ISSN 1644-0765
DOI: http://dx.doi.org/10.15576/ASP.FC/2015.14.1.125
www.acta.media.pl

Acta Sci. Pol. Formatio Circumiectus 14 (1) 2015, 125–133

NEW METHODS FOR GATHERING THE SPATIAL DATA FROM LAND CONSOLIDATION PROJECT

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Abstract. Land consolidation projects in the Slovak Republic have reached the state where there is sufficient sample of valuable information (planimetric and hypsographic measurements, updated maps of estimated pedologic-ecological units, concepts of local territorial system of ecological stability, plans for the general principles of functional organization of the territory, etc.) for society. The contribution points out need to create a uniform public or archiving information system (database), which is incurred in landscape planning activities in model areas. By now several information systems created in Slovakia are not connected one to another and thus cannot be further use. The article pointed out the procedures leading to the processing of a unified information system that collects and archives the outputs of landscaping activities in the area. This is dedicated to the administrators, system users and use cases of the unified system. Therefore we emphasized the importance of system deployment defined for different users. Next step is to describe the input to the elaboration of a comprehensive database. The system is demonstrated on the basis of data obtained from land consolidation projects. Subsequently, we present all computed graphical information by publishing on the local console of OpenGeoSuite environment.

Key words: information system, land consolidation, web interface

INTRODUCTION

There is a number of mainly technical documents taken from a variety of landscape planning activities in model areas (e.g. Local territorial system of ecological stability, General principles of functional organization of the territory in the area of land conso-

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Acknowledgement. The results obtained in the research tasks/projects VEGA no.1/0656/12 and KEGA no. 037SPU-4/2011 have been used/presented in this paper.

lidation, substrates purpose mapping of planimetric and elevation of the land consolidation projects, technical drawings of urban planning and landscaping activities, the technical basis of geodetic activities) but documents and projects are not used anymore because of different file formats and not existing a central database. The documents are made up mostly as single-purpose and their use in other activities is very difficult [Leitmanová 2010].

At present, the number of organizations dealing with projects of developing information system (IS) would present the results of their work on the web and therefore should also fulfill the function of data archiving. Thus raises a number of differently named, content and structural different projects in the same location. This is the information concerning to certain territories, published in the form of information systems, databases either through a Web Map Server (WMS), respectively online access through the web interface.

The term of an information system can be understood in a dual sense. In a narrower sense it is a sign of programs able to work with data in a broader sense, it is a system for providing information necessary for the management (http://www.profitconsult.sk).

Information system consists of people, hardware and software to ensure the gathering, transmission, processing, distribution, storage, selection and presentation of information on the need for managers to be able to carry out their management functions in all components of the control system. Its main task is to ensure sufficient relevant, correct and accurate information in the required timeframe and the required form for the preparation of the decision.

Among information systems there is the one oriented to geographic data.

While GIS stays an IS for collecting, managing, analysing, modelling and visualizing of geographic information, it can be used for property (obtaining data, description of geometry, topology, theme) and temporal changes (dynamics) of spatial objects [Šimonides 2004]. GIS is a set of hardware and software for storage, processing and using of geographic information in two forms (graphical objects and databases) interconnected and topologically organized [Methodological... 2008]. Geographic information system integrates hardware, software, and data for capturing, managing, analysing and displaying all forms of geographically referenced information. GIS allows us to understand, ask questions, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts [ESRI 2010]. GIS is helpful in answering questions and solve problems by looking at the data in a way that is quickly understood and easily shared. GIS technology can be integrated into any enterprise information system framework [GIS 2010].

Online GIS systems are one of the primary components of Geospatial Web. These systems should not be confused with GIS systems that are installed on standalone computer and let the user to access and work with the data on the single hard drive. Such GIS are called stand-alone GIS. GIS community was one of the first, which has adopted the Web as a communication platform [Nebert 2009].

We can define geospatial web as a collection of web services, geospatial data and metadata which is helpful for landscape planning, environmental protection, renewable energy, etc. By finding specific information this is an important that must be supported by any information system [Florczyk 2012].

The aim of the IS-GIS is to create homogeneous and tied whole of landscaping data that would be able to provide extensive and comprehensive information on the area of interest in terms of actual or potential user.

IS are not usually paid attention to the fact that the output of scientific and professional activities in the field of landscape creation should be the information system. Probably in practice lacks suitable (simple) instructions ("model") guiding the steps of the designer. Complex, elaborated in detail, explained and example illustrated instructions would provide a useful tool for administration and municipalities for control of the continuance, correcting of output or verifying of compliance by the project planning team. Also user guide for guidance would support professionals and general public for guidance on this issue, the development of the area and in addition facilitate the training of new professionals.

SLOVAK INFORMATION SYSTEMS

Slovak Republic has inter-regional information network. In this paper we present some selected information systems, which are oriented to Slovakia.

Essential GIS base

Essential GIS base defines the principles of harmonization of national geographic information about the topographical features of the country. This base is part of the Automated Information System of Geodesy, Cartography and Cadastre. Essential base (EB) of data for geographic information systems GIS EB is a model of the real world with a level of detail corresponding to the content of the basic SR (Slovak republic) map in scale 1 : 10 000. It contains information processed by a computer, which describes the presented model, defines its position, shape, features, connections using positional relations aspects of quality, allowing the analysis of phenomena and graphical presentation [Vojtičko 2001].

The purpose of EB GIS is to create a base of relevant information about the Slovak Republic in the system for storing, updating, manipulating, analysing and displaying.

Land register portal

Cadastral Portal enables authorized access to land register data, obtain basic information instantly and without visit to the respective district cadastral registry, for the authorized subjects obtain summary and detailed information without complicated correspondence. Land register data publication over the Internet is supposed to bring enhanced database, improvement of property and legal relations transparency, drop of corruption in environment, increase of the credit of Slovak Republic abroad and the reduction of the workload of the district land registries and the Geodetic and Cartographic Institute in information service delivery (https://www.katasterportal.sk/kapor/informacie.do).

Soil portal

Information System Research Institute for Soil Science and Conservation via Internet map server allows the general public ONLINE browsing information on agricultural soil (http://www.podnemapy.sk/).

MATERIAL AND METHODS

Before the start of processing of information system on the territory it is necessary to define:

- operator, system administrator;
- potential user of the system;
- use cases.

Operators and system administrators may not be the authors and supplies of the spatial information system. After defining of potential users of the system it will be directed to the future user of IS. Use cases represent the expected actor interaction with the system. Interactions are the possible scripts included in the system to fulfil specific user demands.

An important part of the information system is the presentation of information through a web-interface and system deployment (Fig. 1, Fig. 2 and Fig. 3).

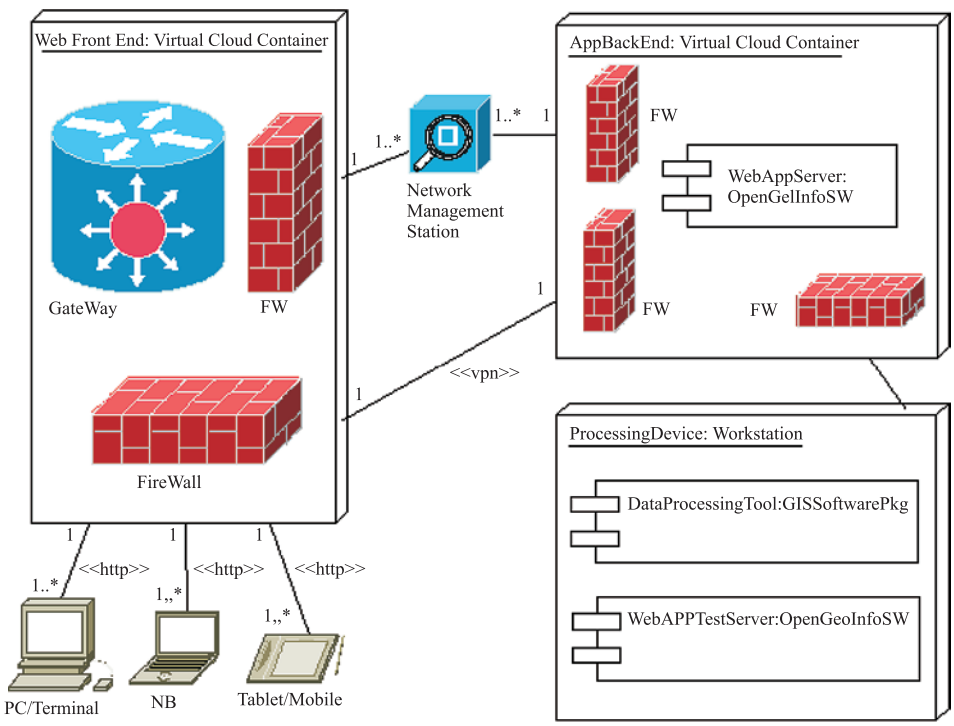

Fig. 1. Diagram of deployment of IS in the network environment

On the Fig. 1 we can see right down equipment for analytical processing and outputs preparation with GIS SW and also with local web application for testing data. Tested outputs can also be placed on the web-application server on the back-end, while both ends communicate with each other only indirectly through the firewall (FW). Right above is the application backend placed in the cloud virtually. Client devices (bottom left) communicate only with web-front-end and it indirectly via FW. Web-front-end (top left,

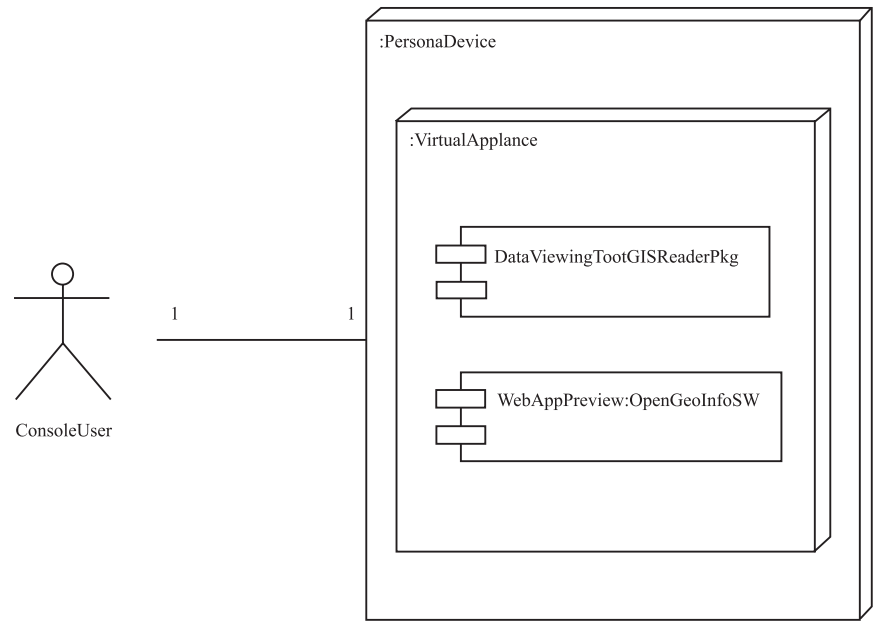

Fig. 2. Diagram of deployment of IS locally on the user device as a virtual device ("snapshot") providing both web-view, as well as GIS-reader

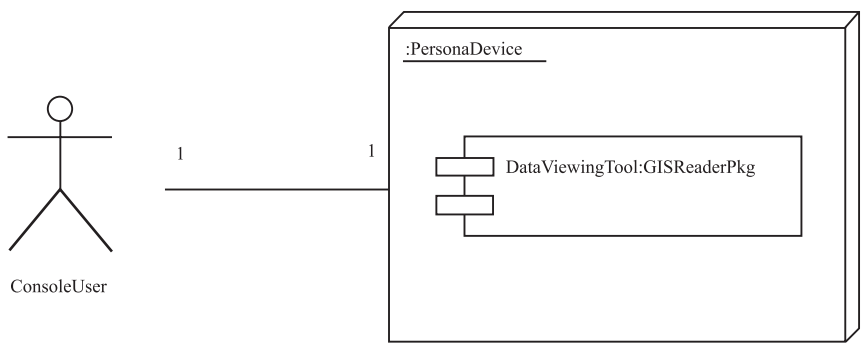

Fig. 3. Diagram of deployment of IS locally on the user device via native GIS viewer

also located in the virtually cloud) processes/filters client requests and mediate relevant responses from the back-end for indirectly via FW and gateway (GW). Network management stations (NMS) monitoring the operation and allow the administration. Client devices, FW and GW are shown by commonly used graphic stereotypes.

User of the system, "see the screen virtually on the screen, where he can browse output in a web and GIS-browser", after starting the virtual device. The user navigates GIS outputs in GIS browser similar to e.g. PDF documents in PDF browser.

Another important part of the system is to determine contents exactly. Details in the system should be brief, clear and understandable. We can divide the system into subsys-

tems according to the content. These methods are developed by the authors of information system.

The result of the proposal of the information system is demonstrated on the example of the particular landscape proposal, which is processed on the basis of information of the land consolidation projects. They are gather available information on initiation, termination and registered projects in the model area, on the course of the activities under the revitalization of the country and integrated river basin management SR, on registers of renewed registration of plots (RRRP), processed urban planning documentation (UPD) etc. By collecting all available data we created a summary table, used as a primary source of information about the investigated cadastral area in the model area (Fig. 4).

Table

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FID	Shape *	NAM	Kraj	Okres	ROEP	UZ_PL	IMP	STAV_PPÚ
0	Polygon	Babindol	Nitriansky	Nitra	Áno			
1	Polygon	Bardoňovo	Nitriansky	Nové Zámky				Rozpracované PPÚ
2	Polygon	Beladice	Nitriansky	Nové Zámky				
81	Polygon	Belek	Nitriansky	Nové Zámky				
4	Polygon	Beša	Nitriansky	Levice				
124	Polygon	Čakýň	Nitriansky	Zlaté Moravce			1. RP	
12	Polygon	Čaradice	Nitriansky	Zlaté Moravce				
13	Polygon	Čeľadice	Nitriansky	Nitra	Áno			
14	Polygon	Černík	Nitriansky	Nové Zámky				Rozpracované PPÚ
15	Polygon	Červený Hrádok	Nitriansky	Zlaté Moravce				
6	Polygon	Čierne Kľačany	Nitriansky	Zlaté Moravce		Áno		
7	Polygon	Čifáre	Nitriansky	Nitra	Áno			
16	Polygon	Dolné Obdokovce	Nitriansky	Nitra				

0 (0 out of 125 Selected)

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Fig. 4. Database of notes at the stage of cadastral area

RESULTS

As a result of our work is a proposal of standardized procedures for creating graphical outputs, data processing and we defined output data structure in order to project results were objectively comparable, verifiable and reproducible. Specifically we defined, described and quantified problems that have arisen in the process of land consolidation projects and at the same time we pointed out the positive possibilities of impacts of land consolidation in terms of effective decision (decision making) for long-term historical perspective on sustainable development of the country. The main parts of the system are connected to each other by trace bling of data and outputs, but especially a unified assessment of the impact of proposals and measures. We divided information system based on thematic areas into subsystems.

Subsystems include the areas of the various stages of land consolidation projects but also materials that enter the project as a basis for the development of stages. We prepared a presentation of some selected subsystems of IS at the local console in the environment of OpenGeoSuite. We prepared a content structure of topics, we processed relevant

legends (within the possibilities offered by the tool). The following figures (Fig. 5, Fig. 6, Fig. 7) schematically shows the structure of the web view directly as the system user will be able to see through browser.

The described system is currently available at the URI/URL: http://fzki.uniag.sk/oktopus.

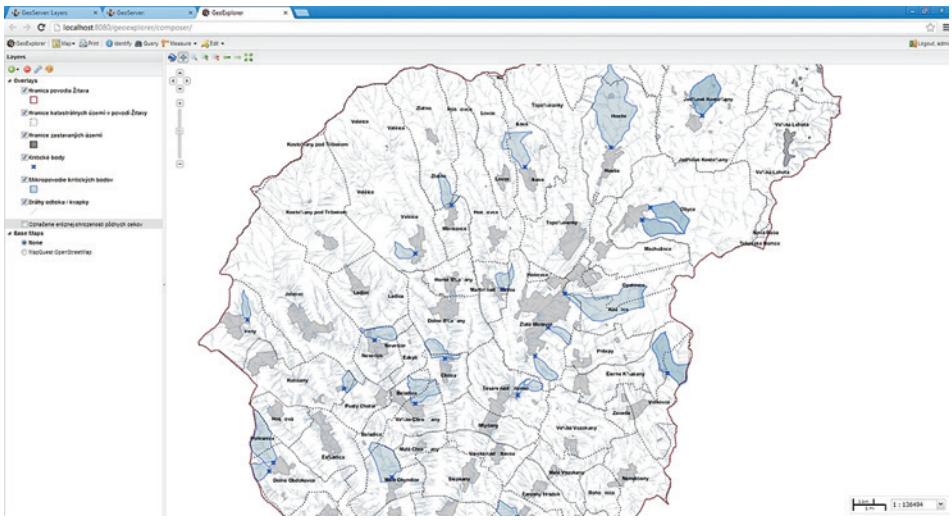

Fig. 5. Demonstration of visualization of some basic and basic derivated themes of subsystem (flowlines, critical points, boundary of urban zone and mikrocatchment to the critical point)

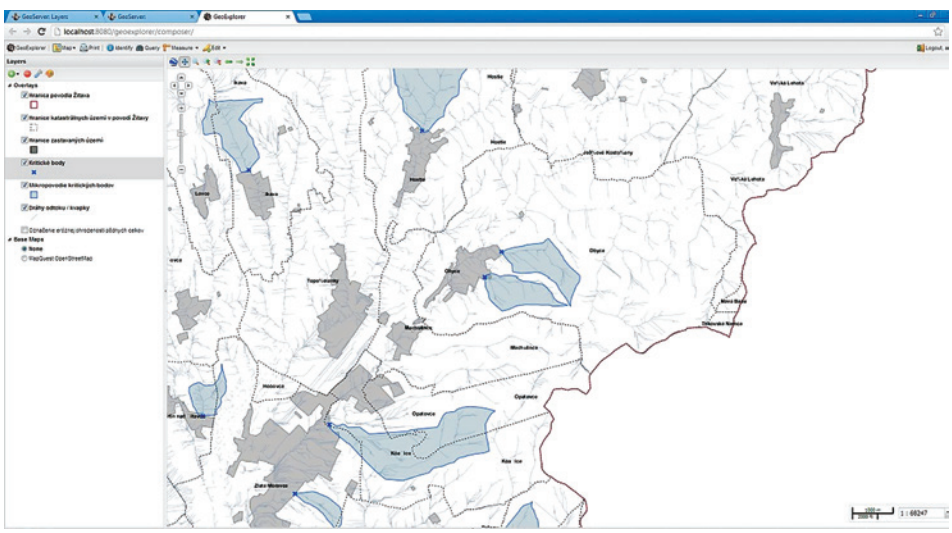

Fig. 6. The information contained in IS can zoom to the level of cadastral area, land units or to any level of detail

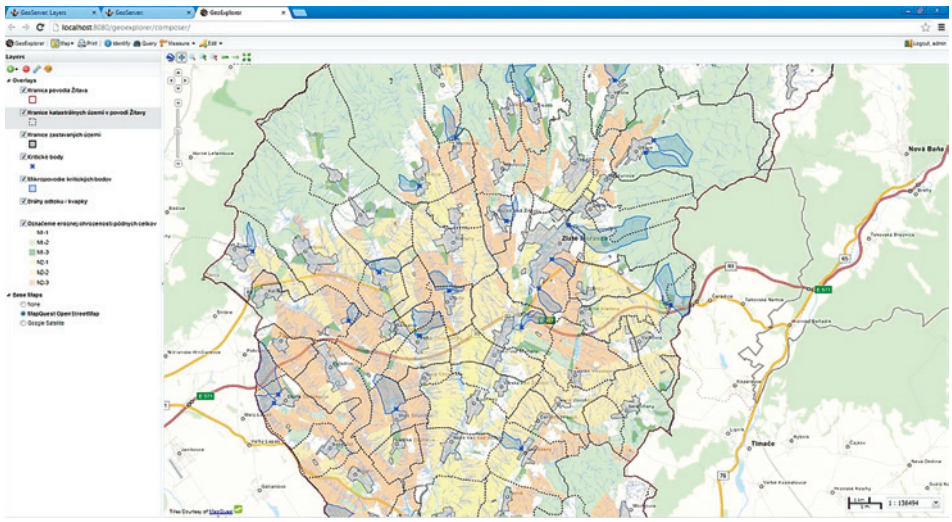

Fig. 7. Presentation of topics processed on the basis of subsystem raster. In this case the theme was used, which is part of the GIS Browser Open Street Map

DISCUSSION

In the paper we defined and fulfilled homogeneous group (not only) data from land consolidation projects, which are able to provide extensive and comprehensive information on the area of interest in terms of actual or potential user.

IS is accessed via web-interface on university servers and archives data produced from the data used in land consolidation projects.

IS users may become farmers-tenants of land respectively small growers, owners of land in the position of the person who rents land, respectively who work on it, mayors, investors, foresters, urban planners, designers of land consolidations, any designers in the area, environmentalists, academics or general (random) candidate about the issue.

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NOWE METODY GROMADZENIA DANYCH PRZESTRZENNYCH W RAMACH PROJEKTU KONSOLIDACJI GRUNTÓW

Streszczenie. Projekty konsolidacji gruntów w Republice Słowackiej osiągnęły stan, w którym zawierają wystarczającą liczbę cennych informacji (pomiarów planimetrycznych i głębokościowych, uaktualnionych map określonych obszarów gleboznawczo-ekologicznych, koncepcji lokalnych systemów terytorialnych stabilności ekologicznej, planowania ogólnych zasad dotyczących funkcjonalnej organizacji terytorium itd.) dla społeczeństwa. Współpraca w tym zakresie wskazuje na potrzebę stworzenia jednolitego systemu archiwizowania informacji (bazy danych), który byłby przygotowany dla działań związanych z planowaniem krajobrazu na terenach wzorcowych. Jak dotąd wiele systemów informacyjnych na Słowacji nie jest ze sobą powiązanych, tak więc nie mogą być dalej użytkowane. Niniejsza praca zwraca uwagę na procedury prowadzące do przetwarzania jednolitego systemu informacyjnego, który gromadzi i archiwizuje wyniki działań w zakresie kształtowania krajobrazu na określonym terenie. Program jest przeznaczony dla administratorów i użytkowników ujednoliconego systemu. Dlatego wyeksponowane tu zostało znaczenie rozlokowania systemu przeznaczonego dla różnych użytkowników. Następny etap stanowi opis danych wejściowych do opracowania obszernej bazy danych. Podstawą prezentacji systemu były informacje otrzymane z projektów dotyczących konsolidacji gruntów. Wszystkie obliczenia w formie graficznej zostały następnie opublikowane na lokalnej konsoli o nazwie „OpenGeoSuite environment".

Słowa kluczowe: system informacyjny, konsolidacja gruntów, sieciowy interfejs

Accepted for print – Zaakceptowano do druku: 12.02.2015

For citation: Leitmanová, M., Bažík, J., Muchová Z. (2015). New methods for gathering the spatial data from land consolidation project. Acta Sci. Pol., Formatio Circumiectus, 14(1), 125–133.