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**PRESENTING NATIONAL HERITAGE  
WITH WEB GEOGRAPHICAL INFORMATION SYSTEM  
„MOBILE CITY GUIDE“**

**Abstract:** We describe usage of Web GIS “Mobile City Guide” for presentation and promotion of national heritage. This system enables citizens and city visitors’ easy access to cultural heritage information and important objects easy find using mobile devices. Information is organized thematically into hierarchically intuitive category structure. This system use Web Services to collect information from basic websites. Optimal routes to objects are presented on navigable map. System support multi language interface and it is map independent.

**Key words:** digitization, National Center for Digitization, city guide, pocket pc application

**1. Introduction**

National heritage is intrinsic element of national integrity and it represents basic intellectual motive for creating feeling of nationality. From that point of view it is first among side-stuff that government should take care. Benefit from investing in Serbian national heritage although is large, is not direct, so this is very frequent reason for ignoring it.

One of necessary prerequisite for quality maintenance and actuality of the whole Serbian national heritage is modern facility issues usage. Without adequate promotion using advanced technologies national heritage becomes passive and unpopular, and also badly maintained and forgotten.

National heritage is conventionally presented through tourist guides, pamphlets, brochures and history, art theory, science history and culture books. Special congresses, like museum and gallery expositions, scientific congresses and cultural manifestations, are very frequently organized with the idea of promoting individual national heritage goods. Concerning that social sciences and art theory plays very important role in our educational system, number of papers, which are to be covered with comprising category of arrangement and publication of national heritage, is very big.

In proceeding we will try to signify some shortcomings of available publication resources.

Information presented in traditional way is thematically limited and we need large specter of different publications to cover the whole cultural potential.

This information sources gives us answer to one of the two questions “what” and “where”. So, it is possible to find detailed entity description (exp. Fig., monument, castle etc.) or we can get information about location of those monuments, but with minor details.

Thematic manifestations for national heritage promotion frequently are very passively and none attractively promoted, especially in our country they are noncommercial and without possibility to be maintained from author.

Papers with topic of promotion and criticism on entity of national heritage without strong and centralized publication stay unknown and barren of basic motive of reaching high quality – concurrency.

The biggest disadvantage of this way of promoting is static ness – limitation on the one and the same set of information. It is not possible to find data about actual events related to promotion of cultural heritage, as the newest contribution to it opus.

Concerning the unlimited of availability, actuality and efficiency of the Internet represents real medium for presentation and publication of national heritage. Big advantage of using dynamic Web applications is relatively low cost of maintaining and easy content refreshment. Web applications for mobile devices give efficient possibility for addressing tourists and other interested visitors to the objects of importance.

This work will expose possibility of promotion national heritage using geographical informational system and Internet technology. As an example of the realization of this kind of system we will present Web GIS “Mobile City Guide” in which are embedded possibilities of objects and manifestations promotion and finding significant locations on the city map. In next chapter we will explain the way of organizing entities into organizes category structure and we will explain sense of this kind of organization. Next we will explain system of localizing objects and finding the route to the destination using navigation map. In fourth chapter we will expose possibility of using Web Services for dynamic collecting information without direct connecting onto application site. At the end we will expose resume of this work.

## **2. Promotion and thematic categorization of national heritage entities**

The basic requirement that stands for objects information presentation is an opportunity for dynamic changes of shown information. Because of that it is important to use some of the programming languages for dynamic Internet programming. In this case we used C# ASP and .NET developing environment. Information refreshment is possible directly on the website, but it is also provided through Web Services (see chapter 4)

Concerning that the goal is to cover as much promotional entities as possible, it is important to organize entities as profound as possible. It means to choose intuitive structure through which user will easily find desired object in the city. Web GIS “Mobile City Guide” realized category tree. User moves through tree and chooses categories and he narrows set of objects which are shown in the list (Fig. 1).

Other way to decrease number of entities shown in the list is to filter them by using the criteria masks, such as marks, key words, and work time etc.

When user chooses promotional entity or group of entities, he can view information about them by using his handheld device (Fig. 2). User can see address and other contact information, brief or full description, user’s marks, location on the city map, advertising information about actual events and other information.

If user add desired provider into list of his favorite providers, he can receive emails with actual information about events associated with that service provider.

Very important requirement for this kind of systems is Multilanguage support, since very important percentage of users is from other speaking area. Our system supports Multilanguage interface based on standardized XML, so it is very easy to add some new languages just by simply editing XML file. Current version, beyond Serbian, supports English, Spanish, Italian German and French language.



Fig. 1. Form for searching promotional entity    Fig. 2. Form with promotional information

### 3. Using handheld devices and GIS for locating significant objects

Locating object and presenting optimal routes to the desired locations on navigable city map represents one of the centralized functionalities of our system. After choosing object or set of objects which user wants to visit, system defines the shortest path to the nearest of the chosen objects.

For the routing we used very effective Dijkstra's algorithm implemented in original and very efficient way. Using the administrative desktop application (Fig. 3) we create vector city map as linked graph, whose nodes represents crossroads or streets fraction points.

Dijkstra's algorithm, simply finds the shortest paths within oriented graph with defined starting point. Concerning the problem scope and algorithm efficiency, there was no need for the realization of more complex algorithm.

Concerning that we realize directed graph, it is very simple to define one way streets, and Dijkstra's algorithm allows us easy usage of associated streets weights.

Important system performance achieved through this is "map independence". Application was originally created for the city of Nibs, but for city change it is enough to change file or couple of files which represents city map and after that we can define vector map using our administrative desktop application „Map Editor“.

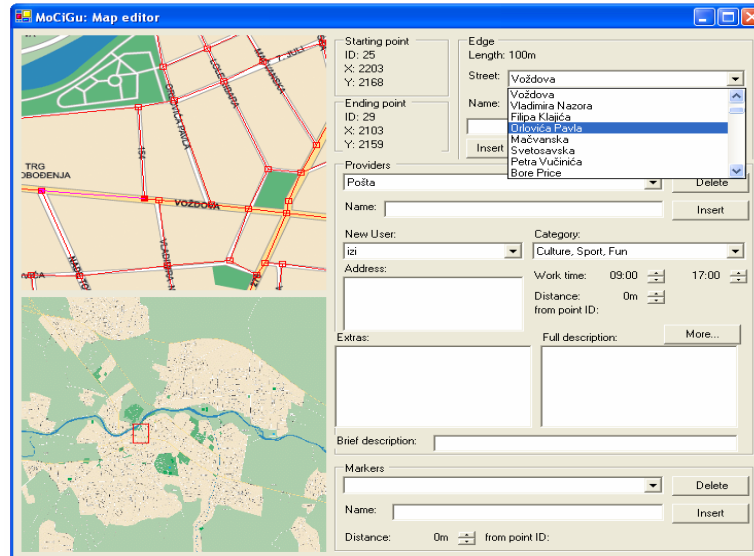


Fig. 3. Working form of the “Map Editor” application

User can define his location by using pair of streets which defines his current location, or by choosing referent point or he can define his position directly on the city map. If user define just one street system points map onto one of streets points so user can easily define his location. One of the possible system improvements is usage of GPS system for automatic definition of user’s location. But, because of the missing of financial support, we didn’t manage to realize this functionality.

When system determine route it clearly presents it on the navigable city map. Since navigation through the city is the necessity of the man in motion, it is very important for this kind of applications to be realized for handheld devices. Application „Mobile City Guide“ provides simple and intuitive user interface for mobile devices (Fig. 4), which designed preferable for Pocket PC devices. Process of interface development meet numerous obstacles since the limited working surface and limited amount of user controls.



Fig. 4. Route view form with navigable city map

Functionality which is not realized through this project and which would be very useful for users in the vehicles is voice navigation. For quality realization of this functionality we also need GPS or some similar system.

#### 4. Using Web Services for informing on actual events

Promotional information update of galleries, museums and similar service providers, is very often under the legacy of one or a few persons. If it is about cultural and historical monuments, it is very often that one person is in charge for larger number of entities. This limitation makes information update hard and demands much time. Big issue is distributed promotion, where competent person must update several sites with the same data and it must be done for each separately.

The screenshot shows a web browser window with the URL `http://localhost/MoGiGu/Arrange%20Provider's%20Info.aspx`. The page title is "MoGiGu" and the main heading is "Zgrada Univerziteta". The form contains the following fields and sections:

- Service provider's name:** A text input field with the value "Zgrada Univerziteta".
- Choose your picture:** A section with a "Browse..." button and an "Upload" button. A preview image of a building is shown.
- Advertising text:** A text area containing the text: "Pod pokroviteljstvom Ministarstva prosvete dana 14.12.2004. raspisan je konkurs za upis studenata postdiplomske studije na fakultetima Univerziteta u Nišu."
- Full Description:** A text area containing the text: "Univerzitet u Nišu je jedan od najvećih univerziteta u zemlji. Pokriva 10.000 km2 i ima 15 fakulteta".
- Address:** Fields for "Street" (Sumatovačka), "Number" (bb), "Phone number" (018/656-123), "Fax", and "e-mail" (univerzitet@edu.yu).
- Web Service URL:** An empty text input field.
- WSDL URL:** An empty text input field.
- Web Method Name:** A text input field with the value "Extra".
- Confirm:** A green button at the bottom right.

Fig. 5. Form for arranging advertising information

Solution which is presented here is providing Web Services. On the form for arranging service providers information (Fig. 5), system user, who is competent person for information arrangement, submits location of WSDL file and the name of Web method (usually named „Extra“). This enables user to refresh information just onto his system, using web or desktop applications.

When ordinary system user (who wants information) choose the field with the last information about advertising entity, our system calls Web Service and it automatically reads data from the basic entity's application database.

#### 5. Conclusion

Usage of Web GIS is one of the very attractive ways for promotion of city goods and national heritage. National heritage should be presented together with city offer, to be presented on often visited and very competitive promotional media. Except for the

information about city offer within the scope of cultural heritage, for the user it is very important to get the possibility for the easy object locating.

This information system realized for handheld devices, which combines marketing and geographic-navigation possibilities, represents competitive possibility or the actualization of national heritage, which would be highly motivating for renewal and maintenance of its quality.

#### References

- Marco Neumann, *Spatially Navigating the Semantic Web for User Adapted Presentations of Cultural Heritage Information in Mobile Environments*, SWDB'03, Berlin, 2003, 9–15
- Philippe Mougín, Christophe Barriolade, *Orchestra Networks*, Web Services, Business Objects and Component Models, White Paper (July 2001, updated October 2001)
- Christian Borntäger, Keith Cheverst, Nigel Davies, Alan Dix, Adrian Friday and Jochen Seitz, *Experiments with Multi-modal Interfaces in a Context-Aware City Guide*, Human-Computer Interaction with Mobile Devices and Services, Springer-Verlag, 2003, 116–130
- J. van der Kooij, A.M.G. van de Camp, A.N. Gritsenko, H. Kong, R. Krysiak, U. Yordan, *Hermes: A Navigation Aid For City Tourists*, 17th British HCI Group Annual Conference, September 2003, University of Bath, UK

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