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Computer Assisted Education for Environment Protection

NaturNet Plus

Design of training platform

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1. Abstract

The document describes the design of architecture for the NaturNet Plus training platform. On the basis of user requirements the initial architecture of NaturNet Redime project was modified and extended. The main focus was on introducing the principles of social networks into the educational platform. The platform should support one of the principles of educational social networks.



2. NaturNet Plus Platform Design Background

The NaturNet Plus educational platform is based on the former NaturNet Redime portal. The initial portal will be adopted and modified on the basis of User Needs analysis^{1,2,3}.

The NaturNet Redime portal for presentation and sharing of knowledge and tools about European sustainability was not established as a single application offering people information or learning content. It was built as an interoperable network, with effective exchange of information, knowledge, services, etc.⁴

The NaturNet-Redime version of portal offered the following possibilities:

- Publishing of metadata
- Searching for information
- Composite different information
- Visualising information
- Providing training
- WikiMedia
- Videoconferencing
- Support for qualitative reasoning

The NATURNET-REDIME platform was designed as a wide range of tools and functions, which provides data combinations from various sources.

¹ Web On line questioner for collection of regional user needs, NaturNet Plus report, Praha 2010

² Dissemination strategy for NaturNet Plus, NaturNet Plus report, Praha 2010

³ The Recommendation for NaturNet Plus, NaturNet Plus report, Praha 2010

⁴ Final activity report, NATURNET-REDIME, New Education and Decision Support Model for Active Behaviour in Sustainable Development Based on Innovative Web Services and Qualitative Reasoning, Praha, 31/10/2007

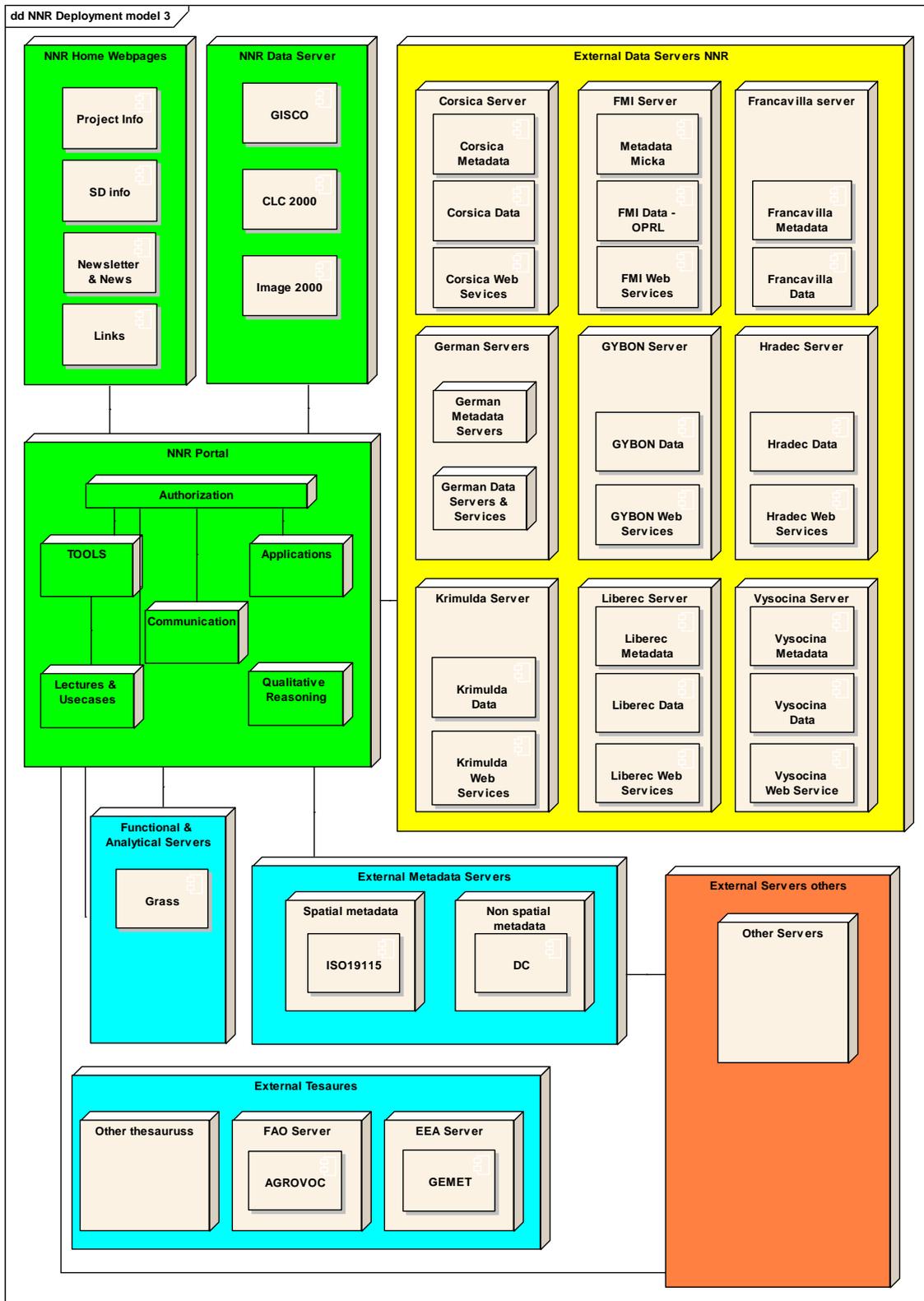


Fig. 1 - NaturNet-Redime Deployment model.



The NaturNet-Redime portal was established for presenting and sharing of knowledge and tools about European sustainability. This educational system was open to other existing interoperable systems. The system was possible to use for awareness about tools developed in running and future FP6 projects. The publishing of these tools and information on the NaturNet Redime portal was possible without interaction of the NaturNet-Redime portal programmers. It was possible to publish the data directly through the NaturNet-Redime metadata system Micka. The NaturNet-Redime portal supported publishing of spatial information using OGC Web services and also publishing of any information and tools accessible on the Internet.

2.1 NaturNet Uniform Resource Management (URM)

The main objective of URM was easy description, discovery and validation of relevant information sources. URM ensures that any user can easily discover, evaluate and use relevant information. Context strongly influences the way how the information will be used. There are different definitions of context in existence. Many context attributes characterize the environmental information or knowledge. From the point of view of context, the information or knowledge could be divided into different parts:

- Information or knowledge provider i.e. a party supplying the resource.
- Custodian, accepts accountability and responsibility for the resources and ensures appropriate care and maintenance of the resource.
- Owner of the resource.
- User, who uses the resource.
- Distributor who distributes the resource.
- Originator who created the resource.
- Point of contact to be contacted for acquiring knowledge about or acquisition of the resource.
- Principal investigator responsible for gathering information and conducting research.
- Processor who has processed the data in a manner such that the original resource has been modified.
- Publisher, i.e. party who published the resource.
- Author, i.e. party who authored the resource.

A possibility for solving the discovery problem within a context is to use metadata for standardised description of any information, knowledge, data sources, sensors, etc. In combination with standardised lists of terms (controlled vocabularies or thesaurus, standardised way of geometric location, gazetteers and controlled list of categories), it will increase efficiency of discovery of requested knowledge, information or data sources. Metadata is descriptive information about an object or a resource whether it is physical or electronic. While metadata itself is relatively new, the underlying concepts behind metadata have been used for as long as collections of information have been organized.



3. User communities and needs for implementing social networks support

NaturNet Plus is mainly targeting the following groups:

- On local level – the project partners (politicians and decision makers in the field of environment and tourism, regional and local governments, cities, ...)
- On regional and interregional level (public authorities, private companies, associations, universities, tourist offices, tourist industry)
- On national and European level (expert panels on basic issues of sustainable tourism, professional associations, universities and other relevant research centres)
- Citizens and different tourist social networks (this groups are main users of tourist services) - their opinion is most important for local authorities and tourist services providers. Their involvement is also important for education of other groups. Their need has to be satisfied by tourist services. Involvement of this group is a complex process and it requires new techniques supporting the interconnection with existing social tourist networks.

New NaturNet portal has to support the involvement and participation on educational processes from all the groups.

4. User expectation

On the basis of the analysis of user needs there were identified the following priorities:

- **Sustainable tourism as a tool of development in natural sensitive areas**
Experience from previous European projects like EMIRES, REGEO, NaturNet Redime project etc. How to organise tourism, how to promote regions, collaboration of tourist providers, the tools for promoting and the tools for collaboration.
- **Collaborative gaming as a tool for promoting of environment and cultural heritage.**
- **Political consequences of sustainable development principles on local and regional level (in relation to regional and local development activities)**
The training will be focused on local and regional decision makers to inform their about requirements coming from principles of sustainable development for local and regional level. What will be necessary to do and how the implementation should be organised organised on local.
- **OpenStreet network**
OpenStreet network base model for building of global information system supporting tourism in rural and natural regions.



- Collaborative Sustainable and Environment Impacts Assessment methodology**
Collaborative Sustainable and Environment Impacts Assessment methodology from NaturNet Redime Matrix. How related information for SEIA and EIA could be managed and published. What is the reason, why is it important to involve citizens and stakeholders in this processes. Relation to other activities as planning and territorial decision.
- Using spatial information for tourist support**
Using spatial information for tourist support, planning, EIA, SEIA. What is the current status of working with spatial information based on the INSPIRE directive, what are the available tools, how data could be used, collected, published and shared.

5. Basic components of the NaturNet Plus architecture

To be possible to cover the interests and needs of all user groups, to support their direct participation, redesign of initial the NaturNet Redime architecture was provided. The redesign was realised in such way, that all the initial functionalities of the NaturNet Redime portal are supported, but more Web 2.0 tools are implemented to support better integration of portal with social networks.

System is composed from the building blocks shown in Figure 2.

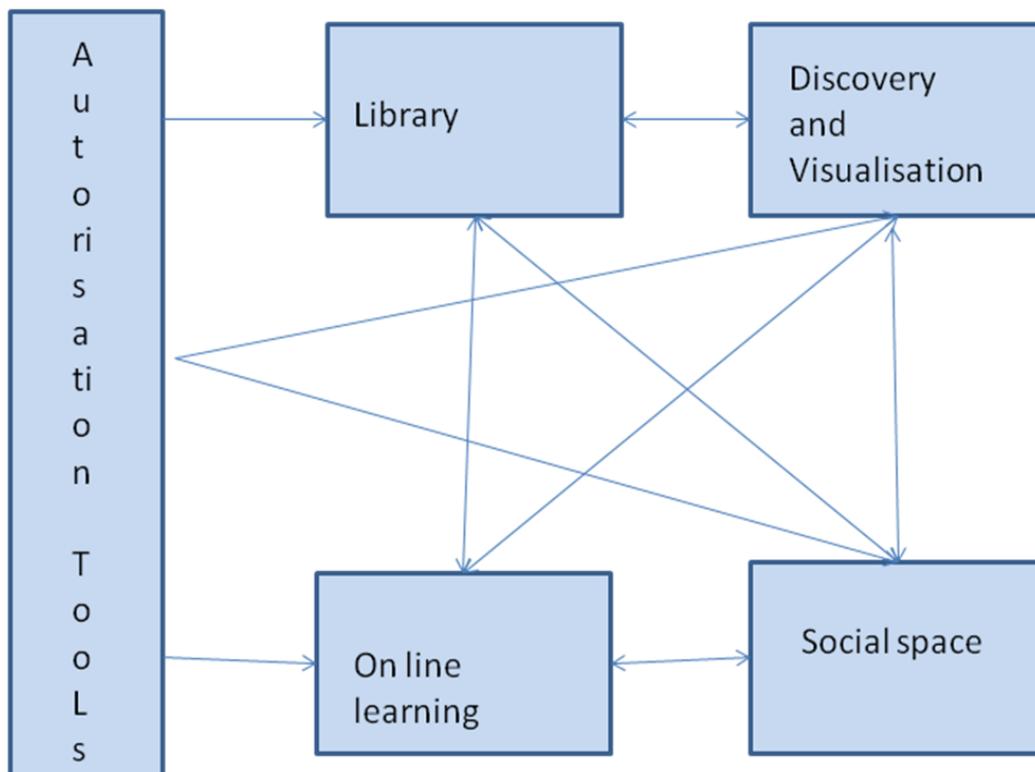


Fig. 2 - Basic NaturNet Plus Architecture Components



5.1 Authorisation and Authentication Tools

Authorisation and authentication tools will manage access to all components of the system and also to the relevant data and information resources. Non authorised person will have possibility only to:

- search and visualise free content using Discovery and Visualisation Modules;
- passive usage of free lecture in on line lecture tools;
- passive access to the content in Social Space.

All other users will have an access to different level of functionality on the basis of their user groups. Access right will give them possibility to see content on the basis of their rights including publish information in library, using on line lecture tools or social space, etc.

5.2 Library

Library is a set of tools that allow the information management on the server. The information can have the following forms:

- Digital maps;
- Files (e.g. document, images, videos);
- Links to external information sources;
- Management of non structured documents;
- Learning lecture (this part is used mainly for the purpose of interoperability with former portal).

The tools supporting the information management are:

- Metadata catalogue - **Micka**;
- Support for management and publishing of spatial data – **Gehosting including DataMan, MapMan**;
- Support for publishing of files and external information sources – **Metadata extractor**;
- Learning Management System – **Moodle**;
- Management of non structured information - **MediaWiki**.

5.2.1 Metadata editor Micka

MicKa is a complex system for metadata management used for building Spatial Data Infrastructure (SDI) and geoportal solutions. It contains tools for editing and management of metadata for spatial information, web services and other sources (documents, web sites, etc.). It includes online metadata search engine, portrayal of spatial information and download of spatial data to local computer.

MicKA is compliant with obligatory standards for the European SDI (INSPIRE). It can be connected with other metadata catalogues that are compliant with these standards too (its compatibility with pilot European geoportals is continuously tested).



MiCKA supports:

- metadata for spatial data (ISO 19115);
- metadata for services (ISO 19119);
- Dublin Core metadata (ISO 15836);
- Feature catalogue (ISO 19110);
- OGC CSW 2.0.2 (catalogue service);
- INSPIRE metadata profile;
- metadata user profiles.

5.2.1.1 Functions

- Web interface for metadata editing;
- Multilingual (both user interface and metadata records). Currently following languages are supported: Czech, English, German, French, Latvian, Polish. It is possible to dynamically extend the system for other languages;
- Context help (multilingual);
- Import of the following metadata formats are supported:
 - ESRI ArcCatalog,
 - ISO 19139,
 - MIDAS
 - OGC services (WMS, WFS, WCS, CSW)
 - Feature catalogue XML
- Export – ISO 19139, GeoRSS
- Support of thesauruses and gazetteers.
- Display of changes by using GeoRSS
- User templates for appearance and functionality management.
- Possibility of map client connection for display of on-line map services.

5.2.1.2 System requirements

- Relational database (ORACLE \geq 9, PostgreSQL \geq 8.0, MS-SQL \geq 2005, or other SQL databases)
- PHP \geq 5.2, support of XSLT
- Operating system independence

5.2.1.3 Concept of work with key names

The system enables in accordance with standards classification of records according to:

- Thematic ISO categories (mandatory for datasets)
- Key words
 - entered by user (arbitrary)
 - chosen from thesaurus

In compliance with INSPIRE requirements parts of the system are:



- GEMET thesaurus service client - data classification (Gemet client is Open Source product⁵)
- service code list

Key words are inserted in order to enable multilingual search.

5.2.1.4 Support of the INSPIRE project

- INSPIRE metadata profile is part of the system
- Choice from key words from GEMET thesaurus
- Choice from key words from code list of INSPIRE services
- Continuous control of metadata completeness according to the INSPIRE profile
- Batch control of completeness of INSPIRE profile
- Implementation of catalogue service according to OGC CSW 2.0.2 standard

5.2.2 Gehosting⁶

The Gehosting system is able to work both with data stored directly on the internal server and with information accessible via web services. Data are saved in geodatabase by default, but the system is able to work also with data in individual files of different formats. Data repositories are represented by the File Repository and the GeoDatabase. Individual SW system components are:

Data Exchange Management – a subsystem which provides physical access to data, import and export of data in files to the Geodatabase and back, access to data via web services providing original data (e.g., WFS), data editing (from a desktop or web client), access to data in mobile applications (mediated through Mobile Data Editor Interface). This is the main component which is worked out in the first stage of the EarthLookCZ Project primarily for the WFS service.

Implementation of the DataMan subsystem from the Gehosting system is proposed for purposes of the portal.

Mobile Data Editor Interface – a subsystem allowing data to become accessible for mobile applications and their editing *in situ*. The solution is not tied to a specific platform of a map client (ArcPad, FieldCheck, TopoLCE, etc. can be used).

Data Publication Management – a subsystem which facilitates management of geographical data and their publication. It allows combining several data sources (internal database data, files and web services) to generate new map compositions, and facilitates their publication either directly in a selected map visualization client (e.g., DHTML, GoogleMap) or in the form of a new WMS web service. Implementation requires utilization and adjusting of the MapMan component.

⁵ <http://www.bnhelp.cz/gemetclient-opensourced/>

⁶ Petr Horak, Sarka Horakova, Karel Charvat, Martin Vlk Using Gehosting Principles for Publication of Users' GMES Data within the EarthLookCZ Project, in INSPIRE, GMES and GEOSS Activities, Methods and Tools towards a Single Information Space in Europe for the Environment, ISBN 978-9934-8105-0-3, Riga 2009



HS Layers application based on Open Source SW OpenLayers has been used as **Visualization Client**. This component can be integrated also into other web applications.

Authorization Service provides the users with access to the portal and to individual functions on the basis of their authorization.

Metadata and Catalogue System facilitates searching for data sources and generating of metadata records. The system complies with INSPIRE requirements and ISO 19XXX standards, and allows cascade searching in other standardized catalogue systems. The system has been based on the current Metadata Portal which is operated by the CENIA Agency. Micka System, under development by the Help Service Remote Sensing company, is proposed as a metadata and catalogue system.

Newly published web services for geodata has been made in accordance with the OGC norms.

Desktop editor in the diagram represents one of the ways how a user could be enabled to edit geographical data. Any SW allowing work with vector data can be used as an editor; a possibility to download and use SW Janitor, which is being developed by the GIS laboratory of the CENIA Agency as a freeware, is offered by default in the framework of the national GMES portal.

5.2.2.1 DataMan

DataMan is a web application designed to make users' data accessible in the web environment. Data can be made accessible either in the form of a geodatabase or individual files can be uploaded directly on the internal server. DataMan works by default with PostGIS database, but other databases accessible through the ODBC interface can be also accessed on the basis of authorization. In the selected database, new tables can be made, their structure can be modified, or they can be deleted. It is also possible to make copies of existing tables and to modify these copies. Geographical data (points, lines, and areas) is being saved in the databases, and additional information of various data types (number, string, date and time, logic value) can be added to each table. This functionality can be used for example if the user needs an option to create his own database for geographical objects, which he could then edit directly *in situ*, perhaps using the Teredit application. The database table can be thus generated, edited and published by the user in MapMan.

Another function of DataMan is the possibility of uploading files with geographical data on the server. TIFF/GeoTIFF, JPEG, GIF, PNG and other raster data can be used and so can also SHP, DGN, DWG, GML and other vector data. In certain cases it is also possible to import vector data directly into the geodatabase and use them for example during a mobile collection of data. In publishing operations, metadata publication is facilitated also in the Micka system.

5.2.2.2 MapMan

MapMan, a web system for spatial data management, allows integration of data accessible through standardized web services (WMS, WFS) with spatial data saved in internal databases and files. All these data sources can be used for generating new map compositions in the web environment. Thus made map compositions can be displayed by the user in several ways – either in classic web browsers (OpenLayers, GoogleMap, DHTML client) or in desktop browsers (GoogleEarth). The possibility to publish these new compositions as a completely new WMS web service, or possibly as a WFS, constitutes, however, a significant part.



Map Project Manager is an upgrade of the UMN MapServer system, which is being developed at the University of Minnesota. MapMan exploits the functionality of MapServer especially in coordinate system transformation and in communication with various web services.

Project Editor (Figure 3) constitutes the basic component of MapMan, it integrates the individual connectors onto data sources along with publication functionality. Project Editor is interconnected with Layers Storage and Symbol Storage, where individual layers and symbols can be saved. An important feature of the system is its interconnection to the metadata catalogue, which facilitates searching out of required data from external sources on the basis of metadata and also collection and publication of metadata on newly made map compositions.

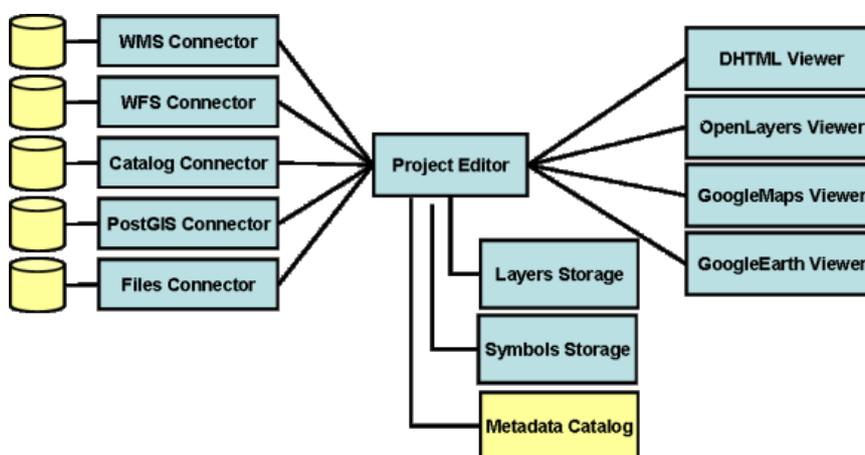


Fig. 4 – Project Editor.

Data sources can be interconnected in several different ways. Internal data sources (i.e. data accessible on the internal server) can be saved in databases or in files. At present SHP files and PostGIS are the supported files and databases; however, connectors for other databases and file types can be also relatively easily implemented.

Data files are saved in predefined data directories accessible to MapMan. External data stored on remote servers are connected through WMS and WFS web services.

5.2.3 Metadata extractor

Metadata extractor is a tool to extract available metadata directly from different files (documents, presentation, etc.), edit this metadata and publish metadata and files on URM portal. Other possibility is extract metadata (and then edit) directly from existing URL addresses and store metadata on URM portal. Access to information is then trough direct URL addresses.



Currently metadata extractor supports:

- publishing documents on the portal – you can select any type of file on your computer, extract and edit metadata and published this file on portal:
- publishing of links to existing Web pages only putting URL of Web pages to extractor:
- or published directly new Web pages stored in Zip file. These Web pages are directly accessible trough URM portal⁷

5.2.4 Moodle

A course management system (CMS) Moodle is Open Source software package which helps educators create effective online learning courses and websites. The software is used all over the world by universities, schools, companies and independent teachers. Moodle is modular in construction and can readily be extended by creating plug-ins for specific new functionality.

Moodle's infrastructure supports many types of plug-in such as activities, resource types, question types, data field types (for the database activity), graphical themes, authentication methods, enrolment methods, content filters.

5.2.5 MediaWiki

MediaWiki is a free server-based software, that is licensed under the GNU General Public License (GPL). It's designed to be run on a large server farm for a website that gets millions of hits per day. MediaWiki is extremely powerful, scalable software and a feature-rich wiki implementation, that uses PHP to process and display data stored in its MySQL database. Pages use MediaWiki's wikitext format, so that users without knowledge of XHTML or CSS can edit them easily.

When a user submits an edit to a page, MediaWiki writes it to the database, but without deleting the previous versions of the page, thus allowing easy reverts in case of vandalism or spamming. MediaWiki can manage image and multimedia files, too, which are stored in the filesystem. For large wikis with lots of users, MediaWiki supports caching and can be easily coupled with Squid proxy server software. Wikitext language or wiki markup is a markup language that offers a simplified alternative to HTML and is used to write pages in wiki websites. Wikitext is text in this language.

There is no commonly accepted standard wikitext language. The grammar, structure, features, keywords and so on are dependent on the particular wiki software used on the particular website. For example, all

⁷ Karel Charvat, Maris Alberts, Andris Dzerve, Stepan Kafka, Jachym Cepicky, Andra Martinsone* Irena Koskova, Marek Šplíchal COMPUTER ASSSTED EDUCATIONAL PROCESSES BASED ON NATURNET LEARNING TOOLS AND THIER INCORPORATION INTO UNIFORM RESOURCE MANAGEMENT SYSTÉM, IALD –AFITA-WCCA conference 2009, Tokyu



wikitext markup languages have a simple way of hyperlinking to other pages within the site, but there are several different syntax conventions for these links. Many wikis, especially the earlier ones, use CamelCase to mark words that should be automatically linked. In many modern wikis (such as Wikipedia and other MediaWiki-based wikis) this convention was abandoned in favor of explicit link markup, e.g. with `[[...]]`.

Some wiki programs allow extensive optional use of HTML tags within wikitext, others a smaller subset, and still others no HTML at all. In some cases, restrictions on HTML may be determined by each site that uses the program.

MediaWiki, the software that runs Wikipedia, has a wiki markup language that allows many common HTML tags, but provides a simple, readable syntax that is intended to allow users to use it without knowing HTML.

5.3 Discovery and visualisation

Discovery and visualisation will allow to both, registered and non registered users to access information (according their rights) on the discovery necessary information and their visualisation. This part of services support not only visualisation on the NaturNet portal, but also on other portals. The discovery services support search through multiple commentary portals. Maps will be visualised using special client on portal, other type of information by tools related to this concrete type of information on clients' computers.

5.3.1 Discovery services - Catalogue

Catalogue services are the key technology for locating, managing and maintaining distributed geo-resources (i.e. geospatial data, applications and services). With OGC catalogue services, client applications are capable of searching for geo-resources in a standardized way (i.e. through standardized interfaces and operations) and, ideally, they are based on a well-known information model, which includes spatial references and further descriptive (thematic) information that enables client applications to search for geo-resources in very efficient ways.

Whereas interfaces and operations of OGC catalogue services are well defined, it is left up to the developer of the system to define a specific information model which a catalogue service instance provides. This includes, but is not limited to, the information which can be inserted in the catalogue, supported query languages, available search terms, response/result sets, etc. This point is of major importance with respect to interoperability between different catalogue service instances.

Catalogue service are based on system Micka. It is based on OpenGIS® Catalogue Services Specification – profile Catalogue Service for Web (CSW) and OpenGIS® Catalogue Services Specification 2.0.2 - ISO Metadata Application Profile standards.



Supported operations:

- Basic: GetCapabilities, DescribeRecord, GetRecords, GetRecordById
- Editing: (CSW-T): Transaction, Harvest
- Multiple search trough many catalogues
- Inquiry items: according to standards
- Extensions: export to GeoiRSS and KML
- Open Web Search

5.3.2 Functionality description

Catalogue client supports the following functionality:

- Adding New catalogue services
- Basic search
- Advanced search
- Metadata visualisation
- Viewing of informatik

5.3.3 Visualisation HSLayers⁸

HSLayers (Help Service+OpenLayers) combines capabilities of ExtJS and OpenLayers and several helper scripts, to truly Web GIS applications. Development has been started in 2007 and It has been open sourced after 2 years of development, in 2009, and released under conditions of GNU General Public License 3.

5.3.3.1 HSLayers components

HSLayers copies the structure of OpenLayers partly, somebody, who knows OpenLayers already, should not be confused, while having a look at HSLayers code.

HSLayers.InfoPanel - Ext.Panel-based class, for displaying various informations from the map, such as results of map queries, search results and others.

HSLayers.MapPanel - Ext.Panel, containing the OpenLayers.Map widget, with several pre-defined controls.

HSLayers.MapPortal - Ready to be used by Portal mapping application, build on top of MapViewer (see next description). Several other fine-tuning features of the MapViewer are predefined here.

HSLayers.MapViewer - Basic map viewer, with map, LayerSwitcher, InfoPanel, OWS clients and Printing control.

⁸ Jachym Cepicky, Stepan Kafka, Premysl Vohnout HSLayers mapping framework, GIS Ostrava 2010 24. - 27. 1. 2010, Ostrava



HSLayers.OWS – OGC WMS and OGC WFS clients. The client gets input GetCapabilities URL, parses it and displays the layer tree. User can choose several image and query formats and display the selected layers in the map.

HSLayers.Printer - Tool for definition of the printing request. User can set desired scale and paper format, move the paper

HSLayers.Util - Various utils used by applications.

HSLayers – Main Class, used for the namespace definition.

HSLayers.Control.ArgParser - URL argument parser based on OpenLayers.Control.ArgParser, but with additional features, such as support for vector data features encoded into the URL.

HSLayers.Control.BoxLayerSwitcher - Google Maps-like layer switcher.

HSLayers.Control.Click - Base class for custom controls, based on the clicking in the map event.

HSLayers.Control.Cuzk - Tool for getting attributes of the nearest parcel to the point, defined by the user by clicking in the map. The data are parsed from Czech office for survey, mapping and cadaster directly.

HSLayers.Control.DrawControls – Base Class for Point, Line, Polygon and Box drawing controls.

HSLayers.Control.LayerSwitcher – Advanced Layer switcher. This component is described below in this paper.

HSLayers.Control.Measure – Line and area measurement. Several lines or polygons can be drawn to map, the tools displays always sum of areas (length) and area (length) of last feature.

HSLayers.Control.Permalink – This class is based on OpenLayers.Control.Permalink and it is used for storing additional informations, such as vector features, in the URL.

HSLayers.Control.Pin - Tool for adding the marker with description in the map. The information about the marker is added to Permalink, and can be send to other user.

HSLayers.Control.ProjectionSwitcher – The map can be switched to different coordinate system.

HSLayers.Control.Query – Tool for interactive point and box queries. The tool is able to form the WMS or MapServer feature request and parse and display several types of responses, namely GML, ArcIMS GML, text and HTML.

HSLayers.Control.State – Will save and restore the workspace of running application for later reusage.

HSLayers.Layer.ChartLayer – Vector layer, which is able to display chart diagrams, based of features attributes.

HSLayers.Layer.MapServer – While OpenLayers.Layer.MapServer provides just the simple interface to proprietary UMN MapServer format, the version in HSLayers is more complex. It includes the complete structure of the mapfile (MapServer configuration file) and so, the content of the OpenLayers.Layer can be changed. This component will be described in more detail later in this paper.

HSLayers.Layer.WarpedWMS – this class is used, when the WMS server does not support the displayed map projection. The images are warped with help of small server-side script.

HSLayers.Layer.WFSSensor – Layer for displaying the sensor informations through OGC WFS. We will describe some few classes more deaily.

HSLayers.Layer.MapServer

One of the features of the OpenLayers concept is, that each map layer, represented by the OpenLayers.Layer class object, is represented as grid of tiled images. The content of the image is set while the layer is initialized and there is no easy way, how to change the layers content.

HSLayers.Control.LayerSwitcher



HSLayers.Control.LayerSwitcher is able to display layers in hierarchical structure. It introduces new attribute of the layer – group – which contains the title displayed in the tree structure. Name of the layer is taken, if there is no group attribute of the layer. Layers are merged into one tree node, if there are several layers with same group name (or name)., Layers will be switched on/off without any further action from user, if they have min/maxScale attribute set. That's why the group attribute of each layer is introduced – one tree node in the layer switcher represents one or more OpenLayer.Layer instances.

Another feature of the layer switcher is the capability of creation of hierarchical structures. Several nodes will be created, if the group name contains slash (“/”) mark. The layer switcher creates hierarchical structures based on previously described HSLayers.Layer.MapServer attributes. Drag'n'drop capabilities is another feature of layer switcher. This feature allows user to customize the layer order and menu, with Source URL, Metadata URL, opacity settings and SLD settings.

5.3.3.2 Server scripts

Several server-side scripts are necessary if we need to use all of the features of HSLayers. They are located in the source/scripts directory of the source code.

feedback.php is used by the load/save state control. The workspace state is stored with help of php session id attribute and when the user comes back on the site, the application will be loaded in the last visited state.

MapCreator.py is printing tool. It gets JSON structure with map attributes (scale, title, ...) and list of layers with specified tiles as input. All images are downloaded, positioned to printing canvas and stored as PDF file, which is then returned back to the user.

Warper.py – Script for warping given WMS GetMap request url to specified coordinate system. Python bindings of GDAL/OGR and PROJ.4 libraries are used for the transformation. However, the user does not need to have those scripts and still she gets the full featured mapping application with WMS and WFS clients.

5.4 Social space

Social space or social network site will support publishing information by all systems users on the base of their rights. It will enable to share this information using other social network sites. It will support easy extension of the community.

“A social network consists of a finite set or sets of actors and the relation or relations defined on them. The presence of relational information is a critical and defining feature of a social network.” [Wasserman, 1994]

Web 2.0 applications include blogs, wikis, podcasts, RSS feeds, tagging, social network sites (e.g. Facebook, Myspace), search engines, Massive Multiplayer Online and others. The focus of the NaturNet Plus project is on social network sites (e.g Facebook, Twitter) as one of the main dissemination and communication tool. The main aim of this activity is to communicate (to give information and to retrieve some feedback) about the NaturNet Plus developments through the NaturNet Plus Portal. This will enable



to induce discussion about certain topics. The retrieved feedback should serve as input information for further developments.

The NaturNet Plus portal will be an entry point for any news (new developments, problematic topics, progress in the project, etc.). News will be posted by the project partners and will be automatically distributed to a number of selected communities – social network sites. Feedback from these social network sites will be retrieved using RSS and answered again from the central point – NaturNet Plus portal. See Figure 4.

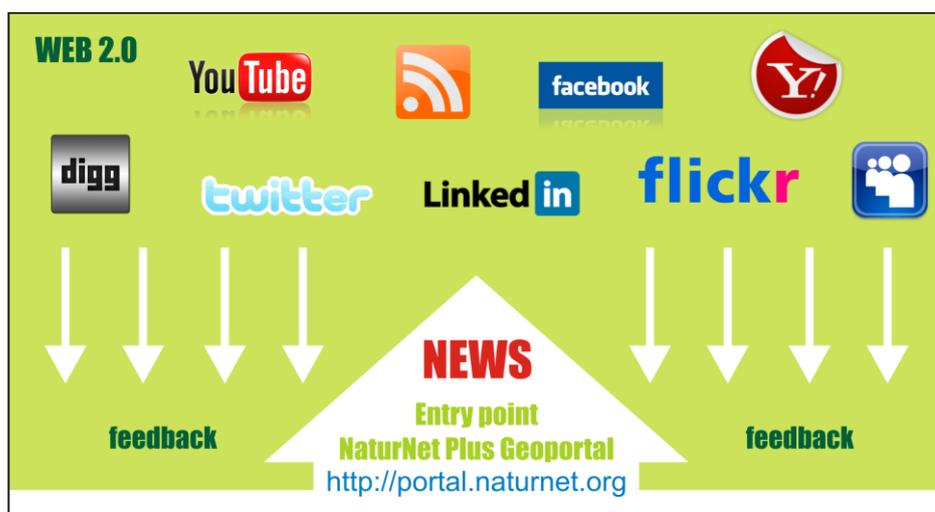


Fig. 4 - Portal & Social Network Sites.

This approach will allow involving other communities from one place without having to enter each community. Users of various social network sites can read entries and comment through their respective communities and don't have to register elsewhere. This will form Citizen and tourist communities group. Its feedback will give an opinion about different types of tourism. The opinion of tourist community will be important part of the education. The main purpose of tourism is user satisfaction. The tourist community will be able to use these NaturNet Plus social networks tools to satisfy their needs.

The tools that will guarantee required functionality will be supported by SimpleCMS.

5.4.1 SimpleCMS

SimpleCMS Content management system is focused on usability and simplicity for end users and its mind. Main advantage in comparison with other CMS systems is simple approach for solving complex tasks. Clarity and security of the implementation is the main target. The simpleCMS provides access to the following features and/or provides access to the following options.



5.4.1.1 Menu

User can define its own menu and submenus. Any menu or submenu can be external link (link pointing to any place on the Internet and not into the CMS itself), where the redirector functionality is implemented and users can return back to the CMS using visible controls. Any menu can be set as Homepage, where of course only one Homepage per SimpleCMS instance is possible. Menu ranking can be reordered in any way to best fit any updates that might be required during the usage.

5.4.1.2 Article

Content holders - they are holding the data you want to publish. As regular articles they are composed from the perex and the content itself. Using WYSIWYG editor provides nice user experience to beginners and support for full inline html can please any person wanting to do more fine grained look of desired article. The editor allows inserting various multimedia content that user can think of, videos, photos, etc. **There is a special support for inserting dynamic maps.** Each article can be enhanced by adding various file attachments, which will be described later.

5.4.1.3 Message

Each menu can be accompanied by the message item, which in reality is simplified article that contains just one view on short text that does not implement detailed view so it could be described as „perex“ only. Since the messages are always on top over the articles they can be best used as the menu description. Also here is used the some WISIWIG editor, with full functionality.

5.4.1.4 RSS

The CMS supports RSS feeds including any RSS feeds from remote sites. It allows a nice and handy way of promotion of our services that we want our user to know about.

5.4.1.5 Translations

The controls of the CMS can be translated into various languages where the gettext localisation system is used, which provides easy translations to most known languages and possibility to use already created vocabularies from any other open-source project. It makes translating work really simple.

5.4.1.5 Remote articles promotion

Each menu in the CMS setup has automatically generated RSS feed for grabs to others. Also optional connectivity to posterous is possible, so your web presentation can be presented on all various social networking sites (for example Facebook).

5.5 On line lecture

Distance training (remote training) using video lecture tools is comparatively new method. Video lecture tool BizBiz offers many possibilities for training (combining first three methods).



5.5.1 Video lecture tool BizBiz

BizBiz is a web browser based e-conference collaboration and learning tool which allows conference members to watch live video enabled presentations remotely from their computers.

It does not require users to install special software apart from modern web browser and java virtual environment and most of the configuration connected with webcam and screencast is done automatically.

Minimal requirement on additional equipment are headphones, (optionally – webcam).

BizBiz focuses on providing a learning platform for spatial planning and GIS but can be used also in other applications.

BizBiz is free of charge and published under open source (Aferro GPL) licence in source forge.

5.5.1.1 BizBiz features

- **Multilingual** – BizBiz currently supports English, Czech, Bulgarian, Italian, Greek, Latvian, Lithuanian languages, but more languages can be added if necessary;
- **Lectures creating and editing** – BizBiz supports tools for preparing and editing lectures by lecturers;
- **Lecturers live narration using webcam provided video and audio;**
- **WhiteBoard (WB)** - WB allows to put on it following elements:
 - images (e.g., slideshows) presentation,
 - simple screencast using an automatically installed Java application
 - webpage demonstration through screencasting,
 - online maps,
 - synchronous pre-recorded video display;
- **Drawing tools for drawing on WB elements;**
- **Keyword list and glossary of lecture;**
- **Uploading files necessary for lecture;**
- **Metadata description of lecture;**
- Mechanism of permissions – the lecturer is able to grant the following permissions to individual student:
 - broadcast video;
 - broadcast audio,
 - upload files,
 - slide transition,



- draw on slides,
- edit lecture data,
- edit slides,
- edit glossary,
- switch groups;
- **text chat;**
- **polls and surveys** – it allows the lecturer to conduct questions with multiple choice answers directed to the audience;
- **student test mode** – each student in separate sandbox. Lecturer can join each one and monitor their work lecture recording;
- **lecture playback.**

5.5.1.2 Lecture life cycle

Every lecture's life cycle consists of several stages:

- upcoming lecture – when a lecture has been created by lecturer and published in BizBiz lecture list,
- live lecture – when a lecture is online,
- archived lecture – after end of online lecture.

Upcoming lecture stage

This is the stage where a lecturer creates new lecture. After this creation the lecture data could be modified till next stage.

Lecturer submits the following data for every new lecture:

- name, surname,
- short description of lecture,
- lecture access (public, with invitation, with password),
- planned start time,
- keywords,
- glossary,
- uploads necessary files,
- submits data for WB: uploads images (presentation slides in ppt, odp, jpg, png, gif formats), web links, maps and uploads pre-recorded video files or inserts embeddable videos from popular video sites like youtube,
- metadata about lecture in Dublin Core metadata standard.



The lecture is published for audience who use BizBiz. After publishing students are able to look all data about upcoming lecture and prepare to it. They can send their suggestions and notes by text chat to the lecturer and the lecturer can make modifications.

Live lecture stage

The lecture is online. There are several ways how the lecturer can manage the lecture:

Simple lecture without feedback

In this case the lecturer takes full part in this event – he/she uses webcam, shows slides on WB, draw on slides, shows maps and pre-recorded video files. Audience mainly have means to watch and hear the lecturer on their personal computers and contact with the lecturer and others by chatting.

Lecture with feedback

There are many possibilities:

- the lecturer can allow video browsing to some students. It can be done by mechanism of permissions. In this way the lecturer has feedback with those students whom he allowed video browsing. Then after little dialog between the lecturer and those students, the lecturer can switch off these permissions and switch on for other student/students. Thus the lecturer can organise feedback with audience.
- The lecturer can achieve feedback with audience by switching on permission **draw on slides** to one or more student. It can be used when the lecturer shows maps on WB.
- the lecturer can use BizBiz feature **polls and surveys**. It allows the lecturer to make polling about interesting questions.
- Using BizBiz feature **student test mode** the lecturer can separate students in separate sandbox. The lecturer can join each one and monitor their worklecture recording. For example each student can draw the solution of some exercise on a blank slide and only he and the lecturer can see it.

Archived lecture stage

This is a stage when the lecture is ended by the lecturer. After that, no user can join the lecture, until it is started again.

Each lecture after ending can be prepared by lecturer for playback. Audience can playback them individually.

What about lectures which doesn't start. There are several possibilities:

- The lecturer can edit lecture's data. If planned time is modified then the life cycle of lecture changes and it is upcoming lecture stage.
- Audience is able to look all data about this lecture.
- The lecturer can delete this lecture.



5.5.1.3 Recorded lectures

These lectures beside online lectures becomes more and more popular.

Lecturers can prepare lecture course and submit data about them in BizBiz lecture database. If the lecture is not secured by a password, then all the resources become public and can be accessed.

Audience is able playback these lectures individually.

6. Conclusion

The NaturNet portal architecture will allow interconnection of all the system components and sharing of information used in one part by other components. For example information in social space will be described by metadata in Library. Social space will support search and publishing information from libraries including for example maps composition.

The architecture will allow easy integration of external applications and their description.