Abstract of the doctoral dissertation

The impact of responsive graphic user interface design on web map effectiveness

In Polish: Wpływ responsywnego projektowania graficznego interfejsu użytkownika na efektywność mapy internetowej

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Keywords: web map, graphical user interface, effectiveness, responsive web design

The purpose of this doctoral dissertation was to determine the impact of responsive graphic user interface design on web map effectiveness. The author used eye-tracking, surveys, and usability assessment in the study. The study involved examining six variants of the graphical user interface of the web map on a desktop monitor and a smartphone. The author used variants of the graphical user interface of a web map based on his previous research and two popular map services: Google Maps and OpenStreetMap. 240 students from the Geodesy and Cartography course of Adam Mickiewicz University in Poznań participated in the study. The study was conducted in chamber conditions at the Faculty of Geographical and Geological Sciences with the use of the Tobii X2-60 eye tracker. Participants answered questions first, then they performed three tasks, and finally responded about their subjective experience. The questions before performing tasks focused on the participants' characteristics determining the frequency of using Google Maps, OpenStreetMap, or other map services on a computer or smartphone. Three tasks that the participant performed were about finding and using the three most significant web map buttons. In the first task, participants searched their current location using geolocation. In the second task, participants used the search button to find a specific city. In the third task, they used the route button to find a route connecting two particular cities. After completing the tasks, the respondent answered three questions that determined his subjective perception of the variant of the graphical user interface of the web map used when completing the tasks. In this way, the author obtained several survey responses and, what is significant, received 720 film fragments corresponding to each task performed by the respondents. Then the author proceeded to statistical analysis of the obtained data. He used the data normalization test, data correlation test, Spearman's rho test for nonparametric data,
and Kruskal-Wallis test. There were many statistically significant correlations between the survey responses and the time results obtained. The time results that have been received or calculated are, the time to the first fixation, time to first click and time to identify the button. Based on these time values, the author constructed indices as their relationship. This index determines the effectiveness of the proposed variants of the graphical user interface of web maps. Based on the entire study, the author came to several key conclusions. These conclusions directly relate to guidelines for creating web maps and especially the graphical user interface. The most effective variant turned out to be the placement of buttons according to the author's previous research and not according to popular map services.