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## **Thematic Map as a Form of Visualisation of Information on Landscape Architecture Components**

### **1. Introduction**

Since time immemorial, a map has constituted a source of spatial information albeit all the discussions concerning its essence [1, 2]. It is widely known that the entire globe is illustrated in the form of various maps. With reference to information one wishes to obtain there are geographical and thematic maps, each of these two with characteristic sets of data.

Geographical maps are characterised by various spatial elements such as: settlement network, drainage system, natural topography, and administrative borders. The division of geographical maps is based on the physio-geographic components distinguishing physical and political maps, where the name itself suggests taking direction into administrative borders, as well as communication lines.

The major characteristic of the latter type of maps is its concentration of on a given subject, whereas other components are simplified to provide better clarity. The thematic maps are classified into: natural and geographical maps, socio-economic maps and natural environment shaping and protection maps. The thematic maps concerning natural environment shaping and protection are devoted to the phenomenon of pollution, natural environment values and resources, and protected areas and natural parks. Other type, socio-economic maps, serve for determining population growth, population ageing, as well as location of tourist facilities or industrial facilities. They may also provide information to assess the attractiveness of a given area, prepare statistics or learn more about the location of objects one is interested in. Moreover, one cannot forget about natural and geographical maps presenting the information on natural habitats of animals and plants or location of various types of soil.

Multistage process of cartographical method of research consists in measurement, processing, and interpretation of information included on a map [5]. The

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purpose is to obtain data expanding the current information included on a map or constituting completely new information [4].

The unique charm of Cracow has lured loads of artists. Myriad of gifted people who contributed to the art and culture of Poland visited the city. Here, on various buildings in the city, particularly within the Old Market, one can find countless commemorative plaques, erected to commemorate broadly-known and respected artists. These landscape architecture components are subject of the present paper. The awareness of the existence of such objects enriched by the detailed analysis contributes to the extension of knowledge not only on their location on the map, but also on their characteristics.

The appearance of programs basing on graphical user environment began the new era in cartography development. PC, at the beginning a device used only for automation of wide range of computational tasks, became the tool of complex modelling and visualisation [6]. The presentation of the computerised research results would in a positive way affect the people's awareness of the richness and history hidden between the Cracow's narrow streets. It would also stimulate tourism allowing travellers visiting Cracow to explore all assets of the city.

The present paper aims to shed the light on the subject of commemorative plaques and indicate how this data set could be used for object location by means of modern technologies.

## 2. Measurement

Before the measurement of landscape architecture objects one prepared the form in ArcPad 7.1 and determined the data relevant of further analysis and inventory.

Having prepared and installed the form on the measurement device described below, one conducted the measurement. When an examined component was found its coordinates were taken, and then the form displayed automatically on the screen and allowed saving the data and taking a picture of the object. The measurement was taken in the maximum proximity of a plaque possible where there was adequate satellite connection.

The device applied for measurement, according to assumptions, did not fail. One did not observe negative impact of low temperatures on the device connected with the measurement performed in the winter season. Battery capacity and running down proved to be sufficient for the all day long measurement.

## 3. Measurement Device

The measurement of coordinates of the landscape architecture components was carried out by means of **Nautiz X7**, manufactured by **Handheld** (Fig. 1).



Fig. 1. Nautiz X7

Source: [www.itechnews.net](http://www.itechnews.net), access: 9<sup>th</sup> September 2009

The operational system applied in Nautiz, Windows Mobile 6.1 Professional, enhanced its performance. Built-in 128 MB RAM and 4GB ROM together with Xscale processor allow for complex and continuous saving of observations. Large and readable screen 480 × 640 pixel Anti-glare 3.5" VGA facilitate preview and configuration control of the saved components. Numeric and screen QWERTY keypad enhances the process of inventory. USB host and client port, SDIO slot, and 9 service RS232 connectors, Bluetooth 2.0 with EDR, modem GSM/UMTS (HSDPA/EDGE) provide adequate connection with the device and data transmission. Not to mention navigation functions – built-in GPS SiRF Star III chipset with WAAS/EGNOS, E-Compass, G-Sensor, Altimetr, applied during measurement. Built-in digital camera 3 mpix with autofocus and LED flashbulb was used to fix the location and components subject to the inventory.

#### 4. Scope

The scope of the research was the city of Cracow: the Old Market and the Salwatorski, Jewish, and Rakowicki cemeteries. The area is not large, but highly developed.

The areas for visual mapping were selected on the basis of the artist commemorative plaques register, the result of the inventory of the aforementioned objects

carried out in Cracow. The area of the research was not extended because of the register (215 objects) and concentration on particularly valuable sections of Cracow with respect to history. In case when no other register of artist commemorative plaques than the one previously made by authors existed, one decided to base the thematic map preparations only on this source.

## 5. Results

Having completed the measurement the obtained data were processed and compiled in the Excel spreadsheet. The compilation allowed for conclusions and determination of the plaque condition. Due to the analysis of the aggregated data one could distinguish 188 outdoor plaques on the building's façades and 27 indoor. With reference to shape, one identified 161 rectangles, 10 squares, and 44 other shapes. As far as the material is concerned, one observed 175 stone plaques, 34 metal plaques, 1 enamel plaque, and 5 plaques made of other material. 198 plaques were classified as in good condition, 1 in medium condition, 14 in bad condition, and 1 in good condition but illegible. The plaque accessibility is precious information for visitors: the inventory classified 207 plaques, 96%, as accessible. These data, such as coordinates, characteristic for each plaque allow filtering them and selecting the objects connected with the authors one is interested in. By means of freeware one can easily prepare the thematic map illustrating the given data in the defined scope.

The authors selected Quantum GIS 1.8.0 – Lisboa, the versatile GIS software, to prepare the map.

The program functions include [3]:

- browsing,
- display,
- edition and creation of vector, raster and database data in various formats, including ESRI shapefile, MapInfotab, spatial data in PostgreSQL/PostGIS, vector and raster GRASS or GeoTiff layers.

Therefore, Quantum GIS allows for easy and quick method of the measured point indication. For better software usefulness one can create or add a plug-in in Python and C++. The OpenLayers plug-in turned out to be very helpful to prepare the map, especially for fast adjustment of background map to existing objects of certain coordinates.

Having completed the measurement one entered QGIS vector layers .shp to the software. Geo-processing tools divided the results for plaques and headstones. The data on the map were presented by means of the signature method i.e. showing the objects as points (Fig. 2).

The given stages of the preparation of the general map of commemorative plaques and headstones were described below.

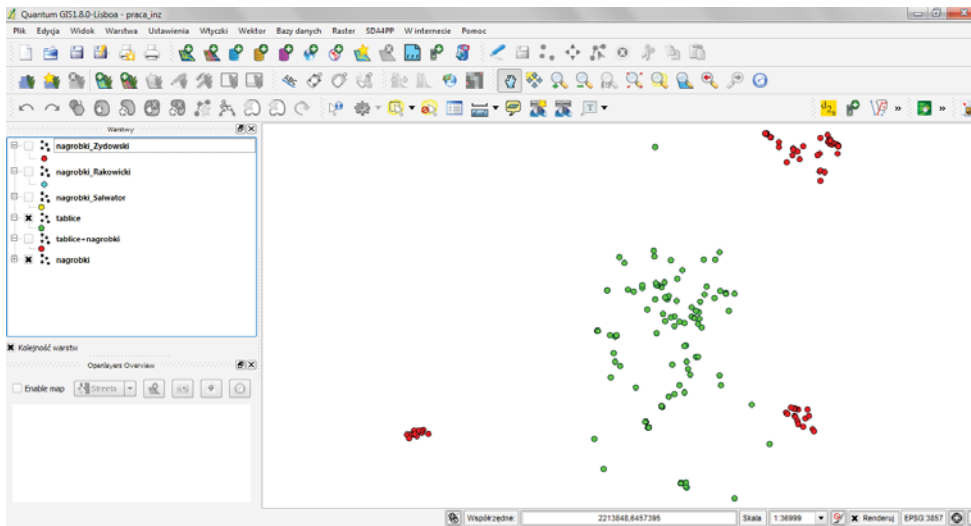


Fig. 2. Location of measured points

The next step was to determine coordinate systems, Google Mercator EPSG:900913 in this case, and download the OpenLayers plug-in. Next, one selected background map among the others offered by OpenStreetMaplayer (Fig. 3) with respect to two features: readability required for this task and ability to obtain clear and readable background map, even while zooming in, as such features were not offered by other proposed background maps. The final effect was the map presented below.

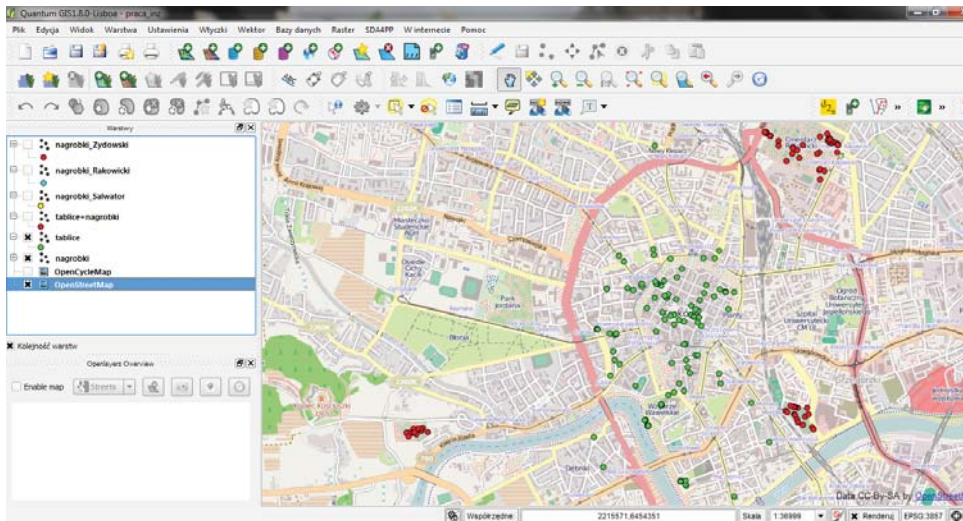


Fig. 3. Location of measured points on background map

To increase the attractiveness and obtain the largest number of information one decided to assign ordinal numbers – under each number in Excel there were data on a given plaque (Fig. 4). As a result on the basis of the data one prepared the following maps: the general thematic map for the city of Cracow and the maps for certain major locations of the investigated objects.

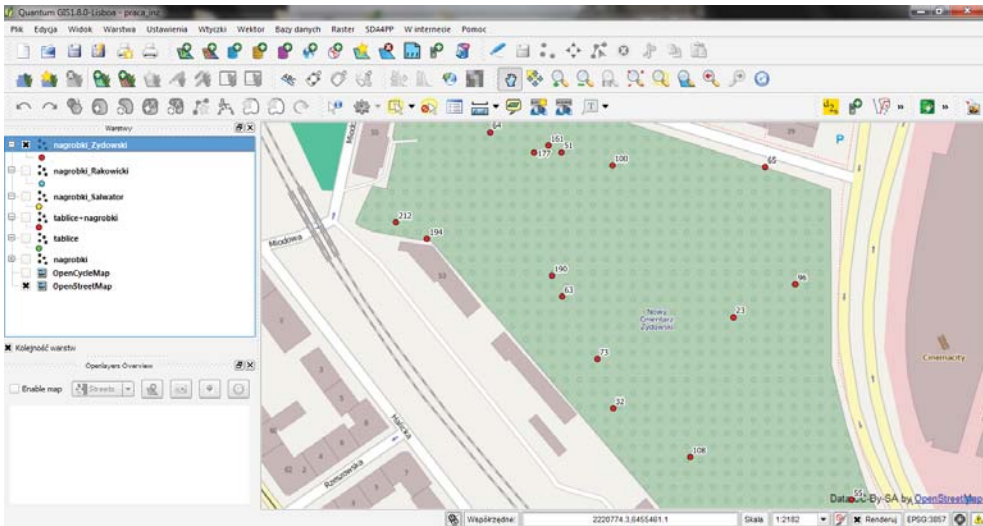


Fig. 4. Location of measured points with description on background map

The above form with the map attached to allows checking the location and number of a given plaque and obtaining other desired information about the object.

## 6. Conclusion

The maps prepared by authors on the artist commemorative plaques on the given area, demonstrating major features of thematic maps, together with the database may constitute the inventory of these objects, also for the purposes of the protection of landscape architecture component. The visualisation allows for spatial analysis of the location of the presented objects and can be used as a background map for tourist routes and educational paths. Due to the application of Quantum GIS one could edit the information and display only the selected plaques, inter alia, to mark up the tourist route in the footsteps of commemorative places of painters. Marking up tourist routes on the basis of commemorative plaques is justified with respect to their non-random location in places connected with lives and works of given artists. The ability to determine the shortest possible way increases sight-seeing effectiveness, whereas the number of objects to visit affects its time. Going further, using the



functionalities of modern mobile phones and meteoric technological progress one may venture on creating mobile map application to read in with the map also the coordinates of plaque location and other data. A user interested in certain plaques, e.g., about painters, by filtering the information on plaque location will be presented only with the results on the number, location and route to the objects selected.

The thematic maps prepared as a result constitute an attempt to present the new subject no one has explored before. The visualisation of the plaques on the map may amaze with their multitude, especially that these objects, in rather small sizes, but stunning and beautifully adorned, are hard to notice by unfavourable setting of their surroundings. As on the day of measurements, i.e. 1<sup>st</sup> January 2012, there were 215 commemorative plaques, 128 of them within the Old Market, and 87 in the selected cemeteries. Submission of the background map and register or database to the Culture and National Heritage of the Cracow City Hall may result in further aggregation of data on other objects after the consent of the City Major Artist or the consent of the City History Preservation Officer in the buildings in their gesture. The data base updated in the aforementioned way and the thematic map of commemorative plaques together with the set of documents, inter alia, decisions on commemorative plaques issued by the City Major Artist, will constitute the complete inventory of these objects. The thematic map itself is an excellent promotion tool which should be made available for tourists and inhabitants. The publication of the obtained data and the map on a website would also expand the knowledge of people interested in the subject by displaying required information about the selected object. Although it does not provide the same level of convenience as information in the mobile phone applications, because it requires planning, it demonstrates a lot of benefits, including these connected with promotion and education purposes.

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