

## MONITORING THE USE OF THE INTERNET APPLICATION FOR TOMICE MUNICIPALITY LOCAL PLAN OF SPATIAL DEVELOPMENT

Karol Król, Barbara Prus

### Summary

Diverse visualizations of environmental data, infographics, maps and Internet services can be information sources not only for their recipients, but also for their creators. That information can come from the monitoring of users' activity, which can be carried out in an automated way by means of Internet applications.

Results for the monitoring of the Internet application presenting the local plan of spatial development of Tomice municipality are presented in the paper. From measuring their users' activity, it can be concluded that despite the increased number of visits from outside Poland's borders, the service remains of greatest interest to local communities. The vast majority of recorded visits came from the adjacent areas or these located near the municipality itself.

### Keywords

website use • Internet applications • local spatial plan

### 1. Introduction

After the political transformation in 1989, two legal acts regulated the issues of planning spatial development within Poland. The first is the Act on spatial planning of 1994 and the second, the Act on planning and spatial development of 2003. The purpose of the legal norms introduced therein was, among other things, to transfer the level of planning decision-making from the national to the municipality level [Prus 2012]. It resulted in the possibility of making joint decisions by citizens about the shaping of the future way of development as well as the adaptation of local space in relation to the needs of its inhabitants [Hernik et al. 2013]. Active participation of residents in the process of creating the planning documents is an important element of ensuring social participation in the process of planning, and thus making spatial development more effective. In terms of access to public information from the range of planning and spatial development, statutory obligation to publish local legal legislation in the Internet pages of the Public Information Bulletin, and also in the form of graphic information (such as the image of the local plan) is important.

Graphic geoinformation as well as geographic and cartographic data are more and more common in the Internet [Król 2015a]. Printed sheets of topographic and review maps are gradually replaced by sets of geodesic and cartographic data provided by extended geoinformation portals [Gotlib 2008, Iwaniak and Kaczmarek 2009, Król et al. 2016, Król and Prus 2016]. Popularity of Internet applications that fulfill the role analogous to tourist maps, road maps or city plans is increasing [Dąbrowski and Sawicki 2010, Król 2015c, Król and Szomorova 2015, Salata et al. 2012]. Attractiveness of maps published in the Internet results above all from the functionality of the medium itself, the resulting rate of the access to information, as well as its diversity [Król 2015b, Król 2015d, Król 2016].

Creating and publishing of an Internet service is the finishing the stage of its implementation. Attempts aimed at its promotion and development should follow as the next stage, along with the monitoring of its use. This, in turn, can provide data necessary for effective management of the application. Whatever the contents or enforcement techniques, all Internet services can be subjected to monitoring.

The aim of the paper was to analyse the information from selected statistics of using the Internet application, which presents the local plan of spatial development of Tomice municipality.

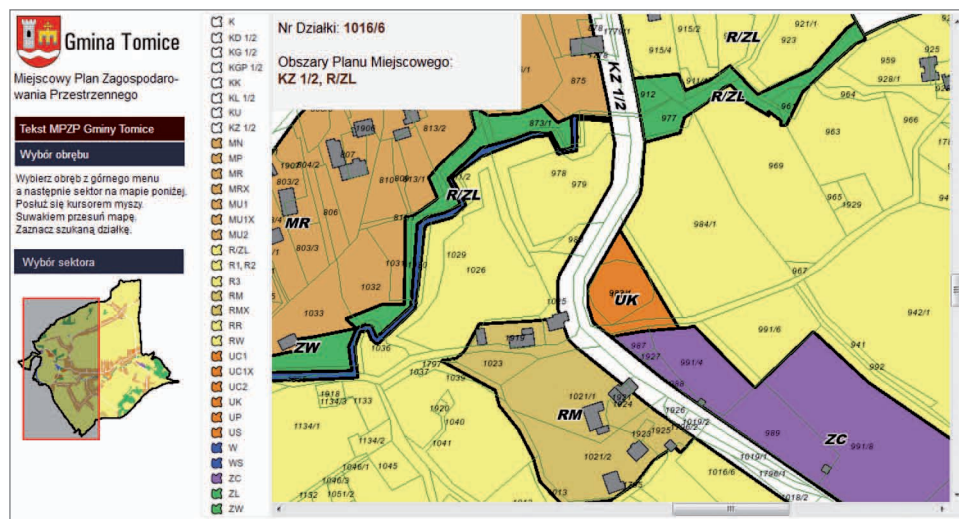
## 2. Material and methods

Tomice is a rural municipality located in Małopolska Province, Wadowice district. The service, which presents the local plan of spatial development for the whole area of the municipality (henceforth referred to with its Polish-language abbreviation: eMPZP), was created in 2012 on the basis of jQuery library except expanded platforms such as MapServer or GeoServer (Figure 1). The application was located on the server and published at the municipality's webpage. Afterwards, it was subjected to monitoring. The main function of the application is to present the map and to provide text information about reference plots' purpose in the local plan for specific objectives [Salata and Król 2012].

The number of displays and average time spent by users at website's pages, users' geo-location as well as verification of used browser's kind and version were included, among other things, in the basic statistics of using the Internet application presenting the local plan for the spatial development of Tomice municipality. They are "traditional" measurements, which give some general view of the website's efficiency [Palmer 2002]. Values of accepted indices were obtained by means of Google Analytics application, one of the most popular tools to analyse the statistics of Internet services [Plaza 2011].

Data collecting was started on 1 January 2013. The results from the period of 4 years i.e. from the first day of beginning the statistics to 31 December 2016 were analysed. The control point for measurement was established as 31 December 2014, i.e. two years after the monitoring of the application commenced. Total measurement results were regarded relative to that. The time preceding the control point was described as "the

first measurement period” and the succeeding time was called “the second measurement period.”



Source: authors' study

Fig. 1. The Internet application which presents the local plan of Tomice municipality (screenshot)

### 3. Results

Altogether, 11,573 unique sessions generated by 7,465 unique users were noted in the analysed period. In the time period from 1 January 2015 to 31 December 2016, an increase in unique sessions' number (by 36%) in relation to the first measurement period was noted. Moreover, the significant increase of the unique users' number, which was up to 56%, as well as the increase of the views' number by 38% were noted in the second measurement period. Over 4 years from the start of monitoring, growing interest in the application can be proved (Table 1).

A high rate of website's rejection (WS) deserves attention although its value in the measurement period slightly decreased. The rate of rejection is the percent of sessions during which a user visits only one page and leaves it without interacting with it. Its value suggests that after entering the website, the user left it without browsing the other pages (no matter how long was the time they spent there). However, users can also leave the website after displaying one page, when they have found the required information and are not interested in visiting other subpages or when the core of a website/application is one hypertext document (such websites usually have a high rate of rejections). This is also the case of eMPZP applications where within one hypertext document, and specifically in the window of a floating frame (iframe), the presenta-

tion of a local plan's map is contained. Therefore, the high value of WS can result from technical building of the service. It is also confirmed by "the average number of pages" browsed by the users during one session (Table 1).

**Table 1.** Selected statistics of eMPZP service

Parameter	Measurement period		Increase	
	1 January 2013 to 31 December 2014	1 January 2013 to 31 December 2016	Value	[%]
	Measurement value			
Number of sessions	4,910	11,573	6,663	136
Average number of pages in one session	1.23	1.24	n/a	n/a
Users	2918	7465	4,547	156
Average time of the session's duration	00:01:14	00:01:08	n/a	n/a
Views	6,039	14,384	8,345	138
Rate of rejections [%]	85.99	83.42	n/a	n/a

n/a – not applicable

Source: authors' study based on Google Analytics

Most visits were noted from the territory of Poland – from such urban centres as Kraków, Wadowice, Warszawa or Katowice. This activity remains within the whole measurement period at the relatively stable, high level (Table 2). In the second measurement period, significant increase in the number of visits by the users from beyond national borders was noted, including these from China and Japan, which in the period from 1 January 2013 to 31 December 2014 were not noted at all (Table 3).

**Table 2.** Urban centres, where the greatest activity of eMPZP users was noted

City	Measurement period			
	1 January 2013 to 31 December 2014		1 January 2013 to 31 December 2016	
	Number of sessions	[%]	Number of sessions	[%]
Kraków	2057	41.89	3,873	33.47
Wadowice	1213	24.70	2,847	24.60
Warszawa	408	8.31	810	7
Katowice	184	3.75	310	2.68
Wrocław	71	1.45	112	0.97

Source: authors' study on the basis of Google Analytics

**Table 3.** Countries where the greatest activity of eMPZP users was noted

Country	Measurement period			
	1 January 2013 to 31 December 2014		1 January 2013 to 31 December 2016	
	Number of sessions	[%]	Number of sessions	[%]
Poland	4,750	96.74	9,429	81.47
USA	16	0.33	518	4.48
Great Britain	17	0.35	383	3.31
Russia	12	0.24	236	2.04
Germany	15	0.31	78	0.67
Italy	0	0	65	n/a
China	0	0	59	n/a
Japan	0	0	43	n/a

n/a – not applicable

Source: authors' study based on Google Analytics

The eMPZP application was browsed most often via Google Chrome web browser, although it can be observed that in the first measurement period, the service was browsed most often via Mozilla Firefox web browser (Table 4).

**Table 4.** Web browsers used most often by eMPZP users

Web browser	Measurement period				Increase	
	1 January 2013 to 31 December 2014		1 January 2013 to 31 December 2016		Value	[%]
	Number of sessions	[%]	Number of sessions	[%]		
Chrome	1,411	28.74	4,961	42.87	3,550	252
Mozilla Firefox	2,302	46.88	4,252	36.74	1,950	85
Internet Explorer	734	14.95	1,123	9.7	389	53
Opera	315	6.42	609	5.26	211	93
Safari	55	1.12	206	1.78	151	275
Android Browser	66	1.34	152	1.31	86	130

Source: authors' study based on Google Analytics

According to Google Analytics algorithms, eMPZP application was displayed most often on stationary devices of desktop type. Multiple increase of displays' number on mobile devices was also noted in the analysed period (Table 5).

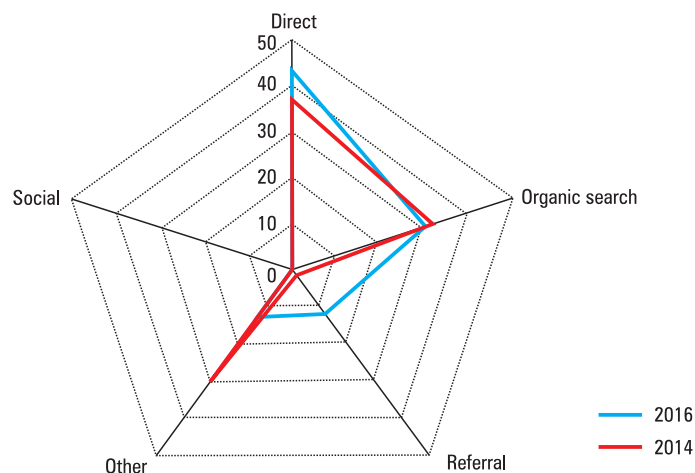
**Table 5.** The type of a device where the visits were noted

Type of device	Measurement period				Increase	
	1 January 2013 to 31 December 2014		1 January 2013 to 31 December 2016		Value	[%]
	Number of sessions	[%]	Number of sessions	[%]		
Desktop	4,701	95.74	10,733	92.74	6,032	128
Mobile	114	2.32	606	5.24	492	432
Tablet	95	1.93	234	2.02	139	146

Source: authors' study based on Google Analytics

Almost 44% of the noted traffic was qualified as coming from direct sources. It can indicate the fact that a great number of users visited eMPZP not by chance but by direct evoking the application in a browser's window. However, it raises doubts as to the application having its own independent domain or subdomain. It is situated at the address "www.tomice.pl/mpzp". However, the information about the application presenting the local plan is placed at the main page of the municipal portal, thus the visits from that source can be in this case counted by Google Analytics algorithm as direct ones.

The eMPZP application is relatively "well visible" in Google search results. It takes the first place on the first page of SERP (Search Engine Results Page) after writing down the Keywords 'mpzp tomice'. Therefore, the high 'incoming' number (visits, users) derives from the organic search. Moreover, a significant increase in the number of visits from the other websites, and a slight increase of visits from social media were noted in the second measurement period (Figure 2).



Source: authors' study based on Google Analytics

**Fig. 2.** eMPZP application – sources of incoming traffic

#### 4. Conclusions

Despite increasing numbers of visits noted from beyond the borders of Poland, the eMPZP service attracted the greatest attention from local communities in the analysed period. Most of the noted visits were coming from urban centres located in the vicinity of Tomice municipality. Therefore the assumption can be made that the eMPZP application is of interest to a narrow circle of people who search for information about the purpose of a given property in the local plan. Therefore, it is a specific group of recipients interested in local investment conditions.

The eMPZP is not accentuated at the foreground of the Internet service of the Tomice Municipal Office. Also, it is not promoted in any way. This largely results from the fact that the eMPZP service – as an IT project – is of a finite character. It results above all from the technology, by means of which it was created, and that significantly limits the possibility of implementing new functionalities or improving the functional usefulness of the application. Moreover, the eMPZP service does not meet the technical requirements in the range of spatial data provision demanded from geo-IT projects, as defined in the Act of spatial information infrastructure [Ustawa... 2010]. In spite of these restrictions, the obtained results allow us to conclude that the application still remains of interest to the users. Therefore, it would not be reasonable to remove it from the municipality's website until it is replaced with an expanded map portal.

Measuring interest in the services, which present local plans or spatial studies, can provide the municipal authorities with important information about the scale of interest in the investment areas within the municipality in question. Google Analytics application is universal, and it provides increasingly accurate and diverse information. It can be used to monitor Internet websites of municipal offices as well as other web services, where information about the users' interests could be of particular importance in the decision-making process. Moreover, via such tools, the message sender can receive increasingly credible data about the range of its impact.

#### References

- Dąbrowski K., Sawicki P. 2010. Wizualizacja ortofotomap cyfrowych w technologii Google Maps. Arch. Fotogram. Kartogr. Teledet., 21, 87–96.
- Gotlib D. 2008. New faces of cartography – the Internet and cartography. Pol. Cartogr. Rev., 40(3), 237–246.
- Hernik J., Gawroński K., Dixon-Gough R. 2013. Social and economic conflicts between cultural landscapes and rural communities in the English and Polish systems. Land Use Policy, 30, 800–813.
- Iwaniak A., Kaczmarek I. 2009. Rola serwisów społecznościowych w budowie infrastruktury danych przestrzennych. Rocz. Geomat., 7, 5(35), 79–87.
- Król K. 2015a. Presentation of objects and spatial phenomena on the Internet map by means of net resource address parameterization technique. Geomatics, Landmanagement and Landscape (GLL), 4, 35–47.

- Król K. 2015b. Conception of a touristic map and nature protection forms created with use of open data sources and free software on a Grybów commune example. *Geomatics, Landmanagement and Landscape (GLL)*, 4, 49–59.
- Król K. 2015c. The description and comparative analysis of chosen tools automatizing the process of creating interactive maps of spatial objects. *Geomatics, Landmanagement and Landscape (GLL)*, 3, 91–99.
- Król K. 2015d. Ocena wybranych technik tworzenia interaktywnych map lokalizacji obiektów przestrzennych. *Acta Sci. Pol. Formatio Circumiectus*, 14(4), 49–59.
- Król K. 2016. Data presentation on the map in Google Charts and jQuery JavaScript technologies. *Geomatics, Landmanagement and Landscape (GLL)*, 2, 91–106.
- Król K., Prus B. 2016. The comparative analysis of selected interactive data presentation techniques on the example of the land use structure in the commune of Tomice. *Pol. Cartogr. Rev.*, 48(3), 115–127.
- Król K., Prus B., Salata T. 2016. Geoportal 2: nationwide network node of spatial information – description of its characteristics and an attempt at evaluation of selected functionalities. *Geomatics, Landmanagement and Landscape (GLL)*, 1, 47–63.
- Król K., Szomorova L. 2015. The possibilities of using chosen jQuery JavaScript components in creating interactive maps. *Geomatics, Landmanagement and Landscape (GLL)*, 2, 45–54.
- Palmer J. W. 2002. Web Site Usability, Design, and Performance Metrics. *Inform. Syst. Res.*, 13(2), 151–167.
- Plaza B. 2011. Google Analytics for measuring website performance. *Tourism Manag.*, 32(3), 477–481.
- Prus B. 2012. Sytuacja planistyczna w Polsce – studium porównawcze. *Infr. Ekol. Ter. Wiej.*, 2(2), 123–135.
- Salata T., Król K. 2012. Zastosowanie języków skryptowych JavaScript w przetwarzaniu i wizualizacji danych przestrzennych na przykładzie planu miejscowego gminy Tomice. [In:] *Badania Regionalnych i lokalnych struktur funkcjonalno-przestrzennych*. D. Ilnicki, K. Janc (eds). *Rozpr. Nauk. Inst. Geogr. Rozw. Region.*, 29, 247–255.
- Salata T., Prus B., Król K. 2012. Opracowanie i zastosowanie nowoczesnego modelu danych przestrzennych dla stworzenia gminnej ewidencji zabytków. *Infr. Ekol. Ter. Wiej.*, 2(1), 41–52.
- Ustawa z dnia 4 marca 2010 r. o infrastrukturze informacji przestrzennej (Dz. U. z 2010 r. Nr 76. poz. 489, z późn. zm.).

---

Dr inż. Karol Król  
Uniwersytet Rolniczy w Krakowie  
Katedra Gospodarki Przestrzennej i Architektury Krajobrazu  
30-059 Kraków, al. Mickiewicza 24/28  
e-mail: k.krol@onet.com.pl

Dr inż. Barbara Prus  
Uniwersytet Rolniczy w Krakowie  
Katedra Gospodarki Przestrzennej i Architektury Krajobrazu  
30-198 Kraków, ul. Balicka 253c  
e-mail: b.prus@ur.krakow.pl