Establishment of the National Spatial Data Geoportal in Croatia

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SUMMARY

State Geodetic Adminsitration (SGA) of Republic of Croatia obliged to establish Multipurpose Spatial Information System (MSIS) fostering national needs for efficient and rationale use of spatial data produced by governmental bodies and private sector. Establishment of MSIS anticipates development of national databases for the products in the responsibility of the SGA and their connection into a unique information system that will allow the users to use the data effectively and expand them by their attribute data.

Number of databases in SGA have been developed for this purpose and as a next step development and establishment of a SGA Geoportal has been contracted. The mentioned contract represents first step in Geoportal development and inculdes development of five databases, creating functionalities among them, data distribution system through the Internet. Through Geoportal the data submitted by SGA will become available gradually from the second half of the year 2006 to users and public by means of public pages on Internet.
Present achievements, techical specifications and functionalities as well as importance of this activites are described in this paper.

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1. INTRODUCTION

By setting up Croatia's first National Geo-portal, SGA implicitly takes over the responsibility for establishing the initial building block of Croatia's National Spatial Data Infrastructure (NSDIC). To continue the NSDIC implementation process in a purposive and structured manner, it is important that SGA's efforts are perpetuated and an institutional framework is being established which provides the necessary capacities, structures and procedures to fulfill future coordination and maintenance tasks

The Geo-portal becomes the first & major access point for distributed geo-information resources in Croatia. It can be seen as the initial building block of a future NSDIC and therefore has to be accessible by the whole Croatian GI-Community (consumers and providers). By establishing the Geo-portal, SGA becomes a Croatian provider of basic services to easily register, execute and integrate external (standardized) GI-Services across the Internet.

2. DATA

MSIS will integrate databases of aerial photographs and digital ortophoto maps, topographic and cartographic database in scales from 1:5.000 to 1:1.000.000, Central Register of Spatial Units, database of permanent geodetic control points and databases of scanned and vectorized cadastral maps. Out of these, this project will include scanned Croatian Base Map (HOK) 1:5.000, Digital Ortophoto 1:5.000 and scanned cadastral maps in various scales. It will also realize links to existing databases of Central Register of Spatial Units and Database of Permanent Geodetic Control Points.

3. SYSTEM DESIGN METHODOLOGY

The Geo-portal as an internet access point to spatial data is an Open Distributed Processing (ODP) System. Reference Model for Open Distributed Processing (RM-ODP) is an ISO standard that provides a framework to describe specifications of ODP systems. Its unique feature is the introduction of five independent viewpoints on the system: Enterprise Viewpoint, Information viewpoint, Computational viewpoint, Engineering viewpoint and Technical (Technology) viewpoint. OpenGIS consortium (OGC) also adopted the RM-ODP, with aim to support distributed GIS and interoperability.

The Consultant team will use RM-ODP for the system design specification. Four of the five viewpoints will be produced.

Enterprise Viewpoint contains the specification of the functional and non-functional requirements, the enterprise-level design, and the description of user interfaces.

Information viewpoint defines what data is exchanged in the system and what the information products are.

Computational viewpoint defines system modularization and logical architecture.

Technical viewpoint describes realization of the modules, technical environments and network architecture.

4. TECHNOLOGY AND PLATFORMS

Although this viewpoint does not define any technology of the system, some strategic directions regarding technology were already set at the time of tender.

Consultant's understanding of the SGA's investments in technologies drives us to the conclusion that the DBMS platform for this project should and will be Oracle. This was confirmed by a requirement on the skills and experiences of the consultants in the Tender documentation that explicitly demanded for Oracle experience.

Another strategic decision clearly set by the Consultant team was that GIS platform for majority of functions will be ESRI. And finally, for the functions of product ordering sdi.suite software from con terra will be used. As regarded other software, like operating system platforms, Web servers and alike, as well as for hardware, the final choice will be made in the specification that the Consultant is responsible to put together.
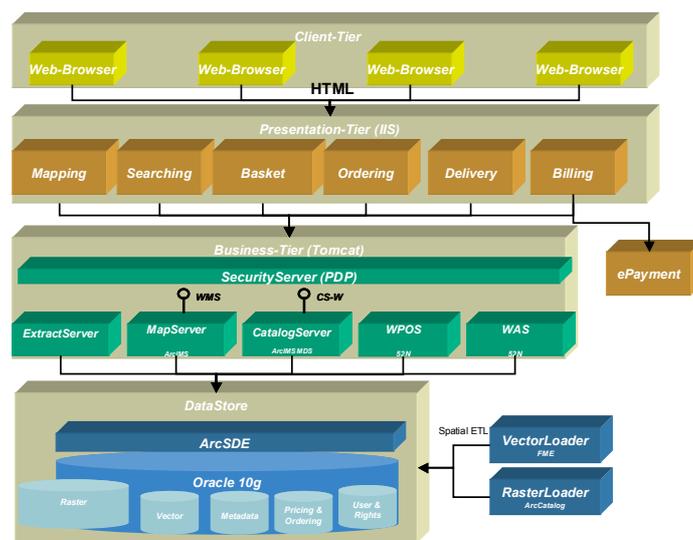

Figure 1 – Draft architecture of the system

5. FUNCTIONAL

5.1 Metadata search

There must be two levels of metadata search – one is simple search, and the other is expert search based on more specific fields.

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5.1.1 Simple search

The simple search view is the default compartment for defining queries. It offers an option to define a spatial filter interactively as well as a thematic filter using just a few input fields.

The map could be navigated by the user (zoom in/out, pan). The contents of the map may change on different scales.

5.1.2 Expert search

In difference to the simple search, the expert search will offer additional query attributes.
The expert search will expand the simple search be simply expanding the view compartment with additional input fields for the expert query attributes. The existing ones will remain and used in the same way as in the simple search.

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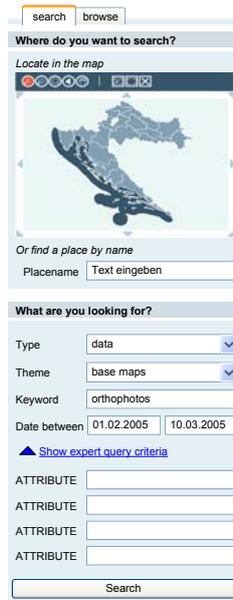
5.1.3 Spatial metadata search

Spatial metadata search enables for defining search envelope (rectangle) on the map. The map is produced by the map viewer service of the Portal and supports pan/zoom operations.

5.2 Channels

Geo-portal should support channels. These act as filters to narrow general scope to specific thematic areas. Basic channels are: Home, Data, Services and Applications. Geo-portal should be open to add new channels later.

As part of the header compartment there are buttons that allows the user to switch between different so called „channels". Channels aim to separate the content at a high level to ease the access for the user. Besides the „home"-channel there are three different channels, one for each coarse grained type of resource:

- data
- services
- applications

The channels will display information, news and promotion, and/or direct access links for certain resources of that type. A channel is also a good context for some help, tips or advices to the user. The following example shows how the application channel looks like.

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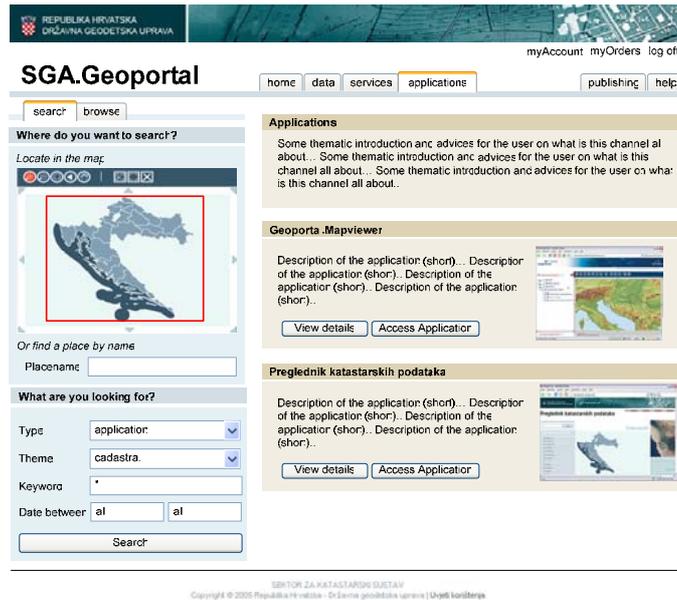
5.2.1 Acquire data

When a dataset is found through metadata search, it is listed in the Data Series channel. Near each entry that is supported by SGA WWW Data Sales there must be a link that introduces the user to the dataset order and sales process.

5.2.2 Engage application

Upon finding application through metadata search, the Geo-portal must enable engaging the application that lies behind its URL – or linking to the URL.

5.2.3 Integrate service

If the found resource is a geospatial data service, i.e. OGC WMS or ArcIMS Image Service, the Geo-portal must enable starting the map viewer that can integrate that service and display it. If the map viewer is already started and has already mapping services added, the newly found resource from the search engine is simply added to the content in the viewer.

5.3 Map Viewer

The map viewer is intended for users of the Geo-portal to view the geographic content of the available services. When a service is found by metadata search, the user can click on the button "View Service" to start the map viewer and display the content of that service. If the map viewer is already started, the service is added to the content of the map.
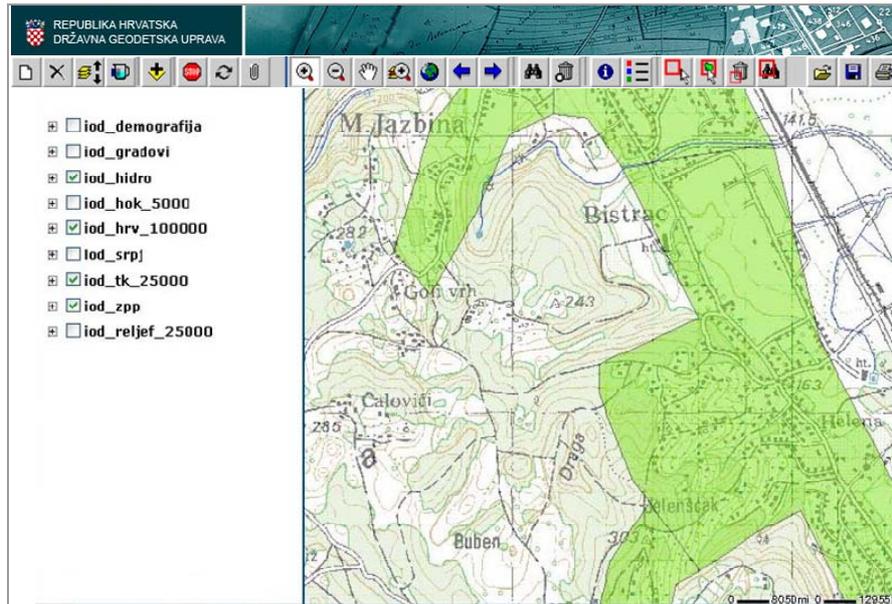
The map viewer supports all necessary functions of a GIS map viewer such as adding layers, map navigation, spatial query, map legend and saving maps.

- adding OGC WMS and ArcIMS Image Service to the map content,
- removing services from the map,
- displaying the services,
- changing order of the layers,
- map navigation (zoom-in and -out, pan, zoom to full extent / visible services, previous/next map extent),
- map query ("identify"),
- display map legend,
- find places,
- save map / open saved map,
- print
- change of spatial reference systems (only requesting different srs epsg-codes from the servers, not re-projection in the viewer itself)

5.4 WWW Sales

5.4.1 Selecting products

WWW sales must support selecting products resulting from metadata search of the Geoportal with aim of ordering those products. The selection methods that should be supported include spatial selection and selection from the list of article. Spatial selection can be by reference geometries (map sheet index) or custom rectangle.

5.4.2 Configuring products

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It must be possible that a set of selected articles (one order-position) is configured, meaning that the user can chose from predetermined output formats, spatial references and quality level (resolution).

5.4.3 Shopping basket

Shopping basket must support viewing the selected articles, as well as viewing the approximate total price. It must be possible to delete articles from the basket.

5.4.4 Checkout

Checkout of the ordered articles must be supported with entering the billing and eventually the shipping address, as well as the payment method. Checkout is finalized by checking the "Order Now" button.

5.4.5 Credit card payment

Payment using credit cards should be supported. The credit card data must not reside at the Geo-portal and SGA WWW Sales at any time. Credit card authorization must be utilized over one of the authorized companies. At least four major credit cards must be included.

5.4.6 Orders review

It should be possible for the user to review his/her previous orders and see in what status they are.
The following sketches will illustrate the workflow of a user finding a dataset through a query (using the simple search), evaluation the metadata of that dataset and accessing it through the order process.

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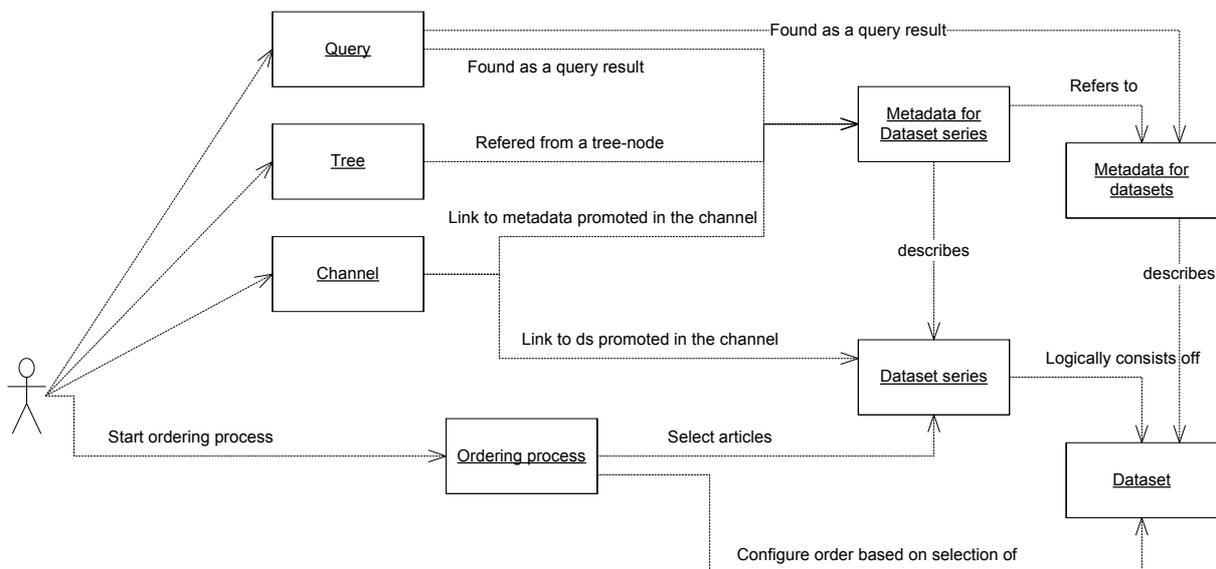
5.5 Authorization and authentication

5.5.1 User registration

The system must enforce registration of the users before they can start using the functions of the system. At registration each user shall enter the required data, including name, e-mail address, system username and password. Upon entering these data, the system must send an e-mail to the user's e-mail address with activation code for first login.
Anonymous users can register to use resources available for them.

5.5.2 User login and authentication

The system must enable users to log in to the system.
The system must ensure the authentication of the users based on the username, password and user activation code.

5.5.3 User authorization

The system shall enable assigning roles to the users. The roles determine what actions a user can take and what resources he/she can use.

5.5.4 Administration of users

The system should enable administration of users:
- setting up user roles
- adding and deleting users
- editing users' properties (roles, passwords, etc.).

The Geo-portal authorization system is a role based system. Roles are groups of users which have different rights to some portal resources. These resources are mainly different portal pages but also partial page elements. For example an anonymous user cannot see the Publish link in top horizontal menu while a logged-in user who is in a role that has rights to view this page will see the Publish link.

Picture above is anonymous user view and next picture shows menu as seen from the perspective of logged-in user who is in role with rights for the publishing link.

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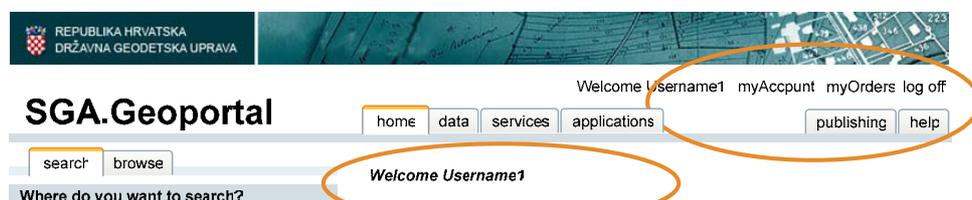
The Geo-portal admins role is a role with rights for administering users and roles. If the admin user is logged into the portal he has different links in the main horizontal menu than other users.
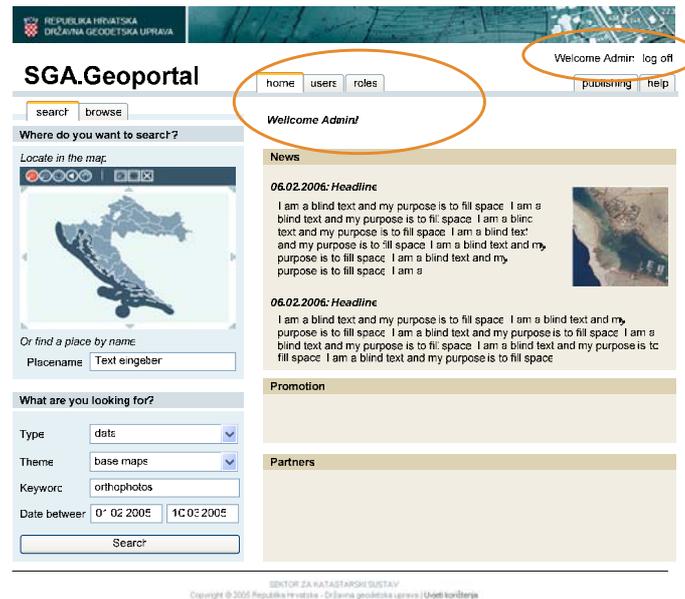
As you can see on the picture above the admin user has available two specific links – Users and Roles. These links open forms for adding/updating/deleting the portal users records and also for managing portal roles and adding users records to selected roles.

Administrator of Geo-portal has admins role, which is built into the system and cannot be seen in this list neither can be edited.

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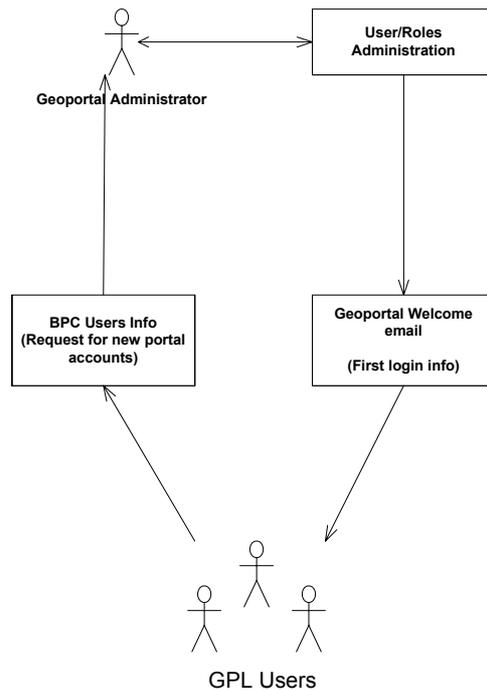
6. CONLUSION

The Geo-portal implementation basically relates to the first step of the INSPIRE implementation plan, namely the harmonization of documenting existing datasets (metadata) and provision of tools to make this documentation accessible. That does not only imply that services to support metadata creation and validation (against standard schemas) have to be provided, but also that metadata creation itself is a major part of the portal's implementation process.

As long as no final guidance documents are available, the adopted proposal for a directive of the European Parliament and of the Council to establish an Infrastructure for Spatial Information in the European Community (EC 2004) and available position papers, particularly on Architecture & Standards (SMITS 2002) and Reference Data & Metadata (RASE ET AL. 2002) shall form the basis for the portal design. For SGA, being able to react on latest developments as well as staying in touch with relevant INSPIRE Drafting Teams together with consultanting team, during the Geo-portal implementation phase and afterwards maintenance phase is important.

The main objective of the Geo-portal itself is to establish the Publish-Find-Bind pattern for SGA and other providers offered geospatial resources. Resources in that sense are of the following:
- Geospatial datasets (data-products)
- Geo Web Services
- (Web-)Applications and other undefined resources

A key-objective of this project is to establish the ordering-process (www-sales) for SGA´s geospatial data products.

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Another goal of the Geo-portal is the role of a nucleus for the National Spatial Data Infrastructure (NSDI) Croatia

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Professional career started 1984 in different companies performing various geodetic assignments. From 1989 until 1996, he worked as associate professor at the Geodetic Faculty of the Zagreb University, teaching Photogrammetry I, II, III classes. Joined State Geodetic Administration of Republic of Croatia 1996. In 2000 appointed for assistant director for Topographic Surveys and State Maps Division.
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Professional career started 1997 in construction company as geodetic engineer. Since year 2000 employed in State Geodetic Administration of Republic of Croatia. Head of department for topographic survey and cartography since 2004. Member of working group for ISO/TC 211 Geographic information/Geomatics, and active member on several projects in SGA

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