Heuristic Evaluation of Geoweb: Case Study

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Abstract: Usability is a part of quality, and this article focuses on the one of testing methods that can be used in usability testing. There are plenty of methods to verify usability, like usability testing, heuristic evaluation, heuristic estimation, cognitive walkthrough, pluralistic walkthrough, consistency inspection, etc. Heuristic evaluation was chosen for this case study. This method was described by Nielsen and Molich in 1990. The publicly accessible GeoWebs, presented in the website “Facts and Data” at http://portal.env.cz/, has been subjected to this type of testing. This is a portal of the Ministry of Environment of the Czech Republic. In this site some links to mapping services can be found. Published projects from the Ministry of Environment of the Czech Republic that were chosen for evaluating were: CENIA, AOPK CR, and Geofond due to functionality. These projects have been compared with a list of heuristics. The separate sections of heuristics were: environment of user interface, used technology, error dilemma, flexibility, aesthetics and design, user-friendly application, privacy, help and documentation, skills, user control and freedom, and a list of maps.

Key-Words: software engineering, software quality, heuristic evaluation, heuristics, GeoWeb, usability, usability engineering

1 Introduction

Nowadays there is a considerable focus placed on the target user. Increasing efforts to enhance the quality is evident in the field of information systems. One of the few parts of quality is the so-called usability of the information system.

There are plenty of methods to verify usability. Like usability testing, heuristic evaluation, heuristic estimation, cognitive walkthrough, pluralistic walkthrough, consistency inspection, feature inspection, standards inspection, etc. Let’s focus on one of these methods, heuristic evaluation.

In this article, map services of GeoWebs, in the field of the environment, have been subjected to the given the evaluation method.

Usability is therefore one of the six fundamental parts of the classical FURPS model and the model quality in accordance with ISO 9126. Simply put, usability is the ability to do anything, to ease the achievement of specified goals.

At the moment the focus is only on information technology, with regards to the concept of involving themselves; in particular to allow users to achieve their objectives quickly, easily, without complex thinking, confused search, and the eventual disappointment of its failure. Although at first glance it seems that usability is an important factor, it is not associated with areas of the Internet for too long.

Testing usability is becoming a phenomenon of our times. The use of tests is growing and it has also become famous in the field of information systems [4], [13].

2 Heuristic Evaluation

One of the many possibilities of testing is the so-called heuristic evaluation. Heuristic evaluation uses specialists who compare the goal of testing in relation to certain principles known as "heuristics." Heuristic evaluation is an engineering usability method used for searching usability problems in the design of user interface so that they can accompany process of interactive design as its part. Heuristic evaluation includes a small number of estimators examining the interface and judging its harmony by known usability principles called “heuristics.” This method was described for the very first time by Nielsen and Molich in 1990. Even though heuristic evaluation finds many usability problems that are not found by user testing, it can also miss some problems that can be found through user testing. It is an easier, and cheaper, way to obtain an overview of the problems in the field of usability than the more
accurate usability testing [8], [9], [10], [11], [12], [13].

3 Publicly Accessible GIS Ministry of Environment
The Ministry of Environment of the Czech Republic granted on its website the “Facts and Data” portal for the environment in the Czech Republic. In this presentation the Ministry of Environment provides access to map services. [6]

The following three mapping services have been subjected to heuristic evaluation. These applications were chosen because of functionality.

3.1 Map Services CENIA
CENIA (the Czech Information Agency Environment) operates under the authority of the Ministry of Environment of the Czech Republic and the former Ministry of Informatics of the Czech Republic Map Services on the Public Administration Portal. It serves as a public portal, State monitored, spatially defined information from different sources and different thematic focuses. The application includes a number of problems that are continuously updated and supplemented. Each individual map service is described in the metadata, which are created in accordance with the standard ISO 19115 "Geographic Information - Metadata" [2].

3.2 Map Server AOPK ČR
The Geographic Information System (GIS), as a tool for processing geographical, visual, and tabular data, is the standard of the Nature Protection Information System (AOPK ČR).

The Nature Protection Agency and the Countryside is gathering data in to geographical databases in order to protect nature. Layers and databases are primarily used for decision-making activities, addressing national and international research projects, or the nature of the information (management, red lists and books, Biotopes, Emerald, Natura 2000, etc.). The responsibilities of The Nature Protection Administration are as follows: protected areas, territorial systems of ecological stability, natural habitats, protected and endangered species of flora and fauna, etc. [1].

3.3 Map Server Geofond
Web Application is part of the Information System ČGS - GEOFONDU. It contains, for example, spatial data on geological surveys, material resources, mining activities in the Czech Republic, etc. [3].

4 Evaluation
These GeoWebs were taken into evaluation. All three projects were compared. Heuristics were used for the examination of these GeoWebs. Heuristics published previously in the article Heuristic Evaluation of GeoWeb (more in [5]) were used.

The separate sections of heuristics are:
- environment of user interface
- used technology
- error dilemma
- flexibility, aesthetics, and design
- user-friendly application
- privacy
- help and documentation
- skills, user control, and freedom
- list of maps

The assessment used the weight 0 (a weight of 0 means total disagree that this is a usability problem) to 4 (a weight of 4 means usability catastrophe). It can be said that these weights are some kind of “bad points” [10].

The author of this article went through all relevant points previously published. Every heuristics became a weight regarding its importance. The total count of bad points sets the quality of the systems. The worst case scenario could get each of these GeoWebs a possible 403 bad points. (More about [5], [7])

Comparing the total number of points determined the order of the tested GeoWebs, see Fig. 1. The exact number of gained bad points is: Map services CENIA, 89; Map server AOPK ČR, 149; Map server Geofond, 103.
The final order in the area of usability using the heuristic evaluation is:

1. Map services Cenia – 78% of collected data was applicable
2. Map server Geofond – 74% of collected data was applicable
3. Map server AOPK ČR – 63% of collected data was applicable

In the case of mapping services Cenia, most of the obtained bad points in heuristics were in the field of list of maps. The most serious problems that have been discovered are: not sorting icons in thematic groups, not enabling the movement with arrows on the sides of the map, the inability to measure the square elements, and the inability to generate a map as an image.

Other important problems are: missing the possibility to determine the restrictive scale display layers, missing the possibility to select the quality of the displayed output, it is not possible to measure the distance of liner elements, it is not possible to measure the content of polygons, there are no additional databases for hotlinks, it is not allowed to choose units, it does not allow data to be download, and project does not contain a description of layers.

In the case of mapping services Geofond, most of the obtained bad points in heuristics were in the field of list of maps and error dilemma. The most serious of problems have been primarily with: icons not being broken down into themes, the name of the page not being located at the upper edge, long access time, there is no numerical scale, the elements in new windows are not interrelated back to previous windows, it does not contain a help link, the descriptions are not in the Czech language, it is not easy to enter and return to the help menu, user can’t easily switch between help and work, it is not possible to measure the square elements, there aren’t hotlinks, search is not simple, and it is not allowed to store the map as a picture.

Other important problems were discovered with the following: not all the text being readable, data was not updated, using to many pop-ups, layers are not thematically broken, layers are not accompanied by a legend, problems in the search area, the possibility of limiting the scale to determine the display layers, not having the ability to choose the quality of the displayed output, not being able to measure the distance of liner elements, not being able to measure the content of polygons, not having saved as a picture, and the fact that accessing time is too long.

Other important problems were discovered with the following: project uses frames, missing legend, the possibility of limiting the scale is missing, choosing the quality of the displayed output is not allowed, it is not possible to measure the distance of liner elements, it is not possible to measure the content of polygons, there are no additional databases for hotlinks, it is not allowed to choose units, it does not allow data to be download, and project does not contain a description of layers.

In the case of mapping services AOPK, most of the obtained bad points in heuristics were in the field of help and documentation. The most serious of problems have been discovered with: the name of the page not being located at the upper edge, long access time, there is no numerical scale, the elements in new windows are not interrelated back to previous windows, it does not contain a help link, the descriptions are not in the Czech language, it is not easy to enter and return to the help menu, user can’t easily switch between help and work, it is not possible to measure the square elements, there aren’t hotlinks, search is not simple, and it is not allowed to store the map as a picture.

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more databases for hotlinks, not being able to specify the exact scale, not offering search options, not having the option to chose the units, maps not being broken down according to themes, and pages not containing a description of layers.

Previously mentioned results are taken from the total possible count of bad points from each group. The Absolute results of obtained points, from groups of heuristics, can be seen in Fig. 2, where all GeoWebs are described, and bad points taken from each group of heuristics. Due to zero values in the area of privacy, this group of heuristics is omitted.

![Fig. 2: Absolute results of obtained points from groups of heuristics](source: author)

### 4 Conclusion

The Ministry of Environment provides the portal “Facts and Data” online, at http://portal.env.cz/. There are some links to mapping services situated in this site. Within these pages three functional map portals were selected and they were subjected to heuristic evaluation.

The results for each individual GeoWebs are listed in this article. All of these projects look usable but there are also some problems that were found. The best is Map services CENIA, second was Map server Geofond, and the last is AOPK ČR. The article mentioned the biggest problems that can occur within heuristics; these problems obtained four bad points. At the same time binding problems are given, which have obtained three points. The composition of these points, which were taken from a group of heuristics, is also given.

The recommendation would be to remove at least the most serious problems in the usability area. This would increase the usability of these projects. It may be better to make just one GeoWeb that will have everything needed by the user. It could contain all layers of each of these GeoWebs which will be divided into thematic groups. In some cases it is necessary to remove at least the most serious problems in the usability area. This would increase the usability of these projects. It may be better to make just one GeoWeb that will have everything needed by the user. It could contain all layers of each of these GeoWebs which will be divided into thematic groups. In some cases it is
obviously better to have a close cooperation, which can only be recommended.

Acknowledgment
This paper was created with a support of the Grant Agency of the Czech Republic, grant No. 402/09/0219 with the title Usability of software tools for support of decision-making during solving spatially oriented problems and grant No. 205/09/P120 with the title Use of geoinformation technologies for detection of places in town with high risk for handicapped people and Student grant agency of University of Pardubice.

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