procedures by which geoprocessing task will be carried out on a remote server and processed product can be obtained. Third, the 3D Rendering service is mainly a component part to create interchangeable 3D visualization from spatial dataset according to the requester.

The prototype web-application, which is a client side, was created by OpenLayers to facilitate user interaction and 2D/3D visualize output result. All necessary input parameters will be collected and submitted to the Data Processing service. AJAX, (Asynchronous JavaScript and XML) technology has been adopted to construct asynchronous connection using the XMLHttpRequest object therefore it could efficiently manage requests and results from distributed geoprocessing service. After all necessary supplied parameters are gathered, the desired data will be requested across network connection from the Data Provider service following WFS or WCS standard, which provides the DEM as grid based or GML data set. Subsequently, the sequence of spatial analyst will process on requested data and then the conversion process of analytical results into a VRML (wrl extension file format) was done by 3D Rendering service component. The output product will be stored in a place corresponding with a return URL location. Thus, the client can visualize on its application and provide URL address of downloadable actual file. The GRASS GIS serves the backend for spatial analytical functionalities and 3D rendering.

Many simulation scenarios have been carried on the web-based application for spatial decision support systems such as flood modelling, landslide and debris flow. But most system only provides potential dangerous area as two-dimensional maps. However this system, not only allows the virtual modelling of real world, but also the 3D representation of simulation scenario using prediction modelling. Application examples of 3D visualization of dynamic flood simulation models, visualization of sub-surface geology and bore-hole data will be presented.

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OPENGEOCODING.ORG - A FREE, PARTICIPATORY, COMMUNITY ORIENTED WORLDWIDE GEOCODING SERVICE

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ABSTRACT

Referencing information and features to geographic locations is an essential component of our daily live. In newspapers and television news we are accustomed to see maps illustrating the location of events in politics, sports, or natural hazards. The process of assigning location to such features is called georeferencing. Postal addresses, a specific way of locational description, are the essential means by which people express their location in the real world. Also many features in administration and business are related to addresses which are used as unique identifiers to geographical locations, often expressed by a pair of longitude and latitude values. Although addresses are data containing location, they do not contain coordinates. Therefore one of the most important features in many applications especially in geographic information system (GIS) is the capability to locate addresses, i. e. to geocode the address. The development was driven by a survey performed with international MSc students and alumni from the Photogrammetry and Geoinformatics course of Stuttgart University of Applied Sciences to gather information about addressing systems used in different countries. The database structure has been setup accordingly. Navigation schemes between the web pages are designed carefully. The data entry form is one of the major pages in this tool; there AJAX methods are used to enable smooth and user friendly data entry. A special care is taken for the correctness of the entered data by validating against the reference database. This reference database is developed by information collected from freely available postal addressing sites like http://www.geonames.org/.

There are two usage aspects for this service. On the one hand, registered users submit address information and corresponding coordinates. Special attention is given to their validation to prevent spamming by comparison to existing data on country, province, city and street level. Alternatively, users can use a Web map to digitize the location, supported by AJAX based techniques for map display and auto-completion. After successful validation, address and coordinates are saved into the database where they can be used for geocoding and extended data validation. On the other hand, the geocoding service for postal addresses is offered based on this data free of charge through a number of REST based web services. The geocoding process generally includes the transformation of an unstructured address into a structured address, the establishment of a correspondence between the structured address and the addressing database, and assignment of coordinates to the address. The geocoding process itself needs access to the database in which the reference data and user generated information is stored.

The service provides results in XML, KML, GML, and JSON format. Additionally a Web based user-friendly front-end is provided for interactive address submission. Results are displayed in a XHMTL page offering the opportunity to display the location based on the Mapstraction library. The geocoding application does not rely only to its internal database filled by the community. If no relevant results can be gained from the internal database, the request will be forwarded to other publicly available geocoding services. The result will be checked, parsed, and forwarded to the user. The application aims to offer free geocoding as a substitute for commercial solutions and can be found at http://www.opengeocoding.org/. While commercial solutions concentrate on industrial countries - and offer only their service for postal addresses in these countries -, this service aims offering geocoding for developing countries. Hence, the application can be an alternative to the existing geocoding services, independent from the commercial solutions provided that a critical mass of participants can be achieved.

[Abstract edited]

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LOCATION BASED SERVICE FOR URBAN MANAGEMENT IN THE CITY OF JOHANNESBURG

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ABSTRACT

The goal of the project was to implement a spatially enabled Urban Management monitoring system for the City of Johannesburg (COJ), with the Inner City being the pilot project.

The City covers an area of 1 644 km2, has approximately 650 000 stands and one million households. Furthermore, the vision of the City is to become a world-class African City that meets world best practices in terms of processes, systems and people. The City is committed to service delivery, also in terms of property and planning services.

GIS is an indispensable tool in realising this vision, due to its ability to integrate various sets of information and to perform spatial analysis. GPS adds spatial intelligence to previously non-spatial information and plays an important supplementary role to GIS.

Urban management became a new function of the department of Development Planning and Urban Management (DP&UM) in 2007 and it entails the responsibility to monitor service delivery within the boundaries of the City. Service delivery by the City and its Municipal Owned Entities (MOEs) includes aspects such as repairing water leakages, fixing of potholes, attending to faulty street lights, replacing missing manhole covers, etc.

The Regional Directors are responsible for this function in the City and they have appointed a number of fieldworkers who are responsible for "walking the streets" in order to identify and report new problems as well as follow up and check on reported problems. Although this function does not include the fixing of service breakdowns, it entails the monitoring and reporting thereof.

The fieldworkers reported service breakdowns on a paper-based system (log book). They would typically report the calls after a day's work in the field. They would also be sent into the field each day with a list of calls to be verified.

It was difficult to attend to queries as the call taker did not have access to the same information as the fieldworker and resource allocation was challenging as it was difficult to calculate demands.

The DP&UM department identified the need for a spatially enabled system that would facilitate urban management monitoring to successfully implement this new program.

Cognisance was taken of the SAP-CRM solution that addresses the customer interface activities using similar functionality and data. The system was to be developed in such a way that it would be integrated into the SAP-CRM solution once the latter was completed. The urban management fieldworkers use handheld devices (HTC TytnII) to capture spatial information. This enables operation staff (Call Centers) the ability to report, track and manage problems based on real-time information received from active mobile field workers.

The pilot project was for the Inner City due to the Mayoral Inner City Charter Commitments which require the implementation of an information system in the 2007/2008 financial year.

Future challenges include the roll-out of the pilot project to the other six Regions, integration with SAP CRM, spatial analysis and modelling for resource planning and other applications such as Valuations.

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GEOLIBERUM: A COLLABORATIVE APPROACH TO CAPACITY BUILDING, FOSS GIS IMPLEMENTATION AND DEPLOYMENT IN MUNICIPAL ADMINISTRATION IN DEVELOPING COUNTRIES

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ABSTRACT

From a planning for development point of view, many times, the municipality is the most important arena of administration, at this level is where things actually happen, processes are more complex due to scale and the need for information is higher; in the case of Mexico it is also here where money and resources for planning and administering the territory lack the most; in the state of Jalisco in western Mexico this is a common scenario; in terms of income most municipalities rely on contributions from the Federal and State governments, however usually land taxation (cadastre) is their most important source of income; this is true only in municipalities where there is a cadastre system operating, there are also many municipalities that do not have any registration of land property.

The project our organisation is launching regards a collaborative approach towards capacity building in land administration at a municipal level; this is not an ordinary training program; this is a project that starts with two lines of capacity building; one in the form of professional training in topics related to geospatial information, from collection to analysis and the other one in the form of consulting services that will assure implementation and deployment of a municipal administration system; this system should be based on Free and Open Source Software.

At the end of the project the municipality shall have a basic Land Information System as well as the personnel trained to collect and analyse information and be able to continue the development of software applications for the diverse areas inside the municipal administration.

Regarding the development of the software applications this could be either made by the municipality or by our organisation (our organisation shall charge a fee for the development of the applications, we are also requesting a state governement grant to cover this aspect), the agreement is that at the end of the project, all software applications developed shall remain as Free and Open Source Software that can be redistributed to the next generation of participants of the GeoLiberum project. We have set our first participants to be municipalities with certain level of development that will allow the initial spin of this project, the second generation shall be less fortunate municipalities that require less investment and can benefit from the FOSS4G developed in the first generation of the GeoLiberum Project.

Second generation participants will invest in the formal training and in the implementation of the FOSS4G already developed, but will generate or finance the update of these software applications as well as the development of new ones, this cycle will assure us the continuation and currentness of the applications, we will also invite local universities to participate in the project as developing nodes, our organisation is set to be one of these nodes.

We believe approaches such as this are feasible and only require commitment, participation and collaboration of several instances such as governments, NGO and academic institutions, our organisation is a key player in bringing together these actors; collaboration is the key to success.

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SNIT-CHILE, EXPERIENCE AND INNOVATION FOR THE SOCIETY OF KNOWLEDGE. GOOD GOVERNMENT, INTEROPERABILITY AND SOCIAL WEB: A METHODOLOGY IN PROCESS

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ABSTRACT

Given the institutional mandate to integrate the georeferenced territorial information generated by all Chilean Government institutions (divided into 8 different thematic areas, who comprehend circa 70 organizational instances) and to make it available to the citizens, the National System of Territorial Information, SNIT-Chile (www.snit.cl), two years since its definitive creation, faces the challenge of developing an effective communicational network who make interoperability a fact to the year 2010.

In this paper we consider the emergence of the manifold Open Source collaborative tools, as the appropriate instrument to fulfill this aim. Considering this as a necessary support, in the purpose of make real steps to Knowledge Societies, basically defined as "oriented to development, collaborative and centered in people" , the introduction of a "storytelling" methodology , seems to dully respond to the need of content and organizational identity as means who could make converse policy-makers and institutions. As it has been stated, Interoperability, is not anymore a technical problem, but a one related to political absence of dialogue and lack of appropriate situational analyses.

In resume, evidence shows that until now, systems in general have been developed as practical answers to particular needs, without taking in due account the possibilities enclosed in new technologies to develop management of knowledge landscapes, monitoring and evaluation who could allow feedback of necessary information between people, institutions and organizations partners in commonly defined tasks, getting solutions that are not fully partake in, reducing efficiency, duplicating efforts and policy comprehension. Lets finally say, that the compromises to integrality of services and regular exchange of the information, to a fully informed, participative and adjusted to context decision-making, are not anymore centered in the seeking of more sophisticated developments of hardware and software who could permit it, but in the human manifestations in which they objectifies. Id est: the clarity of expression and fluidity of transmission of political issues, the permanently actualized mechanisms of participative feedback and the generation of conscientious human networks, with skills of discerning, critical thinking and solid motivational grounds to built knowledge as a collaborative process .

Considering the more general theoretical framework of the Triple H?lix , which make comprehensive the convergence of government, academy and enterprises, as the practical engine of nowadays societies, the full paper will contain documentation about the SNIT, the recent constitution of the National Community of Territorial Information (CONIT) its developments , considerations about the actual Chilean legal framework who sustain this initiative, references to the political perspectives and conditions of its implementation, and a detailed analyze on the "re-signifier" of the different collaborative tools that we will develop and apply in the nonetheless new scenario of government. Last but not least, is in our opinion, interesting to note, the somehow experimental criteria that supports our being-part-of-methodology-proposal, in an investigative line who could be traced back to Ethnometodology, Actors Network Theory(ANT), and other notwithstanding active contemporary investigative trends in social sciences, and respond to the internationally recognized needs to incorporate effective and permanent auto-evaluation mechanisms in public and private organizations management, to achieve higher standards of transparency, efficiency and efficacy, as a way to rise human standards of living.

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APPLICATION OF OPEN SOURCE OGC SENSOR WEB IMPLEMENTATIONS FOR DISASTER MANAGEMENT AND ENVIRONMENTAL MONITORING

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ABSTRACT

Applications in the field of disaster management and environmental monitoring rely more and more on sensor networks. For integrating these sensor networks into software systems, service oriented architectures are a very commonly used paradigm. Especially the Sensor Web Enablement (SWE) standards of the Open Geospatial Consortium (OGC) provide a solid foundation for ensuring interoperability between sensor networks and application systems. This presentation aims at presenting the application of SWE implementations provided by the Open Source Initiative 52°North in different disaster management and environmental monitoring scenarios. After a short introduction into the SWE concepts several scenarios will be presented which make use of these implementations. These use cases are part of the EC funded OSIRIS project (Open Architecture for Smart and Interoperable Networks in Risk Management Based on In-situ Sensors). During this project the SWE standards and implementations were not only used but also improved and enhanced. The SWE standards can be divided into two groups: the information model and the service model. For encoding sensor data and metadata the information model provides three different standards: Sensor Model Language (SensorML, description of sensors, sensor systems and processing steps), Observations & Measurements (O&M, encoding of observation results) and Transducer Markup Language (TML, encoding of observation results and metadata in a way that is optimized for streaming). The service model comprises the definition interfaces of four different web service types: Sensor Observation Service (SOS, pull-based retrieval of measured data), Sensor Alert Service (SAS, push-based access to measured data and filtering based on user-defined criteria), Sensor Planning Service (SPS, controlling and tasking sensors), Web Notification Service (WNS, asynchronous communication between SWE services and/or clients). In the OSIRIS project sensor networks and SWE services were used for realizing the following solutions (due to the length limitations of the abstract the details of these solutions are not presented here but will be shown within the presentation):

- Air pollution: SWE services are used for distributing air quality data captured by mobile sensors (mounted on busses) as well as by conventional stations. The sensor data is used as input into simulation models for predicting the air quality within a city. In a practical demonstration this is realised for the city of Valladolid in Spain.
- Forest fire fighting: In this scenario the positions of fire men are tracked using a SOS instance in order to improve the resource management during an emergency situation. Additionally overview data generated by an airplane mounted camera is integrated into the system. The practical evaluation of this scenario will be conducted in the south of France in a real test fire.
- Fires in industrial plants: The aim is to reduce nuisance alarms by using SWE services (i.e. SAS) for combining different sensor types. This allows defining intelligent and complex alert criteria which lead to a more reliable fire detection.
- Water pollution: The monitoring of the arsenic concentration within a groundwater reservoir (in Tuscany, Italy) is realised in this scenario by using several SWE instances (SOS, SAS, SPS) for accessing sensor data, generating alerts and controlling the sampling rate of sensors.

As a conclusion this presentation shows how open source implementations of Sensor Web services can be used for realising powerful applications in a broad range of use cases. Furthermore it gives an idea how these concepts could also be transferred to other use cases by relying on existing free software components.

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INTEGRATION OF GEO-SPATIAL WEB SERVICES USING ADOBE FLEX

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ABSTRACT

The Geoloketten project supports the use of geographical information in the Netherlands. Within the frame of this project, a network of geo-spatial enabled web-services has been created. These web-services enhance existing web applications resulting in innovative applications for complicated geo-spatial challenges. To demonstrate these web-services, a user-friendly internet GIS application framework called Luigi which seamlessly integrates web-services was developed using the Adobe Flex development framework.

The release of this internet GIS application framework as open source is being considered and we would like to present it to the open source GIS community. The open source GIS community will hopefully provide us with the feedback we need on whether or not to release this application as an open source GIS application.

Adobe Flex is a platform independent platform for developing rich internet applications. The Flex software development kit (SDK) and an integrated development environment (IDE) are required to develop Flex applications. The client platform for applications developed using the Flex SDK is either the Flash Player plug-in (for browser based applications), or the Adobe AIR runtime (for desktop applications).

The Luigi framework currently supports map services such as WMS, WFS and ArcIMS, catalog services, geocoding services, a coordinate transformation service and charting services. Users have the usual pan, zoom and identify tools at their disposition. In addition to this standard internet GIS functionality, the Flex AMF communication protocol facilitates the development of innovative tools which allow end-users to share spatial data across the internet. Using the so called swipe tool, users can "see through" layers covering other layers. Editing tools are also available. Changes can be persisted using the transactional WFS standard.

The application has been designed according to the model-view-controller (MVC) software architecture. The model consists of classes to administer the map layers available in the application and to keep track of the current and the full extent of the application. The map model is being modified by a controller which supports functions like panning and zooming and adding and removing map layers etcetera. These functions are being called by the visual controls from the view layer. Currently, a map control, a navigation map control and a legend/table of contents control are available. After the model has been changed, the visual controls are updated accordingly.

Because of the modular design of the framework, adding new functionality is easy for Flex developers. On top of that, changing the user interface and adding support for additional data formats (for instance one's own custom data format) is a breeze.

The Luigi framework has been used in numerous projects by partners participating in the Geoloketten project to create both simple internet GIS applications for novice users and complex internet GIS applications for professional users. The response from end users has been overwhelmingly positive so far. The dilemma now is whether to make the Flex internet GIS framework open source or not.

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WEBSERVICES APPLICATION WITH DJANGO AND OPENLAYERS

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ABSTRACT

This presentation will show the work I have done few weeks ago, based on a WebServices platform (WMS-WFS-direct downloads) which allows users to browse the Great Toulouse (french city + suburbean area) with a web browser using OpenLayers as well as viewing them in their favorite GIS app with a secured WMS/WFS access, or simply downloading them.

The application includes a great administration tool with which the main administrator can authorize access to users, choosing the layer they can see and/or download.

When downloading, it is possible to get the data in common OGR formats, and into the main projection used in France.

The users can upload their own data as well, and then the administrator can choose to publish them to everyone or not.

It also delivers a high-resolution orthophoto (12.5 cm) of 7 GBytes, thanks to TileCache.

You may see a demo of it at : http://195.114.114.210/wmsmanager/mapview/ (user: foss4g pwd : capetown) but without administration access.

The main purpose of this presentation will be to show how the main modules (django middleware, WMS/WFS server, tilecache, OpenLayers) interact each other to deliver the right content to the right people.

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WEBGIS IN TIMES OF THE WEB AT VERSION 2.0 OR: BUZZWORDS, ANYONE?

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ABSTRACT

The web at version 2.0 (as described by Tim O'Reilly, http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html) nowadays has become reality and proved itself not to be another ephemeral phenomenon.

Our belief is, that this talk is not structurable like others, so we plan a more or less open presentation, reflecting the wanted glorious mess which is already reality in the internet and even more present in the ideas of Web2.0 - although the technique behind offers even better tools for structuring the application itself.

So the talk will also focus on key concepts, structures and techniques of typical web 2.0 applications and platforms and will discuss implications for WebGIS applications.

In core we want to discuss the question "Is the geospatial sector already buzzword-compliant?"

Regarding the Web 2.0 idea in the background, we will have a look at openness (APIs), freedom (licenses) and collective intelligence (user-generated-content) which are some of the essential features of the Web 2.0 and adapt them to the geospatial sector.

Discussed techniques will also include the topics about seperation of content, style and behaviour through (X)HTML, CSS, JavaScript/Ecmascript), responsiveness (AJAX), syndication (RSS) and participation (Wikis).

During the talk we want to present thesevarious topics through exctensive use of examples from ideas, applications and projects we have run till now and then.

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THE USE OF OPEN SOURCE GI SOFTWARE IN TEACHINGS

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ABSTRACT

The use of geographic information systems in universities, colleges, in advanced or further training became common standard in the last years.

In most of the cases desktop GIS of the main software producers - like ArcGIS by ESRI or MapInfo by PitneyBowes - are used. With its well adopted and easy to use windows-like user interfaces, the numerous extensions and functions and the in many cases easy and cheap price structures and licensing models they seem to offer exactly what is needed or wanted.

So why should open source GI software be used in teachings?

This issue was addressed in a research study that started in 2007 as part of a project at the Applied University Eberswalde, Germany. It includes the evaluation of interviews that were following different GIS courses in universities and other educational institutions.

GIS requirements in teachings

The evaluation of use and potential for open source GI software initially demanded the definition of requirements from an organizational perspective (administration, software administrators) and a user perspective (lecturers, tutors and students). Each perspective was evaluated to understand possible barriers in using open source GI software.

The functional complexity of different software applications were also examined according to environmental analysis as this often includes very complex tasks and questions. The common requirements, however, can be easily assigned to other applications.

The main questions and results of the study will be given in the full paper version.

The use of open source GI software in teachings was proved to be sufficient for the initially defined requirements and problems in environmental applications. Even complex tasks could be handled whether sometimes by using more than one software solution or by combining functionalities. In this regard existing proprietary GI software could be completely replaced by open source GI software.

The use of open source GI software is recommended explicitly to students, to get a general idea of different solutions and the comprehensive methods and functions to be used for environmental or any other application. Students have the flexibility to use open source GI software wherever they want - in the university, at home or at work - to solve their GI tasks.

Within the last years open source GI software has established in the GI market and has become a promising alternative for educational institutions. But the enormous potential must be utilised and promoted in a better way, starting by cleaning up existing prejudices.

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GIS IN THE SCHOOL CURRICULUM – PERCEPTIONS AND CHALLENGES FACING EDUCATORS IN THE WESTERN CAPE, SOUTH AFRICA

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ABSTRACT

Geographic Information Systems (GIS) has become a fundamental tool in geographical analysis as it exploits one of the most fundamental principles of Geography, that location is important. GIS is seen as a tool which can enhance the subject of Geography by supporting content delivery, developing spatial awareness and providing the context for critical thinking. As a result, in 2006, South Africa followed the trend set by many countries in the world, and incorporated GIS into the school curriculum. The introduction of Geographic Information Systems (GIS) into the National Geography Curriculum of South Africa poses many challenges to education authorities, educators (both at tertiary and secondary levels), scholars and vendors of GIS software. During the past three years various workshops have been organized by the Western Cape Education Department (WCED) to familiarize Geography curriculum advisors (CAs) and educators with GIS, which until now has chiefly been taught at Universities and other tertiary institutions as part of their under- and post-graduate curricula.

Although information and communication technology (ICT) is one of the main factors which might be an obstacle to the introduction of GIS into schools, other challenges include the level of preparedness of education departments, as well as educators. The choice of GIS software within the Western Cape is a contentious issue, and a final decision on the software package to be implemented in schools has not been agreed upon. Presently two GIS software packages, namely ArcView 3.3 and Geomatica, are used within selected secondary schools in the Western Cape.

This paper aims to address perceptions and challenges faced by Geography educators with the introduction of GIS into the Geography curriculum in the Western Cape, South Africa. The information was obtained from various role players within the education community. This process included a structured survey and informal interviews. From this process it appears that some of the major problems facing Geography educators are as follows: lack of any, or any adequate training in GIS; adequate computer laboratories; other school subjects competing for computer access; change in the teaching approach and time constraints limiting proper instruction in GIS. In order to address these issues, initiatives have come from the private sector, tertiary institutions and public institutions, which include workshops, GIS exhibitions, seminars and training sessions. These initiatives are evaluated against the proposed FET (Further Education and Training) curriculum in which GIS has been introduced.

Although GIS only forms a fractional part of the Geography curriculum it can be utilized as a powerful teaching tool. The advantages of using GIS in the classroom are that it makes the teaching of Geography more creative and provides a visual format which assists students with the learning process. Within the broader framework, GIS also promotes the use of Information and Communication Technology (ICT) where technology is seen as a means for improving general education.

The educator is the primary curriculum facilitator within the classroom. If educators generally are to realize the full potential of the utilization of GIS within the classroom, effective measures need to be introduced to address the difficulties and challenges experienced, whether perceived or real.

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INTRODUCING GIS INTO THE SOUTH AFRICAN EDUCATIONAL MARKET

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ABSTRACT

The South African National Department of Education included GIS in the curriculum for the first time in 2006. The introduction of GIS into the curriculum was a phased approach over the last three years of the Senior Secondary Phase

The Government relied heavily on the Private sector to facilitate with the introduction of GIS. GIMS (Pty) Ltd together with the Department of Land Affairs took initiative and assisted and approached former Geography teachers and other role players to guide the development of educational material. A complete GIS product range was developed in order to address the full spectrum of GIS educational needs in the Department of Education. The GIS school product range included three separate products that were made available, namely Paper GIS, ArcExplorer and ArcView.

During this presentation the different products will be discussed as well as the progress made in providing GIS awareness, GIS training and GIS software.

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A COMPARISON OF SOUTH AFRICAN UNIT STANDARD BASED QUALIFICATIONS IN GEO-SPATIAL INFORMATION SCIENCE AGAINST NATIONAL AND INTERNATIONAL BENCHMARKS

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ABSTRACT

Geo-spatial Information Science" (GISc) in the developed and developing world has established itself as a new and popular science or study field at universities and other tertiary institutions that offers programmes with specialisation in the various study areas of GISc. This demand for knowledge in GISc is driven by an industry that need professionals (human resources) who are capable of more than using Geographical Information Systems as a tool in their working environment.

In order to meet this need, universities and other tertiary institutions have introduced pre- and post graduate qualifications in GISc. The South African Qualifications Authority (SAQA) in terms of the National Qualifications Framework (NQF) acknowledges the fact that there are already within the industry many knowledgeable, competent and skilled resources without a formal qualification in GISc, and has through the GISc SGB generated "outcome based" unit standards and qualifications that can be used for assessment purposes by suitably qualified assessors and moderators.

The South African Council for Professional and Technical Surveyors (PLATO) as a statutory body and public protector, have the responsibility together with the Council of Higher Education (CHE) to maintain education standards in any one of the study areas including GISc in the geomatics study field and to advise universities and other tertiary institutions on the minimum required standards for accreditation purposes.

In order to meet this objective, PLATO, CHE, universities and other tertiary institutions need generic educational models in GISc, which can be used for accreditation that is generally acceptable by both the institutions of higher learning as well as the industry.

Geo-spatial Information Science is the encompassing name of the field studying the theory, development and application of integrated tools for measurement, analysis, and management of the descriptions and locations of earth- based data, often termed spatial data. These data come from many sources, including earth-orbiting satellites, air and sea-borne sensors and ground based instruments. It is processed and manipulated with state-of-the-art information technology and has applications in all disciplines, which depend on spatial data, including geomatics, geography, environmental studies, planning, navigation, geology, geophysics, engineering, forestry and agriculture. It is thus fundamental to all areas of study, which use spatially related data, and includes sub-fields such as Surveying, Remote Sensing, Photogrammetry, Cartography, Geographic Information Systems, Property or Cadastral Studies and Global Positioning Systems.

The focus of the paper will be on the determination of the minimum standard or requirement that can be used for accreditation of pre- and postgraduate qualifications in the GISc study field. The models recommended must comply with the relevant legislative requirements regulating the geomatics profession and higher education in South Africa and must be tested against national and international benchmarks before final recommendation.

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FOREST CROWN CLOSURE ASSESSMENT & TREE SPECIES CLASSIFICATION USING MULTISPECTRAL & HYPERSPECTRAL IMAGERIES

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ABSTRACT

Forests are a key element of environment. The conservation and management of these forests is vital for maintaining environmental stability and ecological biodiversity. The management of forests especially in response to human activities, such as tourism and livestock grazing, require information on quality and quantity of vegetation. Forest inventories have traditionally been used for acquiring quantitative and qualitative information of forests in Pakistan. The parameters that are collected and measured in the forest include species type, age, height, crown diameter, volume etc. With the advent of technology, remote sensing has been found to provide an alternative for forest mapping and monitoring at less time and low cost. This research poses to study two of the parameters, i.e. type of species and crown closure with Quickbird & Hyperion imageries of Ayubia National Park. Crown closure is the percentage or proportion of ground area covered by the vertical projection of tree crowns. Crown closure is a bio-physical parameter important for quantifying the energy and mass exchange characteristics of terrestrial ecosystems such as photosynthesis, respiration, transpiration and rainfall interception. It is an important variable in the estimation of stand volume and in evaluating silvicultural operations and ecological conditions. It has a significant influence on snow pack accumulation and snow melt. Spectral reflectance of plant species vary with wavelength to different degrees. Spectral difference among plant species, have been found by visually looking at the shape of vegetation spectra. Multispectral sensors may not be effective in distinguishing small spectral differences of canopies. On the other hand, hyperspectral imagery having high spectral resolution is expected to give better results. But, the spatial resolution of space-borne hyperspectral imagery is low for analyzing individual tree species. Hence, this study will employ both multispectral and hyperspectral imageries for classification of forest tree species. Crown closure will be assessed by employing feature extraction methods such as Wavelet Transform Method, Band Selection Method and Principal Component Analysis. Whereas, species classification will be carried out with object oriented classification techniques such as Nearest Neighbour Classification, Decision Tree Algorithm and Support Vector Machine Algorithm. A DEM will be generated based on 1:50,000 scale topographical sheet. The contours will be digitized at an interval of 20 meters. Moreover, aspect & slope will be derived from DEM. The field data will be collected by visiting sites in the field, measuring several parameters (crown closure etc.) and determining coordinates with GPS. 10 sample plots will be taken for a sampling intensity of about 30%. Ayubia National Park will be selected as the study area for this research as the National Park has a diverse variety of coniferous and broadleaved tree species in their natural environment. The primary objective of a national park is to protect the landscape, flora and fauna in its natural state and to which the public is allowed access for the purpose of recreation, education and research. Hunting, shooting, trapping, killing or capturing any wild animal within a 3 miles radius of the boundaries of the park and felling of trees and clearing any land in the park is prohibited. Managers require an understanding of the spatial distribution of species composition and crown closure to manage forest resources for particular uses such as recreation, wildlife production, forestry and watershed management. This study will help assist forest managers in the management of forests and will open up new avenues for research in the field of forest inventory and remote sensing in Pakistan.

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PUBLISHING IMAGERY USING WMS - HOW DO THE OPEN SOURCE PRODUCTS FARE?

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ABSTRACT

Have you ever been tasked with having to publish a whole lot of imagery in a format that most clients can read? Where do we start, what tools can we use and how do the Open Source products handle the load, especially when large images are required?

There are many tools out there that can publish imagery. Some are proprietary, some are open source. Some read a few format; some read many. If we could all publish our public imagery using a common protocol, namely Web Mapping Service (WMS), wouldn't that be sweet?

In this session, we discuss how MapServer and GeoServer stand up when you published imagery as a WMS service. In particular, we will look at how well the various formats perform, what happens when you publish very large images, and how suitable these tools are for enterprise deployment. We will show you our attempts to use open imagery formats like GeoTIFF and JPEG 2000. We will also compare MapServer and GeoServer with ER Mapper's Image Web Server, Lizardtech's Express Server and ESRI's ArcGIS Image Server.

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ABOUT THE IMAGEWIKI PROJECT

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ABSTRACT

The ImageWiki (http://imagewiki.org) is an attempt to build an "image commons" around the emerging possibility of visual search. It needs help, input and support.

Many commercial organizations are rushing to build visual search engines and each of them has specific markets in mind. We are also doing something similar except that we are doing it as an open source public utility.

Using the SIFT algorithm we are able to cluster images together based on similarity. We can assert that a a series of images, such as a series of pictures of a specific beer bottle label, taken from different vantage points, or partially obscured, or upside down or blurry, may in fact be referring to the same beer bottle label.

Effectively we create a strong relationship between images and we can then leak meta-data between those images. If a given image has a description, a link, tags or a location associated with itself, then we can make a leap that other images may also have similar associations.

This has strong locative aspects. If you take a picture of a store front with your camera phone, and you post it to a shared server - then somebody else who takes a picture of the same store front may be able to discover that you were nearby and when. So for example if the image commons were to be populated with Google Street View - you would have a way of using photos of buildings themselves as a kind of GPS.

There are however a variety of other interesting and unsolved implications. It is clear that an Image DNS will emerge and there is a question of who will own that Image DNS. Wikipedia faced the same challenges in attempting to define an objective database of human knowledge. There are specific participants such as corporations who invest a lot of money in defining a certain brand identity - will they protest when visual searches do not return their website first? OpenStreetMaps also faced similar kinds of problems in that the ownership and provenance of their data had to meet the highest standards of integrity or else be at risk of putting their entire database and their entire effort at risk. Creative Commons Licensing and Copyright Law does not seem to cover the case of what metadata should be returned on an visual search query. This appears to be new ground.

I will present on both our open source effort to define a shared durable open and public Image Commons and I will comment on some of the unexpected and rather surprising social, legal and political implications that will come out of this new capability that humans will soon have.

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INTRODUCTION TO ASPRS LAS DATA PROCESSING WITH LIBLAS

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ABSTRACT

libLAS is a new, BSD-licensed, open source library for manipulating and processing ASPRS LAS-formatted LiDAR data. libLAS utilizes a stream-based approach for reading and writing LAS data, it supports the LAS 1.0 and 1.1 formats, and it provides C++, C, and Python APIs for manipulating data. In addition, it also provides some command- line utilities for inspecting and processing raw LAS data. Besides accomplishing the task of manipulating raw LAS data, it is expected that libLAS will eventually be used by libraries such as GDAL and GRASS as their LAS format readers. This presentation will cover some of the technical aspects of the LAS format, describe how libLAS can work with these data, and demonstrate usage of the C++ and Python APIs to manipulate LAS-formatted LiDAR data.

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J-HYDRO, AN IMPLEMENTATION OF THE DIGITAL WATERSHED CONCEPT

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ABSTRACT

Hydrology plays a major role in the context of climate change in order to provide useful information regarding the whole hydrological cycle and the availability of the water resource. Recently there has been an explosion in the availability of hydrological (and environmental) data which bring unprecedented opportunities for the hydrological studies. However to be really usable these data must be organized in a useful and easily manageable form. These data are geospatial data and in the particular case of watershed hydrological studies, they are also pertinent to a sub-catchment of a larger basin. Thus, in the recent years, the concept of "digital watershed" was developed as a framework which could solve these issues. Recently projects like CUAHSI (www.cuahsi.org) bring to the attention of the community the needs for the definition of the digital watershed concept, i.e. of a computer framework in which collect and organize catchments data and models, and provided a few design guidelines. The guidelines have an abstract design and, in principle can be realized in different ways.

The goal of this work is to define a model of "digital watershed" which can be used to archive and interrelate geometric information about a river basin and the data collected in it by monitoring systems. In turn, these data must be stored in a way easily usable by hydrological and other environmental models. To this scope, we used a relational database enriched by geographical extensions, i.e. tools adapt to manage and query geometric features, and of a GIS system for visualizing the spatial data, the river network structure and the subbasins organization.

For the organization of the database, moreover it was exploited the hierarchical structure of the river network. Hierarchical ordering includes several possibilities from which we used an extension of the Pfafstetter scheme. One of the requirements of the digital watershed partition was, in fact, that the basin could be analyzed and modeled at different degrees of resolution (revealing or excluding river channels) and the models could be executed closing the basin in any node of the river network, being a node either a physical junction of two streams or a point where, for instance a discharge gauge or stage is present.

The examples provided from different organizations in this field have clear reference to commercial products. The set of tools we present in this work is instead a completely Open Source implementation of those ideas based on the JGrass GIS (www.jgrass.org), HSQLDB, Posgresql-Postgis and an OpenMi (www.openmi.org) based internal command structure. HSQLDB serves as internal database to JGrass, Posgresql-Postgis as a server database and the OpenMI standards are used to connect commands in cascade.

A part of the deployment details: the J-Hydro scheme starts from the hierarchical partitioning of a river basins in sub-catchments which extends the Pfafstetter method and any hierarchical level of the river remains present in this partition in order to be able to access the river networks data at different level of resolution. In practice, tools are implemented to extract the river network from a DEM and produce derived shapefiles and/or to elaborate existing shapefiles which parts are stored in the database(s). The river network hierarchy, in turn, identifies a basin partition, and is used to indexes other features (as monitoring stations) present in the basins. In parallel a set of hydrological and geomorphological models was implemented in such a way that they can be executed for any subbasin inside the basin. In fact J-Hydro provides tools for semi-automatically preparing the necessary data sets (when present) to feed the simulations.

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WEB ENABLED INTER-OPERABLE SPATIAL DATA SYSTEM FOR WATER RESOURCES APPLICATIONS IN INDIA USING OPEN SOURCE GEOSERVER

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ABSTRACT

Geo-spatial applications require map repository and visualization and the task becomes more complicated when the analysis is to be carried out for a country like India. The high priority water sector demands many multi-disciplinary datasets and field observations. A number of solutions are available to handle small databases but building web applications with a huge countrywide database is a bit complex and quite a challenging task. Data modeling, Data organization, RDBMS, map styling, visualization at multiple scales, building flexible GUI and performance optimization in multi-user environment are the various multi-fold challenges.

India is a huge country with an area of 32,87,260 sq km with 16% of the World's population, 2.45% of the world's land resources and 4% of world's fresh water. Building and operating the digital databases for such a large country, is itself a challenge in many ways. This paper discusses the web enabled inter-operable spatial data system developed using OGC compliant Open Source Geoserver. The database consists of 17 geospatial layers pertaining to mapping of waterlogging and salt affected areas in major and medium irrigation commands for entire India, apart from infrastructure layer (Road and rail), major and medium irrigation command map, drainage, canals, reservoirs, administrative boundaries and interpolated field data. These datasets are organized for entire country, which are to be shared by water resources personals working for the water resources development and management. The system handles geographically-referenced information to the Geoweb using open standards and Web Map Server (WMS) 1.1.1 specifications.

The entire country's database is subdivided in states (28) and union territories (7). Data pertaining to each state data is geo-coded in Lambert Conformal Conic (LCC) / Transverse Mercator (TM) projection and WGS-84 datum with standard meridian and parallels defined to suite local area and shape. This state-wise projection system is important to preserve shape and area statistics for thematic layers; however for countrywide seamless virtual mosaic; each state data is re-projected to national standard meridian and parallels and then presented in the application. The databases are organized in PostgreSQL / PostGIS with spatial indexing and tiling mode.

Client interface is built with the base from Openlayers using HTML, Javascript, and CSS. The user has full flexibility of selecting one or many Indian states and the spatial layers. Entire display is devoted for map visuals and multi-theme legends for stacked layers. All other user interaction is provided by mouse controls and query results using framed clouds. The interface includes collapsible layer switcher and index map. The Styled Layer Descriptors (SLD) are generated for all maps and the legends are created and organized for user. The filters, rules, text symbolizer have been used for scale based visualization of maps with annotation. The systems capability would be further enhanced to serve metadata for browsing and data sharing among authorized users over intranet / internet.

The current system is the foundation for proposed water resources information system for the country where many more additional databases are envisaged apart from the one mentioned above. The software once fully realized, aims to provide a 'Single Window solution' for all water resources data and information in a standardized national GIS framework. It will allow the stakeholders to Search, Access, Visualize, Understand and Analyze comprehensive and contextual water resources data for assessment, monitoring, planning, development and finally Integrated Water Resources Management.

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A GEOSTATISTICAL ANALYSIS OF WATER LOSSES IN AN URBAN UTILITY USING THE R AND TINN-R OPEN-SOURCE STATISTICAL COMPUTING ENVIRONMENTS

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ABSTRACT

This paper describes a study in which geostatistical modelling was used to investigate the possible causes of stagnation in water sales for a selected part of the Kampala water supply system in Uganda. R, an open-source statistical computing and graphics language and environment, and Tinn-R, a free graphical user interface (GUI) environment and code editor for R, were used in the study to carry out a set of geostatistical analyses. From historical records of monthly water sales volumes for a sample set of customers within the study area, an empirical variogram model of water sales volumes was established. This model was fitted with a theoretical spherical model of spatial covariance. A second set of sample customer data was used to validate the fitted variogram model.

The fitted model was then used to predict water sales volumes on a raster grid throughout the study area, using an optimal linear interpolation process of ordinary kriging. The predicted volumes were compared with actual water sales for a selected month, and a difference map was generated. Subsequently, post plots of the locations of various reported field anomalies (aged and defective meters, water supply insufficiencies, leaks, illegal consumption, disconnected accounts, and accounts billed on estimated consumption) for the same month were overlaid in turn on the difference map generated from water sales volumes.

These map overlays were used to visually explore the spatial correlations between the prevalence of the different categories of field irregularities and occurrences of large differences between actual and predicted water sales volumes. The comparisons served to highlight the locations and possible causes of significant drops in water sales volumes within the study area. Geostatistical modelling was thus demonstrated to be a useful tool in carrying out geospatial analyses of water losses in an urban utility. Through the use of the open-source software tools, a simple, cost-free geostatistical analysis toolset was developed for the selected study area, consisting of scripts of R code. It is planned that this toolset be incorporated within a spatial decision support system prototype under development for the Kampala water supply service area.

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THE USE OF OPEN SOURCE (AN OPTION FOR DEVELOPING) TECHNOLOGY IN DETERMINING THE BEGINNING OF THE DEFINED WATERCOURSE FOR DETERMINING FLOODLINES IN THE APIES RIVER BASIN

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ABSTRACT

The South African Water Act (Section 144 of Act number 36 of 1998) has made it a requirement for every developer to show a floodline that is most likely to occur once in every 100 years (1:100-year flood event) on all development plans. The City of Tshwane Metropolitan Municipality (CTMM) has however implemented by-laws of which one of them states that no development should take place within a flood event that occurs once in every 50 years (1:50-year Flood Event). The above Act and the by-law however have a shortcoming that was not taken into consideration, namely: the beginning of the rivercourse in any given catchment is not clearly defined. Most rivers become obvious where erosion has created furrows and dongas along the floodplain. While a significant amount of water can pose a serious threat on the upstream side of the river, erosion may have not occurred to form a well-defined catchment. This result in a rivercourse being hidden, allowing a development to take place. This constitutes a significant risk of flooding to the property.

To address the above problem, the author intends to design a way of defining the start of the watercourse in any given catchment. Integrated and co-ordinated disaster management focuses on preventing and/or reducing the risk of disasters, mitigating their severity and ensuring effective response when disaster strikes. Risk assessments, which include flood risk assessment, hazard ratings and hazard zoning (in this case flood hazard rating and hazard plotting) play an important role in the first phase of the disaster management continuum, namely prevention and risk reduction. From the study it was clear that Geographic Information System technology can be effectively applied to integrate these components into a useful spatial model. This study can be used as a pilot study extending over the whole Tshwane area.

There are so many risks that are involved with regard to the flooding along the river course and its plains. Therefore the establishment of a systematic way of defining the full length of a river course on those areas is needed to establish cost-effective solutions that are socially and environmentally acceptable. These evaluations can help during land allocations, and non-flooded land parcels can then be made available for future use. It should however be borne in mind that these lands should be thoroughly regulated and fully monitored during all kinds of development so that their environment, social nature and topography are not threatened in any way.

The aim of this paper is to provide an Open Source GIS model whereby the beginning of a river course can be clearly determined and located. The model will be tested on the Apies River Basin in The City of Tshwane Metropolitan Municipality, which is located in Gauteng. The study has as its main objective the determination of the most likely unbiased starting point of the river using GIS along river courses in the Apies River Basin. This study will be further sub-divided into two sub-objectives, namely:

To use the Apies River Basin as a model to test the use of Open Source GIS in the assessment of options for the location and identification of those starting points of rivers, according to the outcome of the risk assessment and hazard indications along a rivercourse

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GVSIG MOBILE: HOW TO CODE FOR DESKTOP AND MOBILE GIS/SDI

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ABSTRACT

gvSIG started as a first approach to become the open source geographic information system of the Regional Ministry of Infrastructures and Transport of Valencia region (Spain) within a full migration from proprietary to open-source software.

gvSIG is a desktop GIS/SDI client that improves continuously its capabilities to allow a full use of open-source GIS, without needing proprietary software. Therefore, it integrates with other FOSS4G products, as geospatial databases, remote web servers, catalog servers, and so on.

However, no open-source solution was found to address the requirements of mobile users.

It was decided to port gvSIG (desktop) to mobile devices, so that migration from closed software to open source solutions could be achieved. The project, known as gvSIG Mobile has a first prototype published with GNU/GPL license with a basic set of functionalities (vector and raster support, layer management, query tools, WMS access, GPS enablement, viewer capabilities, integration with gvSIG desktop, etc.).

This prototype have been used as a test-bed for validating the working of Java GIS applications on mobile devices. The conclusions of this development proved the feasibility of Java Micro Edition platform for this kind of applications. Next step was to make a full refactoring of gvSIG Mobile with the goal of making as much compatible as possible the source code and architecture of gvSIG desktop and gvSIG Mobile. The objective is to refactor code to make it work in a desktop PC and in a PDA.

The refactoring process being performed in the internal architecture of gvSIG will be described. A big picture of gvSIG Mobile architecture will be given, explaining the hints of the common architecture between gvSIG desktop and mobile, which eases future development of gvSIG Mobile.

A demo of gvSIG Mobile will also be made, including new functionalities planned for FOSS4G2008 dates (Sun phone ME open-source Java Virtual Machine support, basic edition, custom forms, GML and KML support, GPS enhancements, ...).

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SUAS MAPSERVER - AN OPEN SOURCE FRAMEWORK FOR EXTENDED WEB MAP SERVICES

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ABSTRACT

In web cartography the Web Map Service Implementation Specification (WMS) developed by the Open Geospatial Consortium (OGC) has been published as ISO Standard 19128. According to this specification maps of spatially referenced data are produced dynamically from geographic information.

It is notable that these map formats are either "picture" formats or "graphic element" formats. Picture formats include raster file types such as Graphics Interchange Format (GIF) and Portable Network Graphics (PNG), all of which can be displayed by common Web browsers, and file types such as Tagged Image File Format (TIFF) requiring additional software like a plug-in or an external viewer for display. Graphic element formats on the other hand constitute a scale-independent description of graphical elements, so that scale and size of the display may be modified while preserving the relative arrangement of the graphic elements, as ISO 19128 describes. Graphic element formats include Scalable Vector Graphics (SVG) or Web Computer Graphics Metafile (WebCGM) formats.

An OGC compliant WMS applies to three different operations: GetCapabilities, GetMap and GetFeatureInfo, with the first two being mandatory. Sending a GetCapabilities request is the first step in the communication between client and server. On receiving such a request, the server returns a Capabilities file mostly encoded in XML, describing the service, including the map content available and which request parameters to use. Based on the information provided, the client can send a GetMap request. Afterwards, the GetFeatureInfo operation returns information about a map feature at a particular point on the map. For each of these requests, the parameters are described in the standard.

WMS allows optional extended capabilities and operations as needed within an information community.

In this research project a Web Map Server named SUAS MapServer was developed. It is part of an open source based Web Map Service and Web Feature Service framework, for publishing geographic data in both raster and vector image formats according to WMS and WFS specifications. Besides supporting the GetCapabilities, GetMap and GetFeatureInfo requests, additional formats and extensions have been included.

This application offers flexible and friendly user interfaces for the ease of installation, configuration and maintenance. Users do not need special knowledge to install the server and operate the complex database setting directly.

A prototype for a client especially able to use data provided in SVG and Raster format was also developed, using Ajax technique. It can dynamically send GetCapabilities and GetMap requests, and display the map with navigation functions, such as Zoom and Pan. Additionally a client named MoWMS for mobile devices is available supporting GetCapabilities, GetMap and GetFeatureInfo requests. Additionally SUAS provides interfaces to other WMS clients like Openlayers and Carto SVG Map client. Based on user options, SUAS creates the necessary HTML and JavaScript code to deploy Openlayers for map displaying.

The development proves that open, XML-based standards in combination with modern programming languages and integrated development environments allow rapid implementation of recommendations and standards in geo-informatics.

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[Abstract edited]

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SHORTEST PATH SEARCH FOR REAL ROAD NETWORKS AND DYNAMIC COSTS WITH PGROUTING

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ABSTRACT

This presentation will show the inside and current state of pgRouting development. It will explain the shortest path search in real road networks and how the data structure is important for getting better routing results. We will show how you can improve the quality of the search with dynamic costs and make the result look closer to the reality. We will demonstrate the way of using pgRouting together with other Open Source tools. Also you will learn about difficulties and limitations of implementing routing functionality in GIS applications, the difference between algorithms and their performance.

pgRouting is an extension of PostgreSQL and PostGIS. A predecessor of pgRouting - pgDijkstra, written by Sylvain Pasche from Camptocamp, was extended by Orkney (Japan) and renamed to pgRouting, which now is a part of the PostLBS project. pgRouting can perform:

- shortest path search (with 3 different algorithms)
- Traveling Salesperson Problem solution (TSP)
- driving distance geometry calculation

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COMPARING THE PERFORMANCE OF OPEN SOURCE WEB MAP SERVERS

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ABSTRACT

A continuation of a presentation entitled "WMS Performance: MapServer & GeoServer", given at FOSS4G 2007. The talk compared the performance of MapServer and GeoServer as Web Map Servers serving data from Shapefile and PostGIS back ends.

This presentation will expand on the previous years in a number of areas. Raster data access will be included in addition to vector. This years comparison will also include more aspects of cartography such as scale dependent rendering , thematic styling, and anti-aliasing. Also an interesting addition this year will be tile caching; comparing the performance of TileCache and GeoWebCache.

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BUILDING AN APPLICATION FRAMEWORK BASED ON OPENLAYERS AND EXTJS

Bart van den Eijnden and Thijs van Menen

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ABSTRACT

In 2007 the Dutch Ministry of Transport, Public Works and Water Management started building a new framework for their webmapping applications. The previous framework had been based on Chameleon, but technology-wise this was end-of-life, so a new framework needed to be built. OpenLayers was a definite building block because of previous experiences which were all excellent. For the GUI side of things (layouts, forms, treeviews, grids etc.) ExtJS was chosen. With these building blocks, the new framework started to take form in 2008. This presentation will mainly outline the experiences of building with OpenLayers and ExtJS. Both the old and the new framework use Mapserver as a Web Mapping and Web Feature Service.

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INFORMATION, A MUST FOR DEVELOPMENT

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ABSTRACT

Access to reliable information at the right time and in the preferred format is not an option for development but a must. Google's mission is to organise all the world's information and make it universally accessible and useful. This mission extends beyond all borders to all people in all contexts. The need for information in upcoming countries is immense and manifests itself at all levels. Google pursues technology-driven initiatives in various parts of the world that will have a meaningful impact on global development and Google is dedicated to developing business and partnerships with a range of organizations as well as driving the localization of Google products to local markets.

In order to create a platform to facilitate the drive of localization of Google products we at Google are constantly committed to improving our mapping products and the information which they contain. In our presentation we will show case recent developments regarding our mapping services. We will outline and demo the various ways in which you as mapping experts can use our mapping services to populate them with your own information and share them with the rest of the world. In order to find out and experience for yourselves in real life how our mapping services can serve your needs we are organising a 'hands on' workshop which lets you work with the tools we have presented.

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BEEGIS: DIGITAL FIELD MAPPING THAT JUST WORKS

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Silvia Franceschi Franz-Josef Behr and Astrit Rimayanti

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ABSTRACT

LINEE (Laboratory of Information Technology for Earth and Environmental Sciences) and HydroloGIS Environmental Engineering have developed a new system for geological mapping with a tablet PC computer in the field using GIS software: BeeGIS. Based on the the Udig and JGrass GIS framework, in Beegis several new tools have been integrated. These include support for GPS realtime acquisition and mainly observations georeferencing. These observations like geonotes, sketches and photos are stored into a filebased database management system.

The current technology boost towards mobility greatly supports outdoor aimed instruments. Nowadays the price of airy machines has reached an affordable level for the average professional. Also the hardware features as outdoor screen visibility and battery lasting time have experienced an enormous growth.

A tablet pc or an ultramobile pc with integrated gps and digital camera are affordable by any professional and that is also everything needed to be able to try out a digital technique of field mapping, no longer based on the traditional paper mapping techniques.

This presentation aims to show Beegis, first created to support professionals like geologists and engineers on their outdoor activities. Focus will be kept on the set of integrated tools that make out of Beegis a perfect field mapping instrument.

A preview of the implementations:

GPS tool: like most applications Beegis connects to a NMEA enabled bluetooth gps through a virtual serial port, accessing it by using the rxtx (www.rxtx.org) serial I/O libraries. Since also integrated GPS exploit this functonality, Beegis can also connect to those. Once a GPS connection is established, Beegis offers a set of functionalities. Logging can be enabled, which activates a pulsing cursor on top of the map layers that keeps track of the current position in realtime. From that moment on any feature layer can be selected and shapes of the contained geometry type of the layer can be placed in the layer manually. Points are placed as single units into the current layer. Lines are created keeping as nodes the chosen gps positions, which is the same that applies to polygon layers, that are different only for the fact that the last point is attached to the first one of the shape. While manual taking of GPS points leads to more accurate data, the automatic gps data acquisition creates shapes in the selected layer at regular timesteps. This can for example be useful for the delimitation of larger areas.

Geonotes: Beegis can associate various geographical objects with sketches, textual information or the link to any type of document. Once selected the geonotes tool, a single click on the map window pops up a new geonote (or opens an old one). The geonote itself at first look is similar to one of those wellknown postit notes. There is a title are at the top, a color toolbar at the bottom to easyly change the note's color quickly, choosing between a few default colors. The main area of the geonote is divided in three tabbed areas. The first enables a drawing area dedicated to sketches, the second accepts textual input inserted by keyboard and the third, called mediabox, accepts the dragging of documents into the note's area. The inserted documents are stored into a filebased HSQLDB database. By doubleclicking on it, the media is opened with the default system application for that particular media type. This applies for all media types, except of the image types, for which Beegis provides an extra editor, that gives the possibility to the user to draw notes on the image with the digital pen.

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ANALYSIS OF TEMPORAL REMOTE SENSING DATA WITH OPTICKS

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ABSTRACT

Temporal remote sensing data is becoming more prevalent as sensor and analysis system become more capable. Traditional computer vision techniques for object isolation and tracking provide a good starting point for automated and assisted analysis of UAV, satellite, fixed station, and other temporal remote sensing data sets. This presentation demonstrates existing video capabilities and possible expansion points of the Opticks open source remote sensing analysis workbench.

Opticks provides basic animation capability as well as a variety of data source importers and multi-band analysis capabilities. A powerful C++ SDK allows developers and analysts to extend this capability. A basic temporal processing extension will be presented which calculates and removes background noise, isolates and tracks moving objects.

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WELCOME TO OSGEO - YOUR FOSS COMMUNITY

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ABSTRACT

An introduction to OSGeo and what we are about. Introducing the concepts of Local Chapters, Foundation Projects, various committees and more. The goal of the presentation is to welcome newcomers who might like to learn more about OSGeo and join in the effort.

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OPENLAYERS VECTOR STYLE

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ABSTRACT

OpenLayers excels at providing an easy to use library for building web mapping applications. In its first year, OpenLayers was largely about displaying markers over map tiles with a slippy interface. Last year, we added support for rendering vector data client side - giving applications designers more flexibility in layering data from multiple data sources. This year, we added robust support for rule based styling of that vector data. This opens great possibilities for dynamically styled, richly interactive maps in a browser.

This presentation aims to expose newcomers to the flexibility of working with data in OpenLayers. For those experienced with the library, we will cover the full range of options for styling data client side - working through construction of styles in code, parsing from and persisting styles in SLD, and editing styles with a graphical interface.

We'll walk through rules and filters, styles and style maps, symbolizers and render intent - and provide demonstrations of stitching it all together to create nicely styled maps in your browser.

Attendees will benefit from some prior exposure to OpenLayers, though a basic overview will be given.

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WEB 2.0 BRINGS GIS TO THE WORLD WIDE WEB

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ABSTRACT

In the world of Geo-ICT the authentic data sources play a vital role. Mutual exchanging and adapting information between these data sources are one of the cornerstones of what one call the "Spatial Data Infrastructure" (SDI), or in other words the geographical information highway.

Who says data sources thinks of databases. One of the ways to approach the problem is to centralize all the data of a government into a gigantic database model where all the geographical data could find their places. This central treatment works as far as it is sufficient to make the data available only within the own organization. However, this way of working has also its restrictions.

One of those restrictions is that collecting and centralizing these data are only one part. Keep them up to date and ensure that several users can use them in an efficient manner is a complete other task. When these data can come also from outside the organization and have to be delivered to third parties, also outside the organization, these restrictions are of such nature that a solution on the basis of a central architecture is practical not feasible.

The geGIS architecture is obviously perfectly in keeping with the vision reflected in the geGIS concept, which may be summed up as follows:

o Creating an ecosystem of servers for exchanging authentic source data over the Internet on an open and standard basis

o Using this ecosystem as a medium for a new generation of geo windows based on high-performance Web 2.0 technology

geGIS first and foremost involves the management and exchange of authentic source data between equal servers. geGIS operates on the basis of the fact that myriad organizations are now compelled to entrust the actual administration of their data with so-called GIS "specialists". Our basic philosophy is that every IT organization should be able to manage and exchange its own geo data. This calls for an architecture that differs drastically from Google Maps, for example, for which solely one central data manager is available. The exchange of geo data on equal terms is possible solely via a process of standardization, thanks to the open GIS standards of the Open Geospatial Consortium. As well as putting these standards into practice geGIS forges further ahead: the layers developed may be deployed straightaway in a public geo window. There is also a clearly defined client-service interface to reflect the involvement of a Web 2.0 client application.

The geGIS project, started up by the Belgian government in 2006, was a tender to offer a solution for the above-mentioned problem. This paper describes the technical architecture of geGIS and explains, by means of a proven project "in the field", why it can be used as best practice for a cross-border SDI node. Moreover some ideas will be given to work out a solution for the SDI software stack where editing the data via the browser plays a central role. The state of the art of this project and the current initiatives will be presented as an international kick off for the geGIS community.

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A SPATIAL DBMS BUYER'S GUIDE

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ABSTRACT

At FOSS4G 2007 we argued that benchmark results of DBMS systems is only of marginal help when choosing a spatial DBMS. Performance is only one of the few aspects. Also the high rate of development of hardware and software make the result of benchmarks only of temporary interest. In this paper we analyze what is of interest when choosing a spatial DBMS. This will include the following topics:

- The main consideration when choosing a DBMS is functionality: If the system cannot do what you want it to do it is useless. The difference between the different systems is not always clear from the documentation. We will elaborate on caveats when checking the functional requirements of a spatial DBMS against the documentation.
- Although we argued that performance is not the main issue, it is still an issue, we will hunt down when to expect performance issues and how to handle them.
- When choosing a system also hardware should be considered. Possible bottlenecks in a system are: CPU speed, memory or disk I/O. There is no use in investing in non-bottleneck components. Can the bottlenecks be predicted in advance?
- One of the choices is between open source software and proprietary software. Considerations for this choice include: Total cost of ownership (TCO) and vendor lock-in. We will discuss these issues in a spatial context.
- How well does the DBMS integrate with other components e.g. GIS systems. Also may be consider other systems that start to incorporate spatial data like ERP systems. OS software tends to support other OS software and proprietary software supports other proprietary systems. Is there a gap?
- How scalable is the product. It handles my 2 million points now, but can it handle 10,100, 1000-million as efficiently?
- Is the management open to Open Source Software or do they want to buy a 'name'?
- What is the quality of the documentation
- What are the expected future development of the product. Is there a solid base of developers. Can I expect the product still to be there in 3, 5 10 years? Or can the OS product be bought buy a competitor and taken off the market.

In the last 10 years TUDelft and Rijkswaterstaat have gained a lot of experience with many different spatial DBMS systems, this knowledge we wish to bundle in one paper. The paper can be read as a 'Spatial DBMS buyer's guide' in which all aspects of a spatial DBMS that are of importance for your choice will be handled.

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MAPFISH: A WEB-MAPPING DEVELOPMENT FRAMEWORK

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ABSTRACT

MapFish is an open-source development framework for building web-mapping applications. MapFish is based on the OpenLayers and Ext libraries, and extends the Pylons general-purpose web development framework with geo-specific functionnalities. This presentation first describes what the MapFish development framework provides and how it can help developers implement rich web-mapping applications. It then demonstrates through real web-mapping realizations what can be achieved using MapFish. In particular, the web-mapping application for the UN Refugee Agency (UNHCR) is demonstrated. This application includes modern and advanced features, such as editing features in off-line situations, and synchronization when switching from off-line to on-line mode and vice-versa.

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MAPPING THE SANITARY SEWERS OF A SOUTH AFRICAN CITY - FIRST EXPERIENCES WITH FOSS GIS

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ABSTRACT

Actus Integrated Management (AIM) and Partners in Development (PID), two small civil engineering companies, were successful in a bid to investigate the sanitary sewers (wastewater network) of the Msunduzi municipality. The project involved mapping the pipe network comprising 1450 km of pipe and making an assessment of the opportunities for recycling wastewater. A GIS solution was implemented for the mapping task and use was made of two FOSS GIS systems. In this paper the project team's selection of a FOSS GIS solution over a proprietary solution is explained. The team's experience with the two software suites is described and some recommendations are made to assist similar organisations considering a FOSS GIS solution.

A limited review of FOSS GIS systems was conducted and this led to the short-listing of two software suites. The products selected for the project were the Geographic Resources Analysis Support System (GRASS) and Quantum GIS (QGIS). The two software suites were deployed on a personal computer running the Ubuntu Gutsy operating system and concurrent graphical user cessions were provided by means of the proprietary NX system by NoMachine. This solution was chosen over a proprietary GIS solution involving multiple copies of ESRI's ArcView 9.2 software. The choice of the GIS solution was influenced by cost, deployment time, capability of the software, the software's ease of use and the perceptions of the team leaders based on limited exposure to FOSS GIS.

At the outset the project team had fairly limited GIS experience, but fairly well developed CAD skills. QGIS was found to be particularly easy to use and GRASS provided all the analytical tools required by the project. These two products are complementary, which enabled the team to leverage the best of both products. The scope of the GIS task was to produce a single plan of the city's sanitary sewer network. The pipes were to be digitized from 1 : 2500 scale paper plans and the pipe sizes were recorded in attribute tables. Some work had already been done and this was provided as ESRI shape files. Substantial cleaning of the supplied data was needed to eliminate dangles and overlapping pipes. The paper plans were several years old and only covered a portion of the city. Various engineers' drawings in CAD formats were used to patch in missing or updated information. Particular challenges included working with a large set of high resolution aerial photography, working with data in different co-ordinate systems and working with data in various CAD formats. Neither of the software suites were able to satisfy the team's requirements for large format, high resolution paper plots. Thus a solution involving a proprietary CAD product was implemented. The ready availability of user manuals, tutorials and support via the project mailing lists is considered to be one of the primary reasons for the success of the project.

The team successfully completed the GIS task of their project within the imposed budget and time constraints. The FOSS GIS software suites performed as expected and no unexpected limitations were encountered with the products. A review of the project has highlighted aspects of the implementation that could have been improved. Drawing on personal experience from this first FOSS GIS project the authors offer some recommendations to other organisations, which may be evaluating the FOSS GIS alternative.

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MINING SPATIAL DATA FROM GPS TRACES FOR AUTOMATED MAP GENERATION

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ABSTRACT

GPS receivers have become ubiquitous devices. They are present in PDAs, cell phones, jogging watches or even key holders. Virtually every one of these devices is able to log the received data to a file, producing a huge amount of spatial information, typically with a 3D-point every second. Many of these GPSs are installed in vehicles and are coupled to a communication device, such as a GPRS modem or a wi-fi network adapter. Such hardware combination is the basis of real-time tracking services, widely used by trucking companies and rapidly expanding to all types of vehicle fleets. As is known, map generation, refinement and update is very expensive if done in the conventional way by using photogrammetric methods or digitizing satellite images. With the constant bandwidth increase in wireless networks, tracking companies are now transmitting position reports "in-raw", i.e. as received by the on-board GPS unit, with a point every second. Clearly, such detail allows processing the tracking information from a large number of vehicles to produce vectorial maps of the road network, in an inexpensive, accurate and permanently up-to-date manner.

In this paper we describe an algorithm for the automated generation of highly detailed and accurate vectorial road maps from GPS traces. Our implementation was tested using offline GPS logs, in NMEA format, and compact real-time logs from a tracking company, both with a one point per second detail. The relevant data is extracted from GPS logs and filtered in order to improve its quality. Filters are based on the number of satellites used to calculate the coordinates of points, the Dilution of Precision (DOP) value and the time delay between two adjacent measured points. Line simplification is another important step of our algorithm, discarding a significant percentage of the points collected by the GPS. It improves the performance of our map generation process and minimizes the required memory space. GPS traces are simplified by Douglas-Peucker algorithm that is the accepted standard for simplifying polylines. Then, points are inserted on a PostGIS database and our algorithm is implemented using spatial SQL queries to aggregate data from multiple traces to produce a weighted-mean geometry of road axles, diluting GPS errors. Besides the road axle geometry layer, our algorithm also produces a topological connectivity layer of the road axles intersections, incrementally created when road segments are merged to the already inferred map. Further layers are possible to extract from the GPS data, such as traffic-lights location, parking information and road classification. Using our algorithm, a web site where users can upload GPS logs in standard formats, such as NMEA, is able to provide open and free vectorial road maps for download, without requiring any geometric editing from the users.

Using our algorithm, we have produced a vectorial map from the city of Porto, second largest in Portugal, and compared its geometric and topological layers with the vectorial map produced by the City Hall. Our results show a highly accurate overlapping between the two maps in all areas where a sufficient number of GPS traces have been collected.

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A YEAR OF FULL-SPEED FOSS- WINNING THE HEARTS, MINDS, AND BUSINESS CASE

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ABSTRACT

Making the decision to move an organisation of 400 people to FOSS is one thing, but actually doing it is another. This paper details a year in the life of Oxford Archaeology, as we moved from a strategic plan to be using FOSS to suddenly being forced to make the move, and explains how we made the change without causing too much trauma to our staff and clients, and found a new business in the process.

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OPTICKS: TRANSITIONING A PROPRIETARY REMOTE SENSING ANALYSIS TOOL INTO OPEN SOURCE

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ABSTRACT

Opticks is an open source remote sensing analysis workbench. It has been used by the United States government for years as a primary analysis platform for a variety of imagery types and is known for an extensive plug-in API. The principle developer of Opticks has decided to release the core workbench while maintaining some plug-ins as proprietary code in an effort to increase the visibility and use of Opticks. This presentation discusses the ongoing process of releasing Opticks as open source including the unique difficulties related to the government proprietary nature of the product.

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EASING TRANSITION TO OPEN SOURCE GEO-SPATIAL DATA MANIPULATION IN GML

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ABSTRACT

Geography Markup Language (GML), an extensible markup language developed by OpenGIS Consortium is an open source and defines a standard for encoding geographical information and it has become the de facto standard for electronic spatial data exchange among the applications of web and distributed Geographic Information Systems (GIS). Information systems are being spatially enabled to cope with the urge of knowing locations of objects/incidences in order to determine directions and destinations using spatial decision making approaches. As they have been found to be more informed, accurate, and help to understand interactions of earthly processes in many fields including transportation, planning, and resource management.

However, it is still difficult for ordinary (non-programmers) geo-spatial users to move their data/information into GML and carry out any manipulations as they would wish. This could be one of the reasons why many users have not fully adopted GML though they know the facts and advantages of open source systems.

In this paper, we show how geo-spatial data in proprietary GIS packages can be easily moved to GML and how the different manipulations including data storage, change of format, sharing, transportation, adjustment, and management can be carried out in GML.

We use a simple spatial data set from Nakawa division in Kampala City (Uganda) to test our approach. We selected only one layer "wetland layer" which is stored in GIS as polygons its attribute data stored in the associated table. We also make sure that the topology which is mostly affected by the geometry and sometimes limit the usability of the data set in future is handled well by presenting the data basing on GML features (Chang and Park 2006), which contain geometries as well as other properties in themselves.

A feature in GML can be composed of other features and the geometry of a geographic feature can also be composed of many geometry elements. Geometries are composed of basic geometry building blocks such as points, arcs, and polygons (Lake 1999) and the properties of features are the name, type, and value description. With that, a user can obtain GML data, which is self-descriptive, serving as a mechanism for information discovery, retrieval and exchange (Lu et al, 2007). This geospatial data can be stored as GML feature instances and can be shared and transmitted as GML documents or messages.

We used a free tool called JUMP Unified Mapping Platform, which has a GUI and API for performing spatial data processing and manipulation. It has both GML and Shapefile drivers under its API which provided a perfect environment to test our two out-comes both in GML and shapefile.

The results are text-based files which means they can be archived, although GML files are bigger than shapefiles, but they can be compressed with a reduction up to 40-50% compared with shapefile compression which achieves 10-25% depending on the file size. With the data in text format, it makes it unlikely that future software will be incompatible with it, it can be edited by any test editor including notepad, all data is stored as one file, easy to change between the different geometry shapes (polygon, polylines, point), easy to add attributes to the geometry, no need to store x and y coordinates in separate attribute tables as they are directly stored.

In so doing, we provide for an easy way to handle the geospatial data sets in open source independent of data models and database structures.

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JGRASS: THE HORTON MACHINE

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ABSTRACT

In the context of environmental management recently there has been a large use of digital elevation models (DTM) analysis to provide useful information about the morphology of the territory on which hydrological and hydraulic models are based. Analysis on digital distributed data are made using Geographical information systems (GIS). Thus GIS are now widely used in hydrology and geomorphology to automate basin, hillslope, and stream network analyses.

The purpose of this analysis is to describe some quantitative instruments for understanding the morphology of catchments. Indeed, the object of geomorphometry is characterizing quantitatively the morphology of the Earth's surface, and of the topographical properties of the basins, in order to device some indicators of hydrologic and erosive processes and some instruments for a correct parametrization of the hydrologic simulation models.

In the recent past and in the traditional geomorphologic practice, the characters of topography were derived through field investigations and aerial photos; the morphology of topographic surfaces was synthesized in some shape parameters and the channel network was described according to either Strahler's or Horton's schemes. Now, the availability of digital elevation models (DEM) has irreversibly changed the analysis of mountain geomorphology, and above all of the geomorphology at basin scale. Indeed, it has made it possible to shift from a substantial lack to an abundance of data and from manual processing to automatic analysis, starting from Moore's works (Wilson and Gallant, 2000). Nowadays the automatic analysis of topography enables to obtain reliable results and to estimate a lot of quantitative information. Some issues, like the determination of the beginning of the channel incision, still remain open. Moreover, although the traditional methodologies for technological reason can work only with synthesis parameters, the modern analysis, supported by the use of GIS, can easily deal with distributions of the same parameters and can also inquire directly into many quantities once inaccessible to geomorphologues, i.e. the mean length of a basin hillslopes [D'Odorico and Rigon].

In this set of tools we analyse the statistic properties of the elementary (or primary) topographic quantities of the sample basins chosen for this convention.

The topographic properties analyzed by The Horton Machine can be distinguished in: primary topographic attributes (elevations, slopes and curvatures), main derived properties (contributing areas, drainage lengths and stream network extraction) and hydro-morphological indexes and curves (topographic index, proxies of the bottom shear stress generate by surface water flow and distance from the network and from the outlet). In addition to these set of tools in JGrass there has been implemented an hydrological model (Peakflow) and a stability model based on shallow landslide potential (Shalstab).

Several commercial GIS packages have incorporated more common terrain attributes (e.g. slope, aspect, curvature, and wetness index) and terrain analysis procedures (e.g. basin and stream network extraction). These software packages are, however, often prohibitively expensive. JGrass instead is free and Open Source. JGrass is designed to meet the research needs for academic scientists while being simple enough in operation to be used for student instruction and professional use. It is a standalone GIS that has much of the spatial analysis functionality typically found in GIS packages. However, it is also capable of advanced modeling of catchment processes since it is endowed with an extensive dedicated set of tools. JGrass is developed in Java that ensures the portability in all operating systems running a Java Virtual Machine, as for example,Windows, Linux and Mac OsX.

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DEVELOPMENT AND IMPLEMENTATION OF AN OPEN-SOURCE BASED INTERNET ACCESSIBLE WATER QUALITY MANAGEMENT SYSTEM FOR IMPROVING THE QUALITY OF WATER SERVICES IN SOUTH AFRICA

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ABSTRACT

Following considerable success in addressing drinking-water services backlogs throughout South Africa, surveys by the Department of Water Affairs and Forestry (DWAF) have shown that in many instances drinking-water quality in non-metropolitan areas of South Africa is unacceptably poor. South Africa's Water Services Act of 1997 stipulates the standard of service provisioning, and specifies the responsibility of the Water Services Authority (WSA) (municipality) including operation and maintenance of infrastructure, monitoring and management of drinking water quality, etc. In order to ensure an effective and sustainable water service, the above mentioned aspects must be addressed by WSAs.

As very few WSAs have satisfactory drinking-water quality monitoring programmes and even fewer utilise the data as intended, and in order to drive improvement, DWAF and other water sector partners have undertaken various initiatives to assist WSAs with operation and management of water services. In particular, it was evident that a need existed for a drinking-water quality data capture and information dissemination tool, which will both assist WSAs to meet their responsibilities, and meet DWAFs needs to monitor and regulate the operation of WSAs in a proactive cooperative governance fashion. Consequently DWAF, together with the Institute of Municipal Engineering of Southern Africa (IMESA) have rolled out an internet-based Water Quality Management System (eWQMS) to all 166 WSAs in South Africa.

This paper will highlight the open-source nature of the eWQMS, show various features and functions of the eWQMS, with focus on how outputs from the system are being used for indicating performance at WSAs and driving progressive improvement.

The paper will show that the implementation of an internet accessible Water Quality Management System can:

- Create improved awareness of the requirements for effective drinking-water quality monitoring and management
- Drive progressive improvement in drinking-water quality
- Provide real-time reporting of drinking-water quality by WSAs
- Enable intervention in areas facing immediate public health threats
- Provide strategic data related to the quality of water services in South Africa

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A FREE GIS BOOK

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ABSTRACT

Most free GIS projects include free documentation. However, these documents usually refer to a particular software and do not deal with fundamental concepts of GIS. A free book on GIS theory is yet to be written.

This presentation introduces the OSGeo "free GIS book" project, a collaborative effort to write an updated and comprehensive book about Geographical Information Systems, which will be released under a free license.

So far, the table of contents has been fully defined and more than 450 pages have been written. A total of 600-700 pages is expected for the first version. The project is being written by several authors who coordinate their work using OSGeo-provided facilities (wiki, SVN version control system, etc), The project is open to anyone wanting to collaborate, whether writing or reviewing.

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GIS IN THE GEOGRAPHY CURRICULUM: TEACHER TRAINING

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ABSTRACT

The introduction of Geographical Information Systems as a component of the Geographical Skills and Techniques section in the Geography Curriculum from 2006 provided several challenges for teachers as well as the GIS industry. Many of the Geography teachers had had no previous exposure to GIS. Many were also faced with problems such as computer literacy, which proved to be a major stumbling block during training. The industry and tertiary educational institutions were looked upon to provide the necessary training to empower teachers for the roll-out of GIS in Grade 10 from 2006, followed by Grade 11 in 2007 and grade 12 this year.

The Department of Geography and Environmental Studies at the University of the Western Cape was one of the first to respond to this need and have been training teachers from schools in the Western Cape since 2005. Initially training was provided as a general introduction to GIS as an extension of manual cartographic techniques that had been used until then, and the introduction of computerized methods for working with spatial data. The training has, however, become more focused, addressing aspects of the skills and techniques in the curriculum. GIS software is also being provided on a piecemeal basis to schools that have computer laboratories with the implication that some teachers could not work on GIS on their own after having completed the training, leading to other complications. There is still no indication as to the GIS software that will be used for teaching purposes, hence the need for a generic software package that will address this particular problem.

A survey is being conducted amongst Geography teachers in the Western Cape to assess their capabilities to teach GIS. Questions that are asked include a measure of computer literacy, previous GIS training, years of experience, the grades that they are teaching, their level of qualifications, and so on. The survey is also intended to provide answers to the availability of computers at the schools that the teachers are at, the level of access to these laboratories by learners who have Geography as a subject, the software (if any) that is currently being used to teach GIS, and so on. It is hoped that weaknesses in the current situation will be identified. Although the focus of the current research is on the Western Cape Province, attention will also be paid to what is happening in the other provinces in South Africa, as well as abroad. In countries such as the United States of America, Australia, New Zealand and the United Kingdom, GIS is already an established element of the curriculum, and numerous websites exist which are intended to provide support and learning material for both teachers and learners. The situation in these countries will be used as basis to compare the state of affairs in South Africa.

The aim of this paper is to review the training provided by UWC and its contribution to the preparedness of teachers for this new component as well as the challenges that still need to be addressed which includes the choice between proprietary and free and open software for GIS at schools.

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OPENSTREETMAP IN INDIA, FREE DATA IN THE DEVELOPING WORLD

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ABSTRACT

Schuyler and Mikel's talk will focus on a series of multi-day workshops they held in February 2008 in several India universities. Researchers, students, and members of the community were invited to participate, learn, and take stewardship of their city. These were very practical, hands-on days, covering the entire toolset of OpenStreetMap and empowering participants to lead the growth of free and open mapping in India. "We will map India!"

We will review the unexpected obstacles and benefits of doing community mapping in the so-called 'developing' world, and offer pointers for organizing similar workshops in Africa and elsewhere. Indeed, post-FOSS4G, we may be embarking on another series of workshops in southern-Africa.

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PHOENIX: A WEB-BASED COLLABORATION TOOL

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ABSTRACT

Phoenix (www.decisiontools.ca) is an intuitive web-based software platform that offers an integrated set of collaboration and document management tools that enhances productivity and streamlines the decision making process in a distributed workgroup environment. Unlike other collaboration platforms, Phoenix further improves the decision making process by providing powerful tools to visualize, share and publish geographic information through interactive maps. Phoenix provides 18 integrated document management and collaboration modules, among which the Documents, Layers and Maps module enable users to upload data (geospatial data or not) and to create maps, using MapServer technology as a maps "generator". Phoenix could be a very useful tool for cash-strapped emergency managers in developing nations and elsewhere.

Information in Phoenix is organized into workspaces. Workspaces are managed by administrators who control levels of access using an intuitive role based security model. Workspaces contain a specific subset of all resources available in the system and can be configured to be completely open so that anonymous users can freely access content, or completely closed where only one or more specific individuals have access. Users can create any number of nested folders to manage their content in the different modules. Content can easily be moved from one folder or workspace to another using the built in clipboard utility that allows users to create shortcuts to, move, and/or copy any item.

The integrated search module allows users search content in the system and across networked Phoenix nodes. Users can search for content using keywords, geographic extent, and date ranges and can filter their results by workspace and/or type of item. Search results can be added to a users cart and/or workspace for viewing and/or sharing with other workspace members. Using the built-in peer review publishing framework or Really Simple Syndication (RSS) mechanism users can easily share their information with other people within or across workspaces and Phoenix nodes. Items can have one of four published status levels each with their own level of access. Users can publish workspace content to an RSS feed which can be imported into any "RSS reader" such as Microsoft Outlook, Mozilla Thunderbird and most modern web browsers allowing them to keep up to date with workspace activity without having to log into the system.

In addition to its document management and collaboration features, Phoenix provides users with a comprehensive spatial toolkit. Utilizing the latest open standards and protocols users can upload, import, share and publish spatial data in a variety of formats including OGC Web Map Service and Web Feature Service layers, ESRI Shapefile, MapInfo MID/MIF, Geography Mark-up Language, ECW, JPEG, GeoTiff, Google KML and ArcInfo Grid. Furthermore, spatial data stored in Phoenix can easily be integrated into desktop GIS and CAD systems such as ESRI ArcInfo and Autodesk MapGuide. Managing spatial data in Phoenix is easy. The intuitive user interface allows non-technical users to upload, share and publish spatial data in just a few clicks. For more advanced users, Phoenix also provides a comprehensive legend editor that allows users to not only control how their data is displayed in a map but also what features are displayed and whether or not they can be queried.

Phoenix can easily be customized to meet most organizational needs. The user interface "look-and-feel" is controlled using Cascading Style Sheets (CSS). Phoenix comes preloaded with several style sheets that can be used as a template for creating a custom look-and-feel. Workspaces can also be customized in just a few clicks allowing workspace administrators to tailor content and functionality to suite their specific needs.

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INTEGRATING FOSS WEB-GIS TOOLS WITH WEB2.0 CAPABILITIES TO PRODUCE SCALABLE CITY INFORMATION TOOLKIT, SUPPORTING PARTICIPATORY GIS

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ABSTRACT

Sri Lanka, a tiny island in Indian Ocean is a country blessed with natural beauty and a long history. There is a wider requirement from Sri Lankans as well as tourists around the world to know in a simple manner where different interesting places are located. A good solution for this is web based digital maps. However, they are not publicly available in Sri Lanka due to high cost in applying such technologies using proprietary software and the benefits of such adoptions are therefore not at the reach of general public.

Authors have earlier attempted to introduce a city guide for a single city in Sri Lanka using collection of FOSS GIS tools. The experience shows the benefit of having scalable approach to cover different geographical regions while capturing information relevant to that region only, to offer a framework which can be implemented ultimately in several rounds for the whole country. The type of information covered is modularized, thereby information such as, transportation information, places of natural interests or places offering alternative medicine facilities can be added with properties of them, integrating with the location information. Being a small country with frequent requirement to travel from rural areas to major cities and wise versa for various reasons including accessing public administration services, health and education services as well as for leisure and entertainment, information on how to reach the city and then how to reach a specific place is a very common question in everyday life. Most people are depending on community knowledge for such information. In order to offer wider and very effective information digitally also, the necessity to capture the traditional knowledge and individuals understanding regarding different places are highlighted.

Therefore a web portal is developed to encourage participatory GIS, which offers facilities to register known locations or adding write-ups, images and relevant information to already registered locations. Web user is allowed to add practical road signs such as monuments, large trees or damaged road segments and travel tips etc. An advertising module is introduced to add business information and thereby support long term continuity of the system. This will open doors for new business. Innovative entrepreneurs can build business providing new services to the users,

Due to the complex nature of the content considered, a CMS is used integrating with FOSS GIS tools to provide dynamic content manipulation with GIS capabilities. Several web modules were developed to incorporate the scalability and handling of different services, based on WMS and WFS capabilities. UMN Mapserver is used to handle the WMS transaction and Geoserver is used to handle the T-WFS. Spatial data will be stored in Postgres Database, MySql database is used to store non-spatial data

The ultimate goal is to provide a comprehensive, GIS enabled public and business information portal which would keep on building through user participation. Initial participants are the undergraduate of our institute.

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HARVEST CHOICE - AN OPEN SOURCE SYSTEM TO DELIVER AGRICULTURAL DATA

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ABSTRACT

This presentation provides a programmatic and technical overview of the HarvestChoice initiative (http://harvestchoice.org/), which seeks to accelerate and enhance the performance of agricultural systems most likely to bring benefit to the world's poor and undernourished. With a multi-year grant from the Bill & Melinda Gates Foundation's Global Development Program, HarvestChoice and its growing number of collaborators are developing a web portal that ties together databases, tools, analyses, and syntheses intended to improve investment and policy decisions. The initiative makes extensive use of literature sources and reviews, household surveys, GIS-based data sets and analytical tools, crop growth simulation methods, and a suite of spatially disaggregated multi-market models. A variety of Open Source applications support the HarvestChoice portal in the delivery of geospatial and bibliographic data to end users. These include the Drupal content management system for the delivery of site content, as well as the storage of bibliographic data and related metadata. Georeferenced data is housed in a PostGIS data store with a GeoServer interface for the dynamic generation of map data (Web Map Service) as well as complex query construction for raw geographic data (Web Feature Service). The GeoNetwork metadata server provides support for the storage of standard geographic information metadata (ISO 19115) and acts as a front-end client to the GeoServer. Tying together geospatial and bibliographic data, the Solr enterprise search server works in conjunction with Drupal to provide end-users with an integrated search experience of all data across the project.

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OMA - LIGHTNING APPLICATION

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ABSTRACT

"Oma - Lightning" is an online tool which delivers a visualization from the different types of lightning to the web. Its main function is to display the different types of lightning (cloud - cloud and cloud - earth) in an user-friendly web application. The data consists of the exact location of impact, a timestamp and some other attributes (mainly different types of id's). This information is gathered by a network of sensors, also know as the SAFIR system, across three countries (Belgium, Luxembourg and The Netherlands). The SAFIR System is a product of Vaisala (www.vaisala.com) and is the result of research and development conducted by the French National Aerospace Research Agency (ONERA). The application is the successor of an old (1995) desktop application, which could only visualize the information. The main users are scientists, bank and insurance companies, and other meteorological services.

The lightnings are visualized in two different ways:

* each lightning is rendered separately, thus has a point on the map;

* the visual area is covered with a grid, from which the cell size is user-defined. Each cell gets a value, represented by a color, which equals the total number of lightnings it contains.

Both types of visualization can be drawn in two timeframes: the user can query the last N minutes or a specific timeframe.

Oma - Lightning is entirely open source: Linux/Tomcat/PostgreSQL/Java on the server-side and OpenLayers, JQuery on the client-side. The server-side consists of 2 different services: a WMS service and a JSON service. The WMS service is used by the OpenLayers interface on the client side. Because of the different types of visualization there has been build a custom WMS server, partially based on GeoTools, and large pieces of own code (with a little peek to GeoServer). The data resides in a PostgreSQL/PostGis database.

The main focus (next to the usability) was the performance of the WMS server. This resulted in some extra coding and some additions to the GeoTools code base. An example of this is the implementation of some of the principles of the uDig shapefilerenderer (which is know for its excellent performance) into the standard shapefilerenderer of GeoTools (www.geotools.org). Because of the use of a WMS Server, it's possible to show the data in other applications, off course with the necessary additions of the parameters and the integration in other web applications. Every other request to the server is in the JSON-format, performed by Jquery at the client-side. The information provided by the JSON-service depends on the type of map that is visualized in the application. If the point-map is drawn, a click on the map queries the database for the closest lightnings to the click. If the density-map is visible, a click on the map results in a value that represents the amount of lightnings in the respective cell. On the server-side this JSON-service is based on own code, and the operations on the database are performed by Hibernate Spatial. The choice for Hibernate Spatial was very easy, it's the perfect combination to retrieve objects, combined with a spatial query on the database.

This lecture will describe the development, infrastructure and methodology of the Oma - Lightning application. Special attention will be paid to the performance issues and their different solutions. Oma - Lightning has been developed for the Royal Meteorological Institute of Belgium (RMI). This is a scientific institute, engaged in meteorology and depending from the Ministry of Economy. The application was created by Geo Solutions, a subdivision of Cronos (Belgium).

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LOCATION-BASED ACTIVITY REPORTING OF FOREST OPERATIONS USING COMPONENTS OF OPEN SOURCE GIS

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ABSTRACT

The Scandinavian forest owners are either industrial paper companies or non-industrial private owners. Most of the forest owners utilise contractor services for forest operations and like to monitor the activities performed in their property. A high level of confidence between the contractor and the land-owner is needed when the distance to the activity area is very long. New web-based technology can be utilised to organise an online reporting practice. Key elements for reporting the progress of forestry operations are exact timing and correct location. The recent development of the civil Global Positioning System (GPS) technology has made the location data available for a variety of platforms, such as mobile phones. In the described contractor case, a forest stand database could possibly be updated in-situ with the information regarding the forest operations using a combination of a mobile phone and a GPS receiver. As the need for an actual inventory device is insignificant, this could result in benefits in terms of saved costs compared to purchasing a professional data acquisition equipment instead.

This presentation describes how existing Open GIS solutions could be combined for remote update and access of a stand database using a mobile phone. In the current implementation, the field data and the GPS location are stored inside a PostgreSQL/PostGIS database, and a simple web map application implemented with MapServer functions as an interface for monitoring the contents of the database. At this point, the implemention is a preliminary sketch of a possible operative application. In order to develop the system further, we consider the special features for the particular system. Due to the conditions in which the inventory is conducted in and the nature of the data collected, the database design should emphasise availability, data consistency, and error assessment.

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INTO THE WILD: TAPPING THE POTENTIAL OF FOSS GIS FOR GEOPARKS AND NATURE INTERPRETATION

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ABSTRACT

This paper describes the potential that FOSS-based geoinformatics can have in a mutually beneficial symbiosis with nature parks (especially Geoparks), to provide location-based up-to date information for park visitors based on decentralized data- and knowledge repositories.

Geoinfomatics-based applications like GoogleEarth have become a commodity for society during the last years. They have been readily accepted both by laypersons and in academia. In this paper we highlight how similar geoinformatics-driven approaches can be applied for nature parks. This enables the communication the best available scientific understanding about global change processes on a local scale to park visitors, based on new community databases and services and to apply new technology for local and regional applications

Geology forms the foundation of any park's ecosystem. It sets the stage and provides context for the natural and historic local heritage. Therefore the acknowledgement and communication of the geologic setting is central to any nature park concept.

Good management requires a sound understanding of the available infrastructure including the scientific aspects. They need to be appropriately communicated to park visitors and academia. An ongoing dialogue between geoscientists and with park resource management staff is crucial to discuss research needs, projects and grant appeals. This is vital to introduce the means for knowledge management, data access and the representation of the facts and findings.

However, even within United States System of National Parks, where landscape interpretation was first introduced as a means to communicate nature and science, about 90% of the parks still lack a geoscientist in residence. This indicates the huge potential for contributions from the field of cost-neutral FOSS geoinformatics.

We present the Geo-Naturpark Bergstrasse-Odenwald, Germany as a real-world scenario to depict the potential benefits of the application of FOSS geoinformatics for NatureParks/Geoparks. Apart from basic management tasks such as visitor statistics and trail management which can be supported by off the shelf solutions, FOSS geoinformatics can help to open fields of research and communication which otherwise could not be addressed with the available resources.

From the perspective of geoinformatics, the provision of query results to the recipient is the last step in a process chain, ending with the production of mapping products. Yet from the Geopark perspective, the challenge to communicate scientific facts just begins at this stage. For "in the field" communication, computer independent products are still preferable for interaction with the visitors (relying on vision, touch, smell, etc). Also, the challenge to communicate the findings in a barrier-free manner needs to be addressed (Ludwig 2004).

For this, the availability of dedicated Web Processing Services (WPS) will help to enable the on-demand production of geo-pedagogic derivates like conventional maps, GPS-tracks, multi-thematic lenticular products or even jigsaw-puzzles. Recent developments in geoinformatics can make a significant contribution, by enabling service-based access to local spatial data repositories for both park staff and visitors and the on-demand creation of adequate map-related products. Research results shared through park interpretive staff and interest groups will enhance the experience for all park visitors. It helps to communicate the recent state of scientific understanding to the general public.

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EXPANDING THE ROLE OF OPEN SOURCE GIS IN GOVERNMENT

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ABSTRACT

The City and County of San Francisco has recently embarked on an adoption of Free and Open Source Software for GIS (FOSS4G) for web-based geospatial presentation (WebGIS). There have been two primary drivers for this approach: economic pressures to innovate as well as a higher usability standard set by the Google Map interface.

Numerous enterprise purveyors of geospatial information, particularly those in the government sector, are at similar crossroads. End users have come to expect web-based mapping applications that are intuitive and responsive. The legacy WebGIS of the City (developed in 2001) have been described by end-users as 'slow' and 'complicated'. In reviewing alternatives it became clear that FOSS4G was a viable technology refresh option. While the legacy applications continue to serve maps and related data to the public, prototyping of the FOSS4G stack (PostGreSQL, PostGIS, GeoServer, TileCache and OpenLayers), began in October 2007. Within six months of work on the development of the FOSS4G stack it became clear that a FOSS4G application was eligible for pilot consideration.

The City found through its research efforts, that FOSS4G development was experiencing rapid and dynamic growth, with an engaged developer community. Many other municipalities were in the process or had already put in place FOSS4G-based applications serving the public. In concert with these applications, municipalities were providing machine-readable formatted data over the web (GeoRSS, KML, GML), which could be harnessed for use in other types of applications, including decision support systems.

During the search for candidate pilot departments the potential emerged for a larger role for WebGIS within the broader decision support context. WebGIS is well positioned to become the man-machine interface of choice for complex decision visualization. Executive decision-makers have made clear their need to view data roll-ups not only through text reports, but also via the powerful visualization provided by interactive mapping. With the integration of complementary open source modules such as Customer Relationship Management (CRM), Computerized Maintenance Management System (CMMS) and Business Intelligence (BI) FOSS4G is well suited to evolve civil asset management from reactive to proactive.

By augmenting the capabilities of WebGIS in order to go beyond the 'where' question to include who, what, when and cost a broader decision support system will be well-positioned with cost conscious executive leadership. Expanding the role of an open source GIS would serve to demonstrate increased innovation through cooperative crowd-sourcing of software development while providing better service to constituents and a greater return on investment through cost savings found in proactive civil asset management model.

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SENEGALESE LAND REGISTER MODERNIZATION THROUGH OPENSOURCE SOFTWARES.

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ABSTRACT

Since 2007, the ADB (African Development Bank) and the European Community financed a project called the "PAMOCA" (Support Project to Cadastre Modernization). This project's goal is calculating indices effectively which will be used by the ministry of finances to calculation of the taxes. Within this frameworks, investigations were made on a sample datatset of representative buildings, as these cards of investigations being handwritten, each calculation were carried out manually, lot of errors were often introduced.

GeoLabs have developed, with the support and the knowledge of the Senegalese cabinet of real estate expertise SADY & THIAM, a Web application which makes possible to simplify the filling of the sheets into database and automating the restitution of calculations.

This application uses an OpenOffice server to produce both HTML forms used to fill or correct data and the restitution of the sheet of calculations through the OOCMS software. The geolocation of the sheets using a piece is carried out using the MapJax application which use those free softwares : PostgreSQL/PostGIS, MapServer and tools provided by GDAL. The application runs on the GeoLive VServer-1.0 environment which was successfully integrated in the existing proprietary environment.

The data of the GIS setted up by the DGID (Direction General of the taxes and the fields) are thus updated using this application. These updated data are then recoverable using the OGC webservices or directly downloadable as flat files using some proprietary format (in this case : ShapeFile).

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CRITICAL SUCCESS FACTORS (CSF'S) FOR SUSTAINABILITY OF GEOGRAPHICAL INFORMATION SYSTEMS (GIS) IN GOVERNMENT INSTITUTIONS OF DEVELOPING COUNTRIES.

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GENERAL PRESENTATIONS

ABSTRACT

Despite the immense potential of Geographical Information Systems (GIS) for executive level decision making, planning and many other diverse applications, these systems are largely underutilised. This paper outlines some of the reasons for this and identifies the critical success factors for implementing a GIS in a government institution of a developing country. The paper explains how success depends on strong linkages to political drivers and objectives, GIS data availability and a number of social, institutional and technical factors.

Issues common to developing countries which complicate the implementation of a GIS include the lack of good quality spatial data and a shortage of highly skilled people. Ongoing investments in data collection and the academic sector of developing countries are therefore necessary.

The institutional, organisational and social components of a GIS are undoubtedly the most critical, complex and least controllable potential success factors in any GIS implementation. One must acknowledge that social factors are more critical to the success of a GIS initiative than technical factors are.

GIS is a technology which crosses functional boundaries not only within (intra) but also between (inter) organisations. It is important that this inter-organisational nature of GIS is understood. It is widely agreed that the benefits of GIS come from both intra- and inter-organisational sharing of spatially referenced data. This usually radically reshapes relations between organisations. In order for a GIS initiative to succeed therefore, inter-organisational networks must be formed to facilitate data sharing and GIS mediated change.

When considering the option of open source GIS in South Africa, a number of factors must be considered. Advantages of using open source software include the potential to create a local software industry, reduced reliance on external software giants (monopoly), reduced cost of ownership, user based software provided user base is large enough and collaborative parallel development involving source code sharing has potential to increase efficiency and reduce development time, reduced software bugs due to fact that many users are also developers and can find and fix bugs.

Disadvantages include potentially compromised security due to fact that the source code is public, lack of formal support, a lack of a clear development path, software is provided without any guarantees, a lack of documentation in some instances and a difficulty to integrate with proprietary software.

The sustainability and success of GIS in this country depends on a better understanding of the issues outlined above. It is the authors belief that not enough time is spent discussing the "bigger picture" issues outlined in this paper, a better understanding of which will greatly increase the probability of any given GIS initiative being a success.

[Abstract Edited]

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A CASE STUDY OF GIS ANALYSIS FOR THE DETERMINATION OF SERVICE DELIVERY

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ABSTRACT

The use of GIS, for sustainable development planning in South Africa has traditionally followed a simplistic model of line of sight access to facilities. While this method does produce a relative indication of service delivery and backlogs, it is also subject to errors and inconsistencies. With the availability of enhanced software and accurate datasets, there are more accurate ways of determining these service delivery backlogs. This paper presents a case study of service delivery backlog analysis utilising a road network based analysis method. Software utilised included PostGIS for data processing, and a MapServer and OpenLayers implementation for data presentation and reporting.

The basic premise around service delivery and backlogs is based upon of a minimum level of service determination, whereby a distance is determined from a household to a facility. In situations where households are outside the minimum distance to meet delivery standards, they are considered under serviced and part of the delivery backlog. Further analysis is also done on the capacity of the facility to provide for the population in its service area. This paper concentrates on the two methods of determining service delivery distance and discusses the positives and negatives of both methods. In addition, the advantages and disadvantages of the FOSS selected for this analysis is discussed. Finally, a methodology for automating and rolling out this analysis presented.

The line of sight approach, determines the accessibility of households through a method of determining the line of sight distance between the household and the facility. This is traditionally achieved through a process of providing a circular buffer around each facility. All households falling within this buffer are considered serviced, while those outside are considered under serviced and part of the backlog. In many cases, this provides a good indication of service backlogs; however, there are situations where this method fails, particularly related to topographical features (i.e. contours and rivers). This method also relies on the assumption that people can travel "as the crow flies". This is not true, and in many instances road distance is considerably further. A typical example of the shortcoming of the line of sight method would occur when households are closest to a particular clinic which lies across a river, but would typically utilise a clinic further away, but more easily accessible by road.

The other alternative to the line of sight approach is to analyse the households using a more accurate method of determining access to facilities using the existing road network. This is a better method for the since it minimises topographical error, gives true distances to facilities and provides an accurate indication of households utilising a facility.

This methodology has been applied to a single District municipality in KwaZulu-Natal and results are presented. This methodology is now being rolled out to other municipalities in the province.

All analysis was carried out in PostGIS, which performed as well as, if not better that commercial databases. Implementation of a presentation interface was painless, and provides for a high level of user interaction without an associated high training overhead.

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TERRALIB AS AN OPEN SOURCE PLATFORM FOR PUBLIC HEALTH APPLICATIONS

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ABSTRACT

Infectious diseases, such as dengue fever, leptospirosis and malaria, are still part of the epidemiological scenario in Brazil and around the world. The health sector needs tools for the timely detection of variation in the number of cases, in order to characterize epidemic outbreaks, and also to model and identify risk and protection factors in endemic and epidemic moments. These tools should integrate environmental aspects, risk factor detection, and automatic and semiautomatic warning methods, resulting in more efficient outbreak detection and its follow-up in space and time.

These tools should be made freely available for public health services, in particular, on the less developed countries. Besides that, a capacity building program should make possible for programmers on these countries to customize and improve upon the basic systems, adapting them for their local needs. This "white-box" development model involves open software as well as open data.

The TerraLib project has pushed up over the last 5 years into become an open platform for building health surveillance applications. Together with a network of partners in universities, local health authorities and individual collaborators, a family of TerraLib based products has been made available for the health sector in Brazil and Latin America. Two mainly products resulted from this effort: the aRT package and the TerraStat library with the TerraStat Plug-in.

The aRT is a software package for coupling the statistical program R (http://www.r-project.org/) and the GIS library TerraLib (http://www.terralib.org/). This project has been developed with cooperation between Statistics Department at Federal University of Paran? and Image Processing Division (DPI) at the National Institute for Space Research (INPE).

TerraStat is a set of algorithms of statistical spatial-temporal analyses built on TerraLib. This project has been developed and conducted by Spatial Statistics Laboratory-LESTE at Federal University of Minas Gerais (UFMG) and the Image Processing Division (DPI) at the National Institute for Space Research (INPE).

This presentation provides information on how these efforts have been conducted and the results that have been achieved.

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ANALYZING WALKABLE COMMUNITIES, AND PUBLISHING INTERACTIVE RESULTS ON THE WEB

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ABSTRACT

Walkable neighborhoods offer surprising benefits to our health, the environment, and our communities. Throughout the world, but especially in Europe, Canada, and the United States, numerous jurisdictions are starting to consider impacts of walkability in health and urban planning. This presentation will describe how a popular website, walkscore.com, integrated open source solutions in their recent analysis of the top forty most populous cities in the United States.

Simple python scripts and access to the Google Maps API were were used to aggregate the source data into a PostGIS database for analysis. From the database, GDAL was used to create smooth raster images, which are served on top of a Google Maps interface using Mapserver and TileCache. Additional data is made available via FeatureServer.

Unlike many sprawl and walkability models, which cannot easily scale due to a reliance on source data that is not comparable in different jurisdictions, this model relies largely on demographics and nationwide business listings. A brief discussion of different sprawl and walkability models will show how detailed business listings combined with demographics can be a useful proxy for walkability. This use of detailed nationwide datasets ensures similar comparisons down to the neighborhood level, and a reproducible methodology.

Walkscore.com is a project of Front Seat, a civic software company and incubator. Software from Front Seat connects people to the places we live, the resources we consume, and the communities we participate in. Umbrella Consulting LLC is the primary consultant for the walkscore city rankings.

The presentation will describe some of the reasons for using Open Source, and the methodology of the analysis. The workflow of publishing point datasets to raster tiles on the web will also be covered. While the case study is walkability, this presentation may be of interest to anyone who is interested in PostGIS for analysis, or useful methods for displaying large datasets on an interactive map.

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DEVELOPMENT OF A MALARIA DECISION SUPPORT SYSTEM BASED ON OPEN SOURCE TECHNOLOGIES

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ABSTRACT

The Malaria Decision Support System (MDSS) is an integrated open-source database solution for monitoring and evaluation in malaria control being developed by the Medical Research Council of South Africa. The MDSS is being modeled on systems that have been developed within the Lubombo Spatial Development Initiative in Southern Africa. These currently consist of various independent systems being used by malaria control programmes in the region. These systems are used to inform strategic decision making, thereby improving the effectiveness of malaria control within the region.

Various open source technologies are being utilised to transform the various existing systems into one deliverable package that would enable a malaria control programme to capture, analyse and disseminate data within a single spatially enabled framework. To this end, the MDSS will continue to be modular in design, but will integrate all existing components allowing for the management of malaria case data, entomological surveillance data, public health intervention monitoring data, parasitology data and household survey data in one single data management environment.

The development phases of the MDSS are being piloted at selected sites across targeted districts in northern Mozambique, central Zambia and Malawi.

An array of open source technologies has been selected for development of the MDSS. PostgreSQL has been selected as the database environment together with PostGIS for spatial data handling. MapServer compliments the MDSS by using the embedded server technology to display data in an HTML browser directly from PostgreSQL/PostGIS infrastructure via common gateway interface (CGI). HTML, PHP, JavaScript, MapScript and Ajax are being used to provide functionality to the various components while giving the product the authentic look and feel of an application.

The dynamic query component of the database allows for outputs to be visualised as tables, graphs, maps or compiled reports. Mapped outputs can be viewed either online or offline via MapServer. QGGIS has been selected for inclusion in the bundle for higher end spatial analysis needs.

User-friendly documentation includes installation guides, user guides for software used in development, database flow and schema diagrams, entomological lab guides and recent relevant literature.

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WEB PROCESSING AND SPATIAL ANALYSIS WITH THE ILWIS OPEN SOURCE GIS SOFTWARE AND GEOSS DATA

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ABSTRACT

This presentation involves easy accessible integrated web-based analysis of satellite images with a plug-in based open source software. The presentation is targetted to both users and developers of geospatial software. There is an increasing need for organisations to perform on demand geo-processing tasks by integrating and reusing geo-information from within and outside the organisation. Many of these organisations do not have the means to acquire the necessary spatial data (e.g., topographic data and satellite images) and software to perform these tasks.

The last two decades have shown a major shift from stand-alone software systems to networked ones, often client/server applications using distributed geo-(web-)services. This allows the abovementioned organisations to combine without much effort their own data with remotely available data and processing functionality. Key to this integrated spatial data analysis is a low-cost access to data from within a user-friendly and flexible software. Web-based open source software solutions are more often a powerful option for developing countries.

The Integrated Land and Water Information System (ILWIS) is a PC-based GIS & Remote Sensing software, comprising a complete package of image processing, spatial analysis and digital mapping and was developed as commercial software from the early nineties onwards. Recent project efforts have migrated ILWIS into a modular, plug-in-based open source software, and provide web-service support for OGC-based web mapping and processing.

The core objective of the ILWIS Open source project is to provide a maintainable framework for researchers and software developers to implement training components, scientific toolboxes and (web-) service implementations for student projects, research and consulting projects. The latest plug-ins have been developed for multi-criteria decision making, water recources analysis and spatial statistics analysis. The development of this framework is done since 2007 in the context of 52°North. 52°North (http://52north.org/) is an open initiative that advances the development of cutting edge open source geospatial software. Leading research organizations in the field of geoinformatics (ifgi, conterra, ITC, ESRI) participate in 52°North's innovative development for establishing open spatial data infrastructures (SDI) and transformation of these into practical technological solutions. 52°North uses the GPL license.

GEONETCast, as part of the emerging Global Earth Observation System of Systems (GEOSS), puts essential environmental data at the fingertips of users around the globe. This user-friendly and low-cost information dissemination provides global information as a basis for decision-making in a number of critical areas, including public health, energy, agriculture, weather, water, climate, natural disasters and ecosystems. GEONETCast makes available satellite images via Digital Video Broadcast (DVB) technology. An OGC WMS interface and plug-ins which convert GEONETCast data streams allow an ILWIS user to integrate various distributed data sources with data locally stored on his machine.

This presentation describes two use cases in which ILWIS is used with GEONETCast satellite imagery for decision making processes in Ghana. First, it is shown how the GEONETCast data stream is processed and next how local data is integrally accessed with remote satellite images through OGC based web interfaces. Finally, we explain how the ILWIS software can be extended with additional functionality by means of building plug-ins.

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THE USE OF OPENLAYERS FOR THE DEMONSTRATION AND VISUALISATION OF ENVIRONMENTAL RESEARCH APPLICATIONS

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ABSTRACT

Environment science is a complex and dynamic stream. The environmental problems can often easily be understood spatiotemporally. Visualisation of the environmental data gives a great opportunity to deal with the environmental problem. OpenLayers is one of the open source application which provides this opportunity. Also the open source component of the application gives advantage to share and customise it freely. It offers advantage to the decision makers and freedom to developers to use or customise in their own way.

Also OpenLayers can use the maps from different sources (different map services) and it is with no server side dependencies. So the decision makers can have interaction with the maps (environment information) and they can choose the best solution on the basis of the professional knowledge and information available.

This article will describe and examine the use of OpenLayers in the demonstration and visualisation of environmental research applications. There will be given examples from forestry applications and spatiotemporal changes in forests.

OpenLayers offers a great opportunity to visualise environmental information, because it can be easily integrated e.g. in existing webpages. Environmental professionals with no or little knowledge about "web mapping " and / or server technologies can even use the tool.

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BRINGING DATA AND METADATA CLOSER TOGETHER

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ABSTRACT

Catalogs and data seem often too much separated. The GeoNetwork project in collaboration with the GeoServer project has worked on making data and metadata publishing in one go a lot easier. The presentation will show what was done and where the project will try to take such integration in the future.

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GEOSERVER: PAST, PRESENT AND FUTURE

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ABSTRACT

2008 has proven to be another interesting year for the GeoServer project. GeoServer has continued to evolve in terms of exciting new features, stability, and performance.

This presentation will provide an introduction to what GeoServer is and what it does. In addition to an evolution of GeoServer over the last decade.

The talk will also give a comprehensive overview of the various features offered by GeoServer. The wide variety of output format support, customization with templates, access control and security, improved performance, a REST api, and much more.

In finale will be a glimpse into where GeoServer is going over the next year and what exciting new features are on the horizon. Including a look at a new user interface design, the WFS versioning protocol, a new configuration system, Web Processing Service support, and more.

This presentation is intended for anyone curious about GeoServer. Whether you don't know what GeoServer is, or consider yourself an expert user, it will have something of interest for you.

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THE DEFINITION OF OPEN IN OGC, OSGEO AND OSM

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ABSTRACT

This presentation gives an introduction to the three communities in the spatial software realm and how they relate; The Open Geospatial Consortium (OGC), the Open Source Geospatial Foundation (OSGeo) and the OpenStreetMap project (OSM).

OGC: http://www.opengeospatial.org/

OSGeo: http://www.osgeo.org/

OSM: http://www.openstreetmap.org/

In a nutshell OGC is the place where many collaborate on creating standards, OSGeo is the place where many collaborate on implementing software and OpenStreetMap is the place where many collaborate on creating maps. The common ground is that all three are focused on spatially related software and data and all have a clear (though somewhat different) understanding of the term "Open". OGC'S definition of Open means several things:

- OGC membership is open to all (who can afford the fees)
- Publicly released standards can be used royalty free by all.
- All standards get published for public comment prior to the official release
- All can comment.

OGC has very well defined processes on how a standard evolves and what processes it has to go through before it can officially be published. OGC is consensus oriented but also has a voting system that gives players in more expensive member categories more voting power.

OGC's history is tightly connected to Open Source software and goes back to the early 1980s and the GRASS project. It developed a strong need to share data across different brands of software. This need gave birth first to a working group then a non-profit foundation and ultimately to the OGC as an industry consortium. OGC developed from a small initiative of 20 industry members to a full blown organization with 360 members from industry, public administration, research and sciences. During this transition OCG has kept the "Open" but lost the "Source" - meaning that the OGC itself does not implement any software neither closed nor Open Source.

OSGeo's definition of Open follows that of the Open Source Initiative. It is a well defined, legally sound licensing model. Beyond that OSGeo has created a set of policies that define governance criteria by which projects have to abide. Many of these policies have been gleaned from the Apache Foundation and are often based on a meritocracy model. One major outward facing task for OSGeo is to spread word on how Open Source software development and collaboration works and why it works so well. The internal task is to maintain and refine the framework that it has developed for Open Source projects, it's developers, users and increasingly also businesses.

OSM is trying to do everything in the spirit of openness. The maps are "open" in that anyone can use them (licensing issues notwithstanding), anyone can see how they were created, anyone can participate in that process. In addition most of the used software is Open Source. OSM creates and provides free geographic data such as street maps to anyone who wants them. The project was started because most maps actually have legal or technical restrictions on their use, holding back people from using them in creative, productive or unexpected ways.

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ESRI'S OPEN STANDARDS AND IT INTEROPERABILITY

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ABSTRACT

ESRI has built open and interoperable commercial-off-the-shelf software for the last 25 years. ESRI has always been keen advocates of the need for open access to geographical data and software functionality using wide adopted, practical standards. The current ArcGIS range of products have appropriate open application programming interfaces and support key data interchange formats and Web services standards ensuring relevant GIS and IT interoperability between systems over wired and/or wireless networks. In the last decade, ESRI has launched a major initiative to re-architect its GIS product line to adhere to important, emerging IT and GIS standards.

The focus of this paper is to shed light on the different approaches and methods to utilise and implement the various data interoperability transformers and GIS standards. A key approach is the migration from a departmental GIS system to an integrated enterprise GIS system which can only be achieved by interoperable and standard based environments. ESRI supports all the leading IT development and application environments as well as OGC and ISO GIS this include:

- Operating systems: Linux, UNIX, Windows
- RDBMS including spatial types and functions
- Various spatial data translators and formats
- Network Protocols such as TCP/IP, HTTP, and HTTPS
- Developer Environments .NET, and Java (J2ME, J2SE, J2EE, ASP/JSP)
- Handheld Devices
- Enterprise Applications such as SAS, IBM DB2, Oracle, SAP
- Web Services such as XML, SOAP, UDDI, and WSDL

OGC specifications such as WFS, WMS, and GML

In conclusion the relationship between GIS technology and the rest of the IT infrastructure is crucial. ESRI has evolved tools in its software to support and integrate with virtually all of the commonly accepted standards. For all users, this means compatibility and interoperability support with major enterprise systems such as enterprise resource planning (ERP), customer resource management (CRM), enterprise application integration (EAI) and others through a service orientated architecture (SOA) methodology.

[Abstract Edited]

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IMPROVE METADATA CREATION PROCESS USING OPENSOURCE

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ABSTRACT

The metadata creation process is made using mainly metadata catalogues which is one building blocks of a Spatial Data Infrastructure (SDI). But all components of an SDI could potentially help to generate and improve metadata content in the data creation process. Is there any ways to make metadata creation easier? How could geospatial tools (Spatial ETL, Desktop GIS, Map servers, ...) make metadata content more consistent? How to interact with metadata catalogues?

Use cases: BRGM/GeoSciML, UNHCR.

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CONSTELLATION: AN INFRASTRUCTURE FOR GEOSPATIAL DATA SERVICES FOR SCIENTIFIC AND ENVIRONMENTAL USE

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ABSTRACT

The Constellation project provides a solution for the management, discovery, exploitation, and distribution of geographic data within a distributed services framework based on standards compliant, free software modules. The project follows well defined standards based on, for geographic data, the specifications of the Open Geospatial Consortium (OGC) and the International Organisation for Standardisation (ISO) and, for software development, the specifications of the Java language as developed within the Java Community Process. Constellation uses a modular architecture which enables a flexible re-assembly of components to target a wide range of applications in diverse fields. The very concept of a Spatial Data Infrastructure depends inherently on the use of Web Services for geographic data which follow the accepted norms and specifications since that is required to guarantee interoperability. To enable the standards compliant development of Geospatial Web Services within an SDI, Constellation is based on several core components, all of them free software:

- Metro: the project regroups most of the core Java specifications related to WebService handling such as JAX-WS to handle SOAP based services and JAX-RS (Jersey) for RESTful services.
- MapFaces: a cartographic framework providing a tight, synchronous coupling between the Javascript code provided to the client interface and the Java Server Faces (JSF) code running on the server.
- JackRabbit: the reference implementation of the Java Content Repository specifications (JSR-170 and JSR-283) which define a standardized interface as an abstraction layer for the management and use of heterogeneous data.
- GeoAPI: a collection of Java language interfaces for the OGC and ISO geospatial specifications, which is itself a formal OGC specification and is currently aiming to gain its own "Standard Working Group" within the OGC.
- Geotools: a library of components for the complete handling of geospatial data which provides, among other components, the reference implementation of the GeoAPI interfaces.
- JScience: the reference implementation of the Java specification for units of measure (JSR-275), providing the rigorous handling of units and their conversion.

This modular architecture, the respect for accepted norms, and the distribution of all software components under the standard free software license for the Java language jointly guarantee to implementers who base their services on Constellation the fullest flexibility for service development and the long term persistence of their services within their spatial data infrastructure. A demonstration will be presented showing an application for Oceanographic the french national maritime research agency. IFREMER, is developing a new informatic infrastructure to provide normalized access to its geographic databases. IFREMER currently stores and distributes a large volume of heterogeneous data including detailed bathymetric data and results from complex simulation models of oceanographic processes. In support of this evolution towards normalized data access, IFREMER and Geomatys have collaborated to develop a free software, WMS and WCS compliant web service to provide access to a database of large, multi-dimensional, spatio-temporal data.

The presentation will detail this project's contribution to the Constellation web service framework and will present the technical issues related to providing acceptably rapid access to massive multidimensional data sets and to developing image mosaics and overviews for extensive data.

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CAD-GIS INTEGRATION: ACHIEVING COMMERCIAL REALITY WITH OPEN SOURCE SOLUTIONS

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ABSTRACT

There are vast amounts of geospatially-based data across organisations in both GIS and CAD packages that represent a huge investment in software, training and custom development by the custodians of these data. There is also a growing divide between the haves and the have-nots as proprietary commercial software solutions for integrating geospatial data become more expensive whilst access to geospatial information provides essential business benefit. Current CAD-GIS integration problems enhance this differential with alternative views on data integrity, completeness, dimensionality, habits and conventions leading to islands of data and redundancy.

This is compounded as greater than ever flows of geospatial data appear and the advent of more advanced collection techniques, such as automated photogrammetry and laser-scanning. Merging and sharing such datasets has become paramount with the realisation that real business value can be drawn through reuse and the rise in web access is resulting in a growing need to provide external access to such data.

The case for open, interoperable access to data has been met by the Open Source community with viable alternatives to geospatial solutions ranging from spatial databases, through connection technologies to end-user desktop and web applications. In terms of connectivity the Feature Data Object (FDO) data access technology enables the access and analysis of multiple native data formats without translation or duplication. This has been extensively used throughout the OSGeo MapGuide project, but 1Spatial is one of the few commercial partners to have adopted and exploited this in the wider geospatial community.

This paper will explore the practical use and exploitation of FDO beyond the Open Source community boundaries. With specific reference to the CAD-GIS integration problem, 1Spatial has utilised FDO to build data bridges, integrate geospatial data and to also facilitate the convergence of CAD and GIS data sources. The paper will discuss the use of free and open source software (FOSS) with proprietary software (AutoCAD) to achieve greater geospatial collaboration. In this example FOSS has been married to existing technology and business processes and it is shown that real values (described in a case study) can be placed on such a hybrid solution. The example shows how such a low-risk, low-cost solution has been developed around FDO. It provides geospatial access to potentially millions of geospatial data users that would be otherwise alienated from corporate geospatial datasets by virtue of their legacy software investment and productivity tool needs.

This will be illustrated through a case study where a national utility in the UK, having commissioned a corporate geospatial solution, found that the drawing office was not considered in the geospatial systems implementation and only an FDO-based platform provided the cost-point and timescales to meet their data access needs.

Finally, using another example, the paper will also highlight the role free software tools can also play in the geospatial arena when integrated with commercial databases. In this example 1Spatial introduces a new FOSS tool to the community that allows for the simple and efficient management of growing volumes of geospatial data in mainstream databases. This tool enables the management and control of geospatial data in relational databases, such as Oracle9i, 10g and 11g and Microsoft SQL Server 2008.

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ANISOTROPIC COST SURFACES FOR GRASS

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ABSTRACT

Cost surfaces are used as a precomputed solution of the shorten path problem on raster maps. The key point here is that we can compute the cost surface without computing any path. So, this time consuming step can be done once for many target points. To compute the cost surface we can use the Dijkstra algorithm,

On a raster GIS a network connecting every cell with all their neighbour is assumed. For any given cell we can consider only four neighbour, eight or sixteen. GRASS support Queen and Knight patterns. One important topic is how we represent unit cost. The Dijkstra's algorithm work with a graph associating cost to edges. Usually GIS systems use a map to store unit cost. Every cell of this map contains the cost of crossing this cell, either in a fixed direction (E-W) or per unit length. From this cost it is possible to compute the cost of crossing the cell following any direction, assuming that the unit cost do not change. To do this we just multiple the unit cost by the length of the path inside the cell.

In this way it is possible to compute the cost to move to a neighbour cell as half of the sum of the cost of both cells (as we cross half of every cells). This cost can be corrected if we move to a diagonal cell. Anyway this computation method generate polygonal paths, and assume they pass throw the centre of the cells.

For the second step the minimum path to a specific destination point can be build just following a hill descending approach on the cost surface. We just move to the neighbour cell with minimum cost. Note that for this point the neighbourhood used must be the same used for the cost surface computation. Usually this process produce a raster map output. But real problem s are rarely isotropic, usually the cost to move from cell A to cell B is not the same of moving from cell B to cell A. This happen when you are walking, using a machine or building a channel. Moreover, the cost for crossing cell A following a north-south path may be completely different of that of doing it using a east-west one. An extreme case of this can be found

Most GIS systems include functions to compute isotropic cost functions, that is using the computation process show in figure 4. As far as I know, only Idrisi has some anisotropic cost surface function. Unit cost can be interpreted as cell traversing cost for isotropic problems. For anisotropic problems, cost must be associated to direction movement. This can be done in two ways:

Give every cell a minimum crossing cost and direction, and assume a fixed distribution of cost for other directions (that is the approach used in Idrisi).

Give every cell a movement cost to every neighbour cell. This implies using 8 or 16 unit cost maps. Note that there is no need of using more cost maps than connection allowed.

We use the second approach as it is more general. In fact we can derive the first one from the second one in a straightforward way.

In this work we propose a method to compute anisotropic cost surfaces. The method has been implemented on Grass as two new modules: r.acost and r.adrain. The paper explains the method, the implementation on Grass and evaluate them on a practical case.

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MIGRATING FROM A COMMERCIAL INTERNET MAP SERVER TO A FREE AND OPEN SOURCE SOLUTION

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ABSTRACT

Taiwan's Water Resource Agency (WRA) is currently updating its web based Watershed Management GIS. The purpose of the system is the management of the watershed that contains an important reservoir for Northern Taiwan. GIS map information is available on properties, check dams, land use, landslides, gully and soil erosion rates. Also aerial and satellite imagery can be used in the system. The original system is based on the commercial ArcIMS software and HTML/Java for the map application. After we starting updating and modifying the system it was found that changing the existing system would take more time and effort than to build a new map server application from scratch. Also, the existing system layout did not further adding of new information. An extra difficulty was introduced by proprietary software that was running on a remote server outside the office, which meant in our case that using the software over a network was slow and frequent crashes occurred. Last but not least the server that runs the application could only be accessed from inside the client's office building meaning that frequent traveling would be needed to make the necessary changes and to test the system. Therefore, by using FOSS4G solutions we are able to build and test the system 'in house' reducing traveling expenses. A preliminary version has been built and proved to be significant faster and easier to extend and maintain. The goal is to improve the system's capabilities further in a Free and Open Source environment and to add new GIS layer information. The chosen solution is based on the UMN Mapserver software and PHP/Java. Requirements are first of all that the original map layers will be included, these are as follows: SPOT imagery, NDVI landslide change results, basic topographic map layers, landslides, gullies, soil erosion estimates, zoning for protection, dams and buildings. Due to the large number of layers and sub-layers an inventive use must be made of radio, or drop down menus to access the information without compromising the ease of use. The design of the system should follow the layout and functionality of the existing system as much as possible. The new design should keep it simple to understand and use for WRA staff. Furthermore, data should be viewable, query able and a model can be accessed that while running outside the system, resulting maps will be viewable as updated layers in the application. Special attention will be paid to optimizing server speed and stability. Hyperlinks will be used to provide attribute information, photos, tables and graphs. New will be the inclusion of model results that can be accessed from the application. The model currently runs in ArcGIS, however, a GRASS GIS version is currently being investigated and may be implemented in the future. When the system is ready for delivery in July a training will be provided to staff. The author wishes to explain how the migration was done and further likes to show how the FOSS solution compares to the original proprietary MapServer. Focus will be on acceptance by the client, speed, user friendliness and stability.

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GFOSS.IT: THE ITALIAN OSGEO CHAPTER

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ABSTRACT

I will introduce the history of GFOSS.it, its activities, its successes, and programmes for the future.

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WEB PROCESSING SERVICES IN THE CONTEXT OF THE 52°NORTH GEOPROCESSING COMMUNITY

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ABSTRACT

The Web Processing Service (WPS) is the first generic attempt of the Open Geospatial Consortium (OGC) to address distributed geoprocessing on the web. It became an official standard in mid 2007 and defines a standardized Web Service interface to publish and perform geospatial processes over the web. This reflects a common trend of outsourcing geoprocessing functionalities to interoperable Web Services which is supported by increasing network capacity and processing power. With a standardized interface, it becomes easily achievable to integrate such web based geoprocesses in Spatial Data Infrastructures (SDIs) and therefore allows the creation of value-added chains which still can be seen as a missing piece in mostly data retrieval and visualization centric SDIs.

Such WPS processes can range from a simple geometric calculation (for example a simple intersect operation) to a complex simulation process (for example a global climate change model). The geoprocessing community of the 52°North open source initiative started in 2006 to develop a java-based WPS. This implementation has matured over the last two years and is currently the only available open source implementation which covers all aspects of the latest interface specification (WPS version 1.0.0).

The proposed talk will be twofold. At first it will give an in-depth introduction to the WPS specification as well as the architecture and features of the 52°North WPS. A special focus will lay on the 52°North implementation along with the most important features of 52°North WPS such as asynchronous processing, raster support, supported XML parsers and the enhanced build process empowered by apache maven. Besides that, the talk will discuss some valuable enhancements for the next version of the WPS specification, such as profiles and interface extensions.

At second, the talk will highlight the current developments within the 52°North processing community. It is important to note, that one of the main motivations within the 52°North communities is to carry out research related software development and to contribute the results back as sustainable Open Source products. Thus it is the aim of the geoprocessing community to integrate as much cutting edge technology into the 52°North WPS as possible. Current research within the geoprocessing community focuses on modeling Geoprocessing Workflows (GPWs), integrating GRID computing technologies and embedding of GRASS and R functionalities. The talk will also give a roadmap, about when and how those results will be integrated into 52°North WPS and thereby be available as additional features in 52°North WPS.

Finally, a case study will be demonstrated, which will show the benefits and capabilities of distributed geoprocessing. It thereby will also demonstrate some research results already carried out within the geoprocessing community. The case study will be based on a risk management scenario and will be solely conducted with free and open source software. It will cover several aspects such as workflow design, distributed and real-time processing of live sensor data via WPS. Therefore, this demonstration will show how the Sensor Web Enablement (SWE) world can be combined with the geoprocessing domain. To address mainstream needs, the process results will be disseminated as KML and visualized in Google Earth.

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SENSOR OBSERVATION SERVICE FROM UMN MAPSERVER MEETS OPENLAYER

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ABSTRACT

Sensor Observation Services (SOS) describe standardized web services which allow access to descriptions of associated sensors and their collected observation data.

These sensors can measure environment parameters like temperature, ground motion or short - any parameter featured with any physial signal. SOS is part of of the OGC's Sensor Web Enablement (SWE) specification. UMN Mapserver supports the SOS specification since version 4.10. Using UMN's SOS interface and implementing a new layer type called "SOS Layer" in OpenLayers enables us visualizing the sensor data in real-time via the internet.

OpenLayers and new layer type SOS-layer Core of the project we talk about was the implemenation of a new layer type 'SOS-layer' into OpenLayers (which also will be put back to the developing team of OpenLayers). In this context we implemented also a so-called 'SOS Manager' as a new control for OpenLayers to enable users to manage multiple SOS servers in the same map. SOS Manager has a user interface, where several SOS servers could be administered and their layers added to the map. Current Map and Sensor settings can be loaded from old projects and so also being saved into a new one.

The new OpenLayers SOS framework is able to parse the response from the 'GetObservation' document. This resulting from the GetObservation request is designed to query sensor systems to retrieve observation data. Specification of observation data is defined in the Observation and Measurement specification (O&M). The framework implementation in the client visualises mesured data on the map, allows to generate line charts, offers an export interface (csv) and also allows SOS filtering due to the filter encoding (FE) specification.

A combination of wireless sensor networks (WSN), open source databases and web-based geographical information systems has been setup in the Swiss Alps. The observation points, also called 'nodes' are able to communicate with themselves, share their measured data and hop their measured data from one to the next until an upload gateway is reached.

We call this a self organising, self-healing network. In the actrual example project permafrost data, especially rock temperatures are measured in regions, where permanent

measurement and live access to measured data was not possible before. The question behind is what happens to permanently frozen ground (permafrost) in times of climate change and how does this affect on slope stability.

In the presentation we will focus on the software technique and use the pilot project to show a short live demo of the system and the OpenLayers integration.

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MDWEB 2.0 : A JAVA/JEE METADATA CATALOG

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ABSTRACT

Modern environmental research and action often evolves in a framework of joint projects and partnerships which depend on the effective sharing, accessing, and distributing of information including notably geographic data.

MDweb (http://www.mdweb-project.org/) is an open source generic tool designed for such distributed collaborative work. It provides a web service to catalog, and help others locate, resources, documents, and services for geographic or non-spatial information. MDweb is based on international geographic information standards for metadata and communications.

MDweb focuses on the spatial and semantic aspects in resource description and searches by using thematic and spatial reference bases specific to the target application. MDweb also includes extensive features to automate data entry and manage referential bases such as providing editing templates, building spatial databases and accessing thesauruses.

The latest version of MDweb, based on JEE technologies, implements the OGC CSW 2.0.2 specification using the ISO 19115 application schema.

This CSW implementation in the most recent MDweb draws on the Java language metadata implementation of the Geotools library to support multi-lingual searches while a transactional mode enables the harvesting of remote ISO 19115 compliant catalogs.

We will present MDweb, explaining its architecture, showing the design of our ISO 19115 compliant schema, and demonstrating the system using real world, on-line catalogs.

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APACHE VS LIGHTHTTPD BENCHMARK AND OPTIMIZATION FOR SERVING HUGE TILESETS

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ABSTRACT

This presentation will be based on a work I have done for the french Geological Survey. The first point is to monitor and compare Apache and LightHttpd performances for creating and serving huge tilesets (> 20 Millions).

The second point will deal with specific optimization which can be done on this kind of configuration (file formats, tilecache options...).

The third point will focus on hardware/architecture optimization to serve such amount of tiles (proxying, filesystems, RAID...).

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GEOSERVER AND THE GEOWEB

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ABSTRACT

GeoServer's goal has always been to make geospatial information as accessible as possible. In our early days that meant providing solid implementations of open standards (WMS, WFS(-T), WCS), but as the more consumer oriented 'GeoWeb' emerges we are additionally implementing new ways to expose geodata.

This talk will focus on those advances in GeoServer. Specifically the addition of "geoweb friendly" formats like KML and GeoRSS which allows for the emergence of standard GIS data formats onto the web. Support for these formats makes it extremely easy to push existing GIS data out to Yahoo! Maps, Virtual Earth and Google Earth/Maps.

Not only is the ability to share data on the web important, but so is the ability to search that data the same way we search the rest web. A recent advance in GeoServer has been the development of the "GeoSearch", which allows KML produced by GeoServer to be crawled by Google and searched via Google Maps.

Together these features make it extremely simple to expose one's data to the wider GeoWeb, making it available for others to mash-up and remix in new ways.

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GDAL/OGR PROJECT STATUS REPORT

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ABSTRACT

Project developers report on the status of GDAL/OGR project.

The report includes a review of user visible new features in the last couple of years, including new drivers, new core capabilities described via RFCs and progress in areas of focus such as thread safety and internationalization.

Feedback from the Sponsor Survey will also be presented followed by open discussions on suggestions for future work, and project improvement from the audience.

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GVSIG STATUS REPORT. TOWARDS AN OPEN ORGANIZATION

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ABSTRACT

gvSIG started as a first approach to become the open source geographic information system of the Regional Ministry of Infrastructures and Transport of Valencia region (Spain) within a full migration from proprietary to open-source software. As no powerful and friendly GIS tool was found, a brand new project was launched. It's partially being funded as a European Union R&D project.

A status report of gvSIG will be presented, introducing what gvSIG does right now. gvSIG is a desktop SDI/GIS client developed in Java, licensed under GNU/GPL. It runs on Linux, Windows and MacOS and has a high focus on standards and interoperability.

So far, as a GIS client, gvSIG can access local vector formats (Shapefiles, GML, KML, DWG, DGN, DXF), raster formats (ECW, MrSID, Erdas, Envi, GeoTIFF, ...), geospatial databases (PostGIS, Oracle, mySQL, ArcSDE) and remote servers (ECWP, ArcIMS). As an SDI client, gvSIG supports the following standards: WMS, WMC, WFS, WFS-T, WCS, WFS-G, catalog (SRW, CSW, Z93.50), GML, SLD, Filter Encoding, gvSIG features a powerful GUI, with overview map, thematic mapping, simple symbology, data tables (attribute browsing, filtering, joins, field calculator, table structure editing,...), raster settings, geoprocessing, graphic editing (CAD-like editing, snapping, complex selection, ...), as well a many other capabilities (event layers, annotations, reprojection engine -with PROJ4 wrapper-, scripting engine, ...).

It can export geospatial data to GML, SHP, DXF, KML, Oracle or PostGIS, and supports layouts (scales, graphics, legends, north arrows,...).

There is a good relationship with SEXTANTE project, which offers on top of gvSIG a powerful framework for vector and raster analysis, with around 200 algorithms, a model builder, batch execution or command line interface. Also, some details about project dimension will help to clarify project diffusion and community adoption.

Another important goal of the communication is to describe what the project is working on. There are a bunch of subprojects under development within gvSIG, some of them having already published pilot versions: Raster and Remote Sensing, 3D, Network Analysis or gvSIG Mobile. Other subprojects are being developed, with soon publishments: Web service publication (aimed at generating configuration files for MapServer, GeoServer, deegree or GeoNetwork), advanced symbology & labelling, topology support, metadata editor, BXML.

New sub-projects will start working on topograhy or sensor web enablement.

Finally we'll state what the project envisions, to create an open organization for enabling a collaborative framework which will ease the work among all actors, allowing anyone to integrate into the project in an agile and open way. This open organization aims to promote FOSS4G, to help to switch from knowledge speculation to collaboration, to sustainability, to find meeting points with other projects, to certify quality, to keep equality, to generate highly specialized ICT firms, among other goals. Some steps has already been done towards openness: full user documentation, developer documentation, tutorials, plug-in repository, self-moderated local mailing lists..More steps are being done: collaborative testing, on-line localization, accessible SVN.

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A FREE GRAPHICAL MODELING TOOL FOR GEOSPATIAL ANALYSIS

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ABSTRACT

When working with GIS, it is common to perform calculations that involve several steps. While most proprietary GIS feature some kind of graphical modelling interface (i.e. ArcGIS ModelBuilder or IDRISI Macro Modeller), no free GIS application has a similar tool. Although analysis capabilities are well developed in free GIS, users do not have the necessary tools to graphically create models based on those capabilities, and must rely on scripting languages and command-line interfaces to automate those tasks that involve several steps.

This presentation will introduce a graphical modelling tool that allows users to quickly and effectively create models. This tool is included as a part of the SEXTANTE project, a set of more than 200 extensions for the free GIS gvSIG, and models can be created using any of those extensions.

Models can be saved and included as new extensions in the SEXTANTE toolbox, so later can be used by any of the remaining SEXTANTE elements, executed as batch processes or even included as a part of a new model.

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THE USE OF FOSS IN URBAN MODELLING AND SIMULATION

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ABSTRACT

"An explanation of how UrbanSim is used to address challenges in developing nations by modelling and simulating urban environments"

Africa is experiencing unprecedented urban growth. This level of urbanization will place enormous pressures on social, ecological, economic and infrastructure systems. Cities, as the engines of national growth, competitiveness and global connectivity, face many complex issues, including competing in the global economy, providing and maintaining services to millions of people amidst huge urban poverty, high levels of crime and environmental degradation.

The Urban Dynamics Laboratory (UDL) is being established at the CSIR to develop a capability for modelling and simulating the dynamic and interactive nature of complex systems. The facility will be used both as a vehicle for developing, refining and validating models and software, and as a practical workbench that can be used for applications varying from testing theories developed in urban sustainability science, to providing science-based decision support in urban planning and design to all tiers of government.

The crux of any modelling exercise is to find the most important characterizations of a real world system, and then to search for the most truthful representation of these characterizations in the modelling system, taking into account the unpredictability, instability and the irreducibility(holistic nature) of the system. UrbanSim (the free and open source software) is being evaluated as the primary simulation platform for the UDL. It is a prime example of a new breed of simulation tools that are capable of modelling individual agents, such as households, businesses, developers and government agencies to study the dynamic interaction of these agents with their environment and implications for urban development, including land-use, transportation and congestion, service provision and the environment.

The UrbanSim model system consists of a number of models, including a household transition model, household mobility model, household location choice model, employment transition model, employment mobility model, employment location choice model, accessibility model, land price model, a development model and can be loosely coupled to a variety of transport models. The number of variables used by these models are by no means trivial, for example 8 variables for each of 1.3 million households, 8 variables for 1.8 million jobs, 13 variables for 1 million buildings. In addition the spatial variation of these (nearly 40 million) variables are known at a spatial resolution as small as a 150m x 150m gridcell.

The presentation will explain how UrbanSim is used for modelling and simulation of urban systems and why UrbanSim was chosen as the primary simulation software for the UDL. A detailed technical overview will be given on the functioning and implementation of UrbanSim.The presentation will cover the research done over the past 2 years as well as present the results from the first simulation runs with South African data and how the UDL team will attempt to alter the UrbanSim software to adapt to the challenges of the South African dual economy and the scarcity of data. The contributions towards the software and modelling in terms of variable size grid cells and indicators will also be discussed.

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THE USE OF FOSS GIS IN INTEGRATED GEOGRAPHICAL SYSTEMS IN LOCAL GOVERNMENT IN SOUTH AFRICA

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ABSTRACT

Are there alternatives to ESRI ArcGIS for Local Government in South Africa?

It is general knowledge, that in February 2007, the South African Cabinet approved a free and open source (FLOSS) strategy whereby government will migrate its current software to open source software. This has far reaching implications for all levels of government and various debates are currently discussed around issues such as the unknown risks and level of maturity of software. What is however clear, is that a requirement has been placed by National Government.

Within the OSS community, much development is being undertaken on GIS software. There are, however many debates and uncertainty on the viability of FLOSS for Local Government. On the one hand, FLOSS proponents claim that FLOSS is viable, and on the other hand, non-FLOSS proponents state various disadvantages to claim the opposite. This creates a certain risk in the implementation of FLOSS software, due to uncertainties related to support and software maturity. However, risks needs to be managed in terms of support of software, customisability and adherence to software and data standards such as OGSC compliancy. Maturity needs to be assessed in terms of software development maturity and organisational/departmental maturity.

In order to embrace such technologies, the results of research into the development of Hybrid Geographical systems are presented. A hybrid software scenario would suggest a combination of Proprietary software, and FLOSS software where it seems viable. It is important to note that two different systems are not proposed, but that one merely embrace the advantages of tried-and-tested technologies (such as what proprietary software has to offer), while also embracing the potential and Governmental requirements FLOSS has to offer.

Such an approach can manage risks and software maturity issues identified within FLOSS GIS software, where for example, ESRI Arc GIS Server can be used to manage spatial data into a MS SQL geo-database (which is generally recognised as mature technologies), from where FLOSS GIS viewer technologies be used to publish GIS data to less GIS sophisticated users. Alternatively, geo-data are managed within the ESRI ArcMap environment, and interfaced to Postgres (a FLOSS database) and PostGIS (a FLOSS spatial map interface and alternative to ESRI ARCSDE), from where FLOSS viewers, such as MapServer create GIS maps on an intra- or internet platform. This solution provides for an alternative where ESRI ArcSDE and MS SQL are not purchased, thus having savings in terms of software licensing.

As part of the presentation, a case study will be presented where such systems are being implemented at at least 22 Local Municipalities in South Africa.

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EVALUATION OF SUSTAINABILITY INDICATORS FOR COASTAL MUNICIPALITIES OF THE STATE OF RIO DE JANEIRO (BRAZIL) USING FREE SOFTWARE

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ABSTRACT

The State of Rio de Janeiro, in accordance with the "Demographic Census 2000" from the Brazilian Institute of Geography and Statistics, is the brazilian state with bigger ratio of urban population (96.52%). With population expansion, the formulation and application of the techniques to monitor and control processes induced by human activities at the coastal zone are basics to the social secure in harmony with the environment. This paper shows the evaluation of the sustainability indicators for the coastal cities of the State of Rio de Janeiro (Brazil), leading account the analyzes of 41 socioenvironmental thematic indicators, calculated from 49 parameters, using six different dimensions of sustainable development (space, cultural, economic, ecological, social and politics). Those were applied to 34 coastal municipalities from Rio de Janeiro (Brazil), classifying these in regions with low, middle or hight degrees of the anthropogenic impact. The basic data sets were obtained from oficial institutions and data not informed in the sets (5%) were calculated by the bivariate statistics correlation. All data were treated with free software (Debian Sarge GNU/Linux, MySQL Server 4.1 and Web Server Apache 2) and the final product, available at Internet, the "Atlas of Sustainability Indicators for Coastal Municipalities of the State of Rio de Janeiro, Brazil", was writed in PHP (PHP Hypertext Preprocessor) language, including the thematics maps online generated. A logical model of database was developed to store the data and the metadadata associated. The indexes of each dimension were calculated by arithmetic mean of the components indexes. The final index "General Index of the Anthropogenic Impact - GIAI" was calculated by weighted arithmetic mean, with value of 2 to pound applicated to indexes of the economic, social and ecological dimensions; value of 1.5 to pound applicated to indexes of the space and political dimensions and value of 1 to cultural dimension. Exploratory statistical analysis was realized to base the classification of municipalities, following the intervals: a) High impact - maximum value of the series to limit 1 (L1), where L1 = (mean + standard deviation of series); b) Medium impact - limit 1 (L1) to limit 2 (L2), where L2 = (mean - standard deviation of series); and c) Low impact - Limit 2 (L2) to minimum value of the series. When the sum or difference between the mean and the standard deviation exceeded the limits of maximum or minimum values, the standard error of the mean was used in substitution of the standard deviation at the formulas of the L1 and L2 limits. As principal results obtained, the cultural dimension showed the bigger average (0.7925 ? 0.2568), followed of politics (0.6214 ? 0.1305), ecological (0.3618 ? 0.1775), social (0.3431 ? 0.1131), space (0.3398 ? 0.1383) and economic (0.3014 ? 0.0587). The greater percentual of municipalities with index above of the average was obtained for the cultural dimension (70.59%), followed of ecological, economic, social and politics (52.94%) and space (47.06%). In relation of the GIAI, 52.94% of the municipalities showed indexes above the mean, where 38.89% of municipalities belonged to Guanabara Bay Litoral, 38.89% to Lakes Region Litoral, 16.67% to North-fluminense Litoral and 5.56% to South Litoral. The three higher indexes of anthropogenic impact were obtained to the municipalities: Belford Roxo (0.5123), Rio das Ostras (0.4987) and Rio de Janeiro (0.4962). And the three lowest indexes to: S?o Jo?o da Barra (0.3041), Nil?polis (0.3400) and Paraty (0.3480). The use of the free software is incentivated for governamental organizations to reduce costs of treatment of socioeconomic data and to guarantee stability and security of applications. The evaluation of sustainability indicators contributes for the analyses of the socioenvironmental characteristics of coastal cities, still searching to perfectioning the public polices instruments effectives at Brazil.

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INTEGRATING COMMERCIAL AND OPENSOURCE SOFTWARE FOR AN ENVIRONMENTAL HEALTH INFORMATION SYSTEM FOR THE CITY OF TSHWANE METROPOLITAN MUNICIPALITY

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ABSTRACT

In December 2000, various municipalities within the functional area of Pretoria were amalgamated to form the City of Tshwane Metropolitan Municipality (CTMM). This has enlarged the jurisdiction of this local government enormously, with some of the poorest and least developed areas in Gauteng being incorporated into this municipality.

CTMM inter alia has the responsibility to ensure a healthy environment for all its citizens. As part of this responsibility it must reduce environmental health factors (such as Cholera and food poisoning) to safeguard the health of its population. Therefore it is crucial for the Environmental Health Services of CTMM to have access to up-to-date information. Unfortunately due to the fact the CTMM previously were independently managed by various municipalities, the various environmental health offices were using disparate systems, comprising sometimes of manual hard copy systems. Management and dissemination of environmental health information proved to be difficult and necessitated an integrated approach to facilitate access to all relevant information.

An Environmental Health Information System (EHMIS) for the Environmental Health section of the City of Tshwane Metropolitan Municipality (CTMM) was successfully implemented during the course of 2004. A web-based system with a user-friendly interface was developed on MapGuide OpenSource that allows users to access information via the intranet for query and reporting purposes. The database was designed and structured using SQL Server technology, as required by the Municipality. The above architecture ensures sustainability of the system due to the fact that it can be maintained and supported in-house, if the client has the ability to do so. The security module enables CTMM to determine the users of the system and the functionalities that they can access. Therefore, the web-based system enables all personnel with authorisation, such as Environmental Health Practitioners and their managers, to view up-to-date information on a daily basis, as well as to capture and report on environmental health information.

Due to the fact that the system is Intranet/Internet based, it could be possible for the public in general also gain access to view certain non-sensitive information, provided that the Municipality would approve such access to the public. The system was designed according to the specific needs of the various Environmental Health Practitioners and managers, which were determined at user and system specifications workshops. User training was conducted to nominated staff from CTMM, subsequent to the implementation of the system.

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OPEN SOURCE WEB-GIS OF THE UN HIGH COMMISSIONER FOR THE REFUGEES (UNHCR): A MODEL FOR THE UN

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ABSTRACT

UNHCR manages important amount of geospatial information and is looked after to increase its dissemination to a large community of partners and users. This ranges from large scale mapping at the level of refugee camps, to global aggregated distribution maps of displaced populations. Committed to the design and development of the UN Spatial Data Infrastructure (UNSDI) and to the improvement of the delivery of its GIS outputs, UNHCR has developed a solution based on MapFish open source software and a suite of other open source tools. The solution provides for the marginal connectivity conditions the field operations are executed in and for the need for simple and "procedure-light" mechanisms for database development and maintenance.

The Web-GIS is a central component to the Operations Support Portal being developed by UNHCR and will serve the integration of multi-source tabular datasets and other georeferenced information. The Web-GIS has innovative tools for the automation and homogenisation of data process flows permitting offline operations and synchronization of data produced or used at the different levels.

The integrated application uses open source software such as PostgreSQL/PostGIS, Spatial Data Integrator powered by Talend, GeoNetwork metadata catalogue (UNSDI standard), GeoServer/MapServer, OpenLayers/MapFish, ExtJS and Google Gears. The choice of an open source solution also strengthens collaborations with a number of partners groups, both at the global and local levels.

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IMPROVING OPEN SOURCE GIS-SDI INTEGRATION: THE WEB SERVICE PUBLISHING EXTENSION FOR GVSIG

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ABSTRACT

In the open source domain, desktop GIS tools have usually been clients -consumers- of standard web services (Web Map Services ,WMS, Web Feature Services -WFS-, Web Catalog Services -WCS-, Catalog Services for the Web -CSW-, and others) which are provided by commercial or open source server-side software like MapServer, GeoServer o GeoNetwork. Each OSS server-side technology has developed its own mechanism for creating and configuring these services, typically by using text files or simple web pages, but far from an interactive GIS-like user interface.

For this reason, publishing standard geospatial web services is still considered by many users as an off-line task for specialized technicians rather than something they can easily do themselves. It is also a disadvantage of an open-source GIS/SDI stack compared to a single-provider commercial solution.

The need to better integrate desktop GIS with the creation and management of geospatial services arose in the Regional Council of Infrastructure and Transport (CIT), the governmental agency which also funds most of gvSIG's development. The gvSIG publishing extension was thus born, as a way to ease the process of producing geospatial services equivalent to the data and maps managed in the desktop GIS. A separate project developing a gvSIG extension for metadata creation and publishing (to Geonetwork) is carried out by the University Jaume I of Castellon, and the current paper focuses on the publishing of the map and data services.

The architecture of the publishing extension is designed following the plugin concept which pervades gvSIG, with a common user interface and core functionality to access the GIS objects (views and data layers) and connect them to the plugable components which create the specific configuration files or messages depending on the publishing target. Specific exporters are registered to deal with a defined service (e.g. WFS) for a certain target (e.g. GeoServer).

The extension allows users to export a WMS service from a gvSIG view (a 'map' with a number of layers), replicating all the symbology and visibility information from the view, so the visual result of the WMS output will be equivalent to displaying the view in gvSIG. Similarly, the user can choose a number of feature layers from a view to be exported as WFS services, or raster layers to be published as WCS services. At this point, exporters for MapServer and GeoServer targets have been developed. The paper and presentation will show practical examples of these functions.

The extension has fulfilled its initial goals, allowing the users in the CIT to easily publish and update services directly from their daily GIS environment into their production server without specific knowledge of the involved server tecnologies.

As future work, it remains important to establish a more fluid integration that enables the desktop GIS to manage the configuration of the services, that is, not only to export this configuration but also to be able to read it into gvSIG projects and perform updates. In addition, support for more technologies (DeeGree) and services (SOS, WPS, WFS-G) is planned, without major changes in the established architecture.

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DEVELOPING OPEN SOURCE TOOLS FOR REGIONAL LAND USE PLANNING

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ABSTRACT

Aboriginal land claims for most of Yukon Territory (the westernmost part of Canada's north) have now been resolved between the Government of Canada, the Yukon First Nations and the Government of Yukon. Under the terms of First Nation Final Agreements, appointed regional land use commissions are expected to reach consensus about resource/development issues, and recommend a common Land Use Plan for both First Nation Settlement Lands and Crown (public) land. Land use plans provide guidance on appropriate types and levels of activity. Management priorities are established to meet social, economic and environmental objectives. Responsibility for land and resource management decision-making is shared between departments of government, First Nations, co-management boards, industry and other land users. The first regional land use plan was recently completed in North Yukon, in the traditional territory of the Vuntut Gwitchin First Nation (NYPC, 2008). A recommended plan for the Peel River watershed is expected to be complete by December, 2008.

A regional planning process results in a large repository of land and resource-related knowledge - both scientific and traditional. This includes biophysical classification and mapping, a large amount of wildlife, fish and habitat-related analysis, development footprint mapping, and a variety of economic assessments, most notably tourism, oil and gas, and minerals. The North Yukon LUP further proposes that management of multiple land use activities (cumulative effects) be done through the application of indicators and thresholds as part of a Sustainable Development framework. On-going access to the repository of planning data is necessary for monitoring and assessment of indicator status.

In 2006, the Yukon Land Use Planning Council led a multi-participant project to develop an on-line 'atlas' of regional data. Our end-users want concise and accurate information about regional landscapes (1:250k scale) and the means to use that information to make choices about future development. The end users understand the challenges of assembling data from multiple sources, and want a significant improvement over a DIY approach to mapping. With funding provided through the Canadian Geospatial Data Infrastructure (CGDI) initiative (GeoConnections), an application was developed using free Open Source software for everything!

This presentation will discuss how to leverage robust FOSS components and standard protocols (OGC:WMS) to create stable platforms for distribution of value added information products. As fundamental elements of good application design, processes for establishing user needs, functional and non-functional requirements will be reviewed, including descriptions of use cases. It will be demonstrated that a small organization, with limited resources, can use existing data and FOSS to meet its goals within a reasonable timeframe.

Analytical capabilities of FOSS will be used to provide an example of how the information within the Atlas may be useful to the regional land use 'community of practice'. Tools for management of Atlas content, including assignment of map, layer, and widget access privileges by user group will be demonstrated. It will be shown that complex GIS analysis need not require expensive proprietary systems.

Finally, the Atlas will be used to evaluate 'baseline' cumulative effects indicators relating to oil and gas sector activity. Linear feature density and surface disturbance values will be calculated and compared for different areas within the home range of the Porcupine Caribou Herd.

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RISK MODEL FOR OSS: VALUING HIDDEN COSTS

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ABSTRACT

IT based industries have shown great interest in Open Source Software (OSS) over the past few years. The fundamental reason for the exponentially expanded share of the OSS products in the industry may seem to be reduced R&D costs and time. The visible actual costs associated with OSS at first blush points to licensing costs. What people don't recognize while using the OSS are the hidden costs, which are realized sooner or later. An old joke on software goes like: Software, free. But hey the manual costs only $10,000. A severe threat to the open source industry is from the communities of patent holders who can at any point of time smack the open source licensees by filing an infringement suit.

It is valuable to understand the virtual costs and prepare a model to evaluate the risks and costs involved in using the OSS. We have tried to prepare a risk model for the same in an organized fashion. Without a single well-defined risk assessment technique and model, every company is using its own models to assess the risk (if it does so in the first place). Many ways can be implemented for leveraging the quality of the model, one of which has been discussed over here. A way of sharing modules with your external associates (R&D partner) can increase model's accuracy and reliability by choosing a common denominator to combine both the assessments.

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