



## CONCEPTION OF A TOURISTIC MAP AND NATURE PROTECTION FORMS CREATED WITH USE OF OPEN DATA SOURCES AND FREE SOFTWARE ON A GRYBÓW COMMUNE EXAMPLE

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### Summary

In the last decade, far-reaching changes in the way of using the Internet, which as a result of range, multimedia and interactivity plays bigger and bigger role in interpersonal communication, could be observed. These changes are accompanied by development of geo-information services which are usually associated with geo-visualization understood as presentation of geographic information on the maps. Attainability of computer techniques which enable creating of network applications activated users who often and often build their own topic services which connect chosen contents with a map base.

The aim of the paper is to analyse chosen data sources as well as techniques and computer tools which can be used to create topic maps according to the conception “user-creator” (producer), “user-producer” (produsage). The project of a topic map presenting chosen touristic object and also nature protection forms localized in the area of Grybów commune (Małopolska, nowosądecki district) was presented in the article. In conclusion, it was revealed that the created map is elastic in edition and development and its every element is possible to be modified. However, it has got some limitations. Its modification needs expert knowledge and access to a server and published data can be questionable for users.

### Keywords

prod-usage • prod-user • Internet cartography • OpenStreetMap

### 1. Introduction

The Internet is one of the most important elements of media environment where a contemporary man functions and is in many respects the most powerful of many media ranks – telegraph, telephone, radio and television [Morbiter 2009]. Quickly widespread, more and more cheap and widely available, it constitutes equipment of the most households both in cities and villages [Król 2006, Król and Wojewodzic 2006].

Internet in view of its range, multimedia and interactivity plays significant role in interpersonal communication [Pawłowska-Mielech and Bocek 2006]. Contents

published in the Internet as well as the form of their publication can influence receiver's behaviour and decisions, mould markets and create brands and they after all give possibility of having and using "virtual identity" [Ostaszewska 2013]. Information is available in the Internet for everyone and its placing is relatively quick and cheap [Mastykarz 2005].

In the last decade, far-reaching changes in the way of using the Internet can be observed. Statistic web sites gave up to contents generated dynamically by the users themselves [Król and Salata 2013]. These changes are accompanied by geo-information web services development known also as geospatial services or services of spatial data. They are usually associated with geo-visualization implied as geographic information presentation on maps [Gaździcki 2012, Sudra 2012].

Users exploit digital maps first of all for objects location, browsing of service centres, telephone/address data, routing of ride itineraries and also space exploration [Tkaczyk 2010].

Appearing of computer techniques which enable building of network applications with use of procedures, protocols and tools activated users who are more willing to create topic services joining chosen contents with the map base made accessible by geo-data suppliers.

The aim of the paper is to analyse widely available data sources as well as chosen techniques and computer tools which can be used to create topic maps according to the conception "user-creator" (producer), "user-producer" (produsage).

The project of a map presenting chosen touristic objects and also nature protection forms localized in the area of Grybów commune (Małopolska, nowosądecki district) with use of open data sources and free software was presented in the article.

### 1.1. Community of active users

"Produsage" is a term used for the first time by A. Bruns [2007] and it is a combination of the words "production" and "usage". This conception describes the current of changes connected with net resources usage and presents a pose of an active user who from a passive receiver becomes a creator of contents popularized in the Internet.

Development and attainability of Internet technologies including possibilities of cartographic components of web sites created a new group of "users-producers" or "users-creators" (producers).

Conception of a "user-producer" was presented by Y. Benkler [2002] and is tightly connected with a term "produsage". A "producer" is a user who runs activity called "produsage". Characteristic feature of users from the "producers" circle is inclination to joining into communities and working together over created content. It is usually work within the frame of voluntary service and taking part in "produsage" projects is voluntary. Moreover, in that model there is lack of predetermined work distribution or allotment of duties. Particular tasks are realized spontaneously according to users' preferences. Elaborations created in such a way are of open character and are available for the other members of society who can use and improve them. All of that as well as common access

to open data resources and geo-information tools including API programistic interfaces gave rise to Internet cartography and formed current of “geographic information created by users’ society” (Volunteered Geographic Information, VGI [Goodchild 2007]).

One of the most complex and dynamically developing VGI projects is OpenStreetMap [Cichociński 2012, Neis et al. 2012]. Various Internet services of “mashup” type where map elaboration is usually a web site’s component also form part of that current [Kowalski 2007].

## 1.2. Free software

Idea of free software has developed for over twenty years and is tightly connected with Free Software Foundation activity [2015] which was founded in 1985 by R. Stallman. History of free software started from strictly computer appliances such as servers operating systems and computer web management. Now it gains raising popularity. Expanding number of widely available programmes especially for office, graphic or multimedia usages is created [Bednarczyk and Rapiński 2011]. It concerns also trade programmes including spatial information system and Internet cartography.

Even though “open source” term is identified with “free software” one, there is significant difference between them. Free software philosophy concentrates on moral and ethic aspects of software accessibility whereas open source emphasizes its technical perfection. So free software is at the same time open source one (free and open-source software: FOSS), however, not every open source software is a free one. Considering ideological differences that separate free software and open source movements, they are used to be called FLOSS term (Free/Libre Open Source Software) [Ghosh 2001].

“Free as in free speech, not as in free beer” sentence reflects conception of idea reasoning of open software which is free as “free speech” and not as “free beer”. Free software is a matter of freedom of usage, not the price (lack of license fees). To emphasize this difference, free software is often called interchangeably “libre software” [GNU 2015]. “Free software” understood in the price context (f. ex. Internet Explorer or Adobe’s Flash Player) is made accessible free of charge but it differs from open source (f. ex. Mozilla Firefox) in the fact that users have not got an insight into programme source code and cannot modify it.

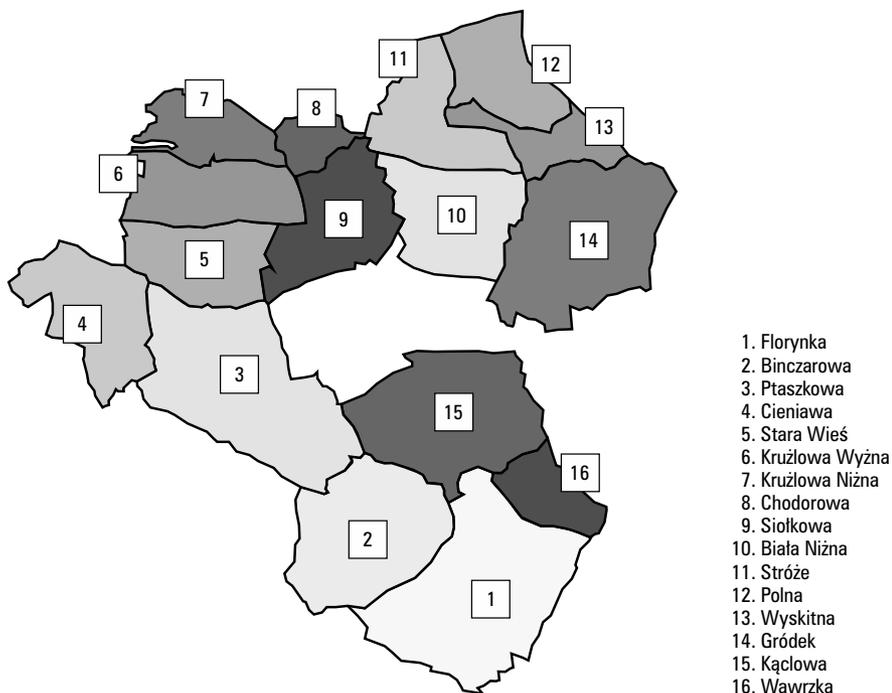
Lerner and Schankerman’s [2010] researches show that most of open source programmes are created in commercial firms which also offer close software. It is tightly connected with business model of its facilitating which can assume usage of open source programmes as the way to introduce clients to the other payable firm products.

Open source is the way of software creating and distribution based on sharing it together with a source code. Open source type programmes are not subject to patents and their usage does not need paying a licence fee. Open source idea base is to provide users with unrestricted access to source programme code which can be modified and made accessible [Deek and McHugh 2008]. Moreover, source code attainability allows to analyse applications operation, to detect and remove mistakes. It is connected with permanent access to actualizations and new functionalities.

### 1.3. Grybów Commune characteristics

Grybów land is situated in nowosądecki district in the midst of picturesque mountains and streams, in the river basin of Biała Tarnowska also called Dunajcowa or Grybowska. The river is a right-bank Dunajec tributary 101.8 km long.

Grybów Commune belongs to rural ones and consists of 16 village councils (Fig. 1). Its area is 15.301 ha, of which agrarian lands comprise 8.267 ha, including arable land of 3.727 ha and meadows and pastures together of 4.517 ha. Forests' area is 5.169 ha.



Source: author's study based on Grybów Commune map portal [GIS Grybów 2015]

**Fig. 1.** Grybów Commune administrative partition, demonstrative map

Administratively, the commune is located in Małopolskie Voivodeship in the range of nowosądecki district. 5.053 households compose all the village councils (including 3.014 farms) where 24.906 people are registered, therein the most in Ptaszkowa (704 persons), Biała Niżna (588 persons) and in Stróże (556 persons) [Gmina Grybów 2015].

Picturesque location as well as favourable climatic conditions decide about the fact that Grybów Land is reputed as one of the most beautiful places in Małopolska. Grybów city and nearby towns compose the centre of mountain touristic trails so that is a good starting point for mountain excursions and bike tourism.

Around Grybów city, there are Grybowski Mountains which compose north-western region of the Low Beskids. Many unique monuments including beautiful Orthodox

and catholic churches that testify to centuries-old historic and cultural tradition of the region can be found here [Szumlańska 2002].

The commune's strength is its attractive location and area shape, flora and fauna variety as well as cultural wealth reflected in many monuments and still cultivated traditions. In the commune's area, there are objects that create Wooden Architecture Route in Małopolska: St. Dymitr Orthodox church in Binczarowa, St. Bishop Wojciech church in Kałłowa, St. Mary's Birth church in Kruźłowa, St. Andrew church in Polna, All Saints church in Ptaszkowa and also beekeeping museum in Stróże [Grybów 2007].

Grybów Land can also be proud of holiday centres in Cieniawa, Grybów, Stróże, agrotouristic farms in Ptaszkowa, Siołkowa and Kałłowa, ski lift in Cieniawa and the ski lift and ski running route in Ptaszkowa. There is also vigorously active local population. Particular importance belongs to agrotourism and rural tourism and residents and the commune pay much more attention to the region's promotion in the Internet. Attention deserves to rich in information commune's web site [Gmina Grybów 2015], regional information portal "Grybów24" [Grybów24 2015] as well as activated in 2013 touristic map portal together with MPZP local plan prepared within the range of the project entitled "Activating of the communal map portal of Grybów Commune" and financed within Activity 413 Introducing of Local Development Strategies included in PROW for the years 2007–2013 [GIS Grybów 2015].

Despite the fact that the region takes more and more importance as touristic as well as recreational and rehabilitative centre and it can be attractive for investors, there is lack of factors in the commune's area which would favour its development [Kmak and Poreba 2006]. Absence of industry and work places, difficulties in running independent business and also decreasing profitability of small farms cause impoverishment of this area and carry along danger of their degradation in future [Kmak et al. 2003]. Features of local community are resourcefulness and initiative of its inhabitants and also the net of services rendered mutually in the form of next door favour or for some small price. However, the main source of incomes of local households is still hired work abroad. In the light of above mentioned, promotion of touristic values as well as Grybowska Land nature protection forms become particularly important.

Initiatives of the commune's promotion can be not only taken up by the Communal Government but also by communities of users-volunteers through various forms of activities in the Internet including blogs, forums and various topical map elaborations.

## 2. Project conception

In the conception's stage, several basic project assumptions were accepted:

1. The idea of promotion of touristic values and Grybowska Land nature protection forms illuminates the map's creating.
2. The map of monuments and nature protection forms will be fully prepared on the basis of free software (techniques and computer tools) and open data sources (geographical data bases).

3. The map will be created as the own service (mashup), topical, made according to the current “produsage, producer”.

In the light of accepted project assumptions, the map service OpenStreetMap was chosen as deliverer of geographical data. Basic point elements of the map – POI (point of interest – a marker, a drawing-pin) in the form of own graphics and also the other objects will be plotted on the map with use of Leaflet JavaScript library (BSD License, GPL – compatible free software licenses). Elements of navigation being part of application menu will be created by means of jQuery UI (MIT License, free software license). The map and application menu will be entered in the frames of hypertext document HTML (HyperText Markup Language) with format given by means of cascading style sheets CSS (Cascading Style Sheets) and published on the data server in the form of “mashup” type web site.

### 3. Data sources

OpenStreetMap (OSM) is a social networking project with the object of creating the world map accessible without any restrictions which could be edited by every user. The project was initiated in 2004 by Steve Coast from University College of London [Drop et al. 2013]. There was a notation in the project mission that its superior aim is to deliver both ready maps and also “*unadorned geodata to all who need them*”. [OSM 2015].

OSM map is created by users all over the world on the basis of data from GPS manual receivers, air pictures and the other available sources (f. ex. data passed free of charge by territorial council entities, firms or institutions) and also sketches made in the field. OSM data base is being built by volunteers. Appearing of new resources is depended of the users’ eagerness and willingness to perform for example measurement in the field or image tracing of available air pictures [Cichociński 2012].

OSM data are kept in a relational PostgreSQL base. The basic data unit is a node which can appear independently as a point object or as a part of a complex object. Nodes are composed in ways which can be linear or surface. Mentioned types build relations that serve to logical joining of objects which compose the greater entirety. Data have got spatial reference in geographic coordinate system WGS84 [Drop et al. 2013].

OSM data bases are made accessible within the frames of ODbL open license (Open Data Commons Open Database License). This is a license “attribution”, “share-like” type and it is recommended by Open Data Commons to publish all types open data. The license enables free data redistribution, modification and usage with the same privileges for the other users.

### 4. Techniques and tools

Leaflet [2015] is JavaScript library published in 2011 written by Vladimir Agafonkin and used to create interactive map applications. Next to OpenLayers and Google Maps API, it is in the circle of the most popular mapping JavaScript libraries and is used by such internet web sites as Facebook [2015], Foursquare [2015] or Pinterest [2015]. The

library allows users to create and make accessible their own topic maps, to organize information layers, mark, describe and present objects in space and many others. The project concentrates on efficiency, usefulness and simple API. Moreover, with regard to relatively small size of the library as well as support for interactions evoked by means of touch panel, Leaflet is regarded to be one of the best libraries for designing maps for mobile devices [Donohue et al. 2014].

Usage of Leaflet library does not need from users advanced knowledge from the range of spatial information systems GIS (especially issues connected with coordinate systems) and programming of basic functionalities of a map is relatively simple.

Leaflet library is not connected with any deliverer of map elaborations. With its help, access to different base maps can be received. It is most often used with maps created on the basis of OpenStreetMap project data which enables free of charge usage of geographic documented data.

Leaflet library allows to implement interactive maps put fluently together in real time from tens of tiles comprising the map's fragments to the structure of hypertext document. In OpenStreetMap terminology, maps are called tiled web maps or slippy maps. This term describes contemporary internet maps which can be increased and moved.

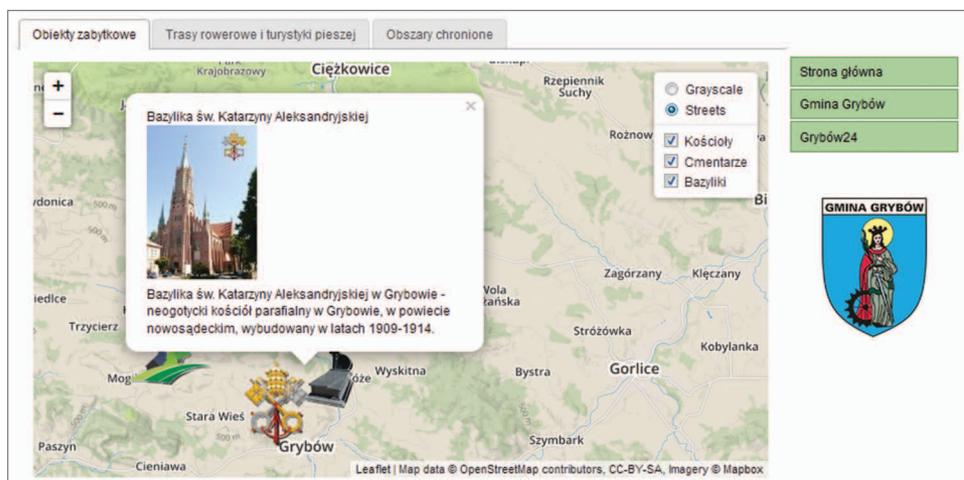
To create map service, chosen scripts created on the basis of jQuery UI (jQuery User Interface JavaScript Library [jQuery UI 2015]) were also used. JQuery UI is a set of widgets with determined functionality which allows to create interactive network applications. "Widget" term is connected with a feature of JQuery scripts which takes the form of external modules. These modules can be freely "sticked" in or out the structure of a base document. Widgets allow to organize elements which are part of application interface.

JQuery is a light programistic library for JavaScript language, created in 2006 [Król and Szomorova 2015]. JavaScript is an object-oriented programming language which enables to create dynamic Internet services [Salata and Król 2012]. JQuery UI supports to project interaction with a user. The content and objects presented in the application's window gain dynamic character. Objects' dynamics expresses in the possibility of their dragging, catching, dropping, resizing, sorting and selecting. JQuery UI also delivers techniques and tools that enable to create animation effect, for example dynamic presentation or hiding elements in different configuration (show, hide, toggle) [Stachura et al. 2014].

## 5. Form and result of application's introduction

Basic part of formed application is an interactive map that bases on OpenStreetMap resources. The map together with navigation elements was placed in the structure of a hypertext document prepared with use of basic markers obligatory in HTML5 specification [W3C 2015]. 10 kinds of POI points (markers) were plotted on the map according to the accepted division: Orthodox churches, churches, chapels, basilicas, synagogues, cemeteries, institutional buildings, museums and open-air museums,

sports buildings as well as places to sleep in and catering. Every kind of a point was marked with a separate icon prepared in the form of PNG file. The icons were related with text description and graphics which characterize given object (Fig. 2). Considering a great number and variety of the points, they were grouped and placed in topic layers which can be freely included and excluded. Similarly, maps of nature protection forms which were plotted with marking of their spatial range were prepared. Moreover, to increase transparency, menu which enables changing of map base kind was created.



Source: author's study based on OpenStreetMap

**Fig. 2.** The map and interface of application content management, view in the window of the Internet's browser

Application prepared in such a way is elastic in edition and development. Their every element can be modified. It also fulfils international standards of Internet web sites formation established by World Wide Web Consortium [W3C 2015]. Considering mentioned features, it can be in a relatively simple way put into any web site. It has got, however, some restrictions. It was created through hand-coding technique (Hand-Coding Web Pages) and placed in data server. Edition of the map created in such a way demands from a user expert knowledge and access to the server (edition of files on the computer disk and then overwriting of the previous ones put in the server). Some solution could be writing in of a map into web site structure manager by means of CMS system (Content Management System) which helps to edit contents in the web site window. Moreover, quality of content published in such a way which can be out of date, inaccurate or completely unreal could arouse doubts between users. Service creditability can be built by giving data sources and regular content updating. All that needs time and work costs and that is why there is such a small number of independent services of local character.

## 6. Conclusions

The Internet is developing very dynamically. Techniques and tools that are made accessible there enable users' quick exchange of information as well as creating and putting there contents of various forms. Conception presented in the paper presents idea of an individual topic map with subjective commentary and created by users community. This conception provides full freedom and independence in deciding about character of contents drawn into the map. Moreover, it is not connected with any costs of licence buying.

History, culture and widely understood characteristics of Grybów Commune was described in many published papers – memoirs, jubilee books, annuals, guide-books, scientific papers and the others. They comprise a rich source of information about commune's history and contents written there are often used as documented material for various multimedia elaborations.

Grybów Commune is well represented in the Internet by The Commune Council web site, the regional information portal as well as the map portal. The Commune publishes in the Internet developed map service that displays touristic values, capital causations, location of service points, planning, record and another issues. However, this service has got closed character for the users. There is lack of independent initiatives in the Internet which are taken up by local communities that would concentrate on promoting of commune's values with help of small information-touristic portals. This space can be filled with topic map services created by users.

The Internet map service where text description and photo documentation of presented objects is completed by their location in space can be perfect completion to published elaborations. Numerous techniques and geo-information tools made accessible free of charge in the Internet and developed by users communities can be used for topic map services building. There are no limits or restrictions for applied contents. Map topics can be both a touristic route with a viewpoints list and also a map of unrestrained waste dumps. A map prepared in such a way can be published in the Internet as a web site's component or sent as a link.

Rural areas development can result not only from real local activities from the range of environment protection and shaping or infrastructure development. It is tightly connected with social development understood as level increase of education, initiative as well as awareness and responsibility for surrounding environment. Bigger and bigger role is played by digital media including the Internet and various map services. They provide access to spatial information, enable participation of local community in planning process, allow to promote touristic, natural and economic values of regions. They comprise information flow channel which in the light of increasingly bigger commonness of mobile devices will become more and more important.

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