

Usability Inspection of Web Portals: Results and Insights from Empirical Study

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Abstract

Web portals are a special breed of web sites, providing a large and diverse user population with a blend of information, services and facilities. Whether they reach their aim of facilitating users' access to diverse resources and to which extent, remains an open question. In the paper this issue is addressed with usability inspection of horizontal information (news) portals. The reported experiment was targeted to establish whether expert reviews can be performed with a reasonable level of performance by non-usability experts with some training. An empirical study of four web portals was used to support the statement, and the results appear to support this claim. Although the findings from a single experience cannot be generalized, we believe that the results of this study could contribute to improve the general understanding of the field. However, in order to draw general sound conclusions and to examine the robustness and validity of the findings, more studies should be conducted.

Keywords: *usability, inspection methods, horizontal information web portals.*

1. Introduction

Portals are web-based applications typically designed to provide a large and diverse user population with a blend of information, services and facilities. Internet users carry out a variety of different tasks online, and knowledge, abilities and needs differs from person to person. The idea of web portal is to collect information from different sources and create a single point of access to information, functions and services that are relevant to one person's work or personal interests [1]. Due to specifics of portals as web sites, here primarily addressing their complex and hybrid structure and media specificities along with diversity of user population, their tasks and workflows, particular usability evaluation approaches should be employed. Yet many current web portals suffer from problems related to low usability since in many portal projects usability is an afterthought or is completely ignored in others.

Horizontal information (broad-reach and news) portals, which cover diverse resources and target the entire Internet community, are the most visited Croatian web sites. To carry out the comparison and to evaluate how easy to use horizontal information portals are, we have conducted a series of experiments in two comprehensive studies that employed a range of usability assessment methods, both empirical and analytic. This paper provides an insight into just one part of the conducted research; it reports on usability inspection of a number of news portals. In order to find empirical evidence (if any) of the possibility of acquiring comparable results, expert reviews were conducted with both "instant/novice" inspectors on the one hand and HCI experts on the other. The reported experiment was targeted to establish whether guideline-based inspection can be performed with a reasonable level of performance by non-usability experts with some training. An empirical study of four horizontal web portals was used to support the statement, and the results appear to support this claim.

2. Web Portals and Usability

Web portals are a special breed of web sites, providing a blend of information, applications and services [2] which serve as a gateway to information or Internet services. One could say that portal design is a hybrid of web and application design with a flexibility requirement thrown in to keep things exciting [3]. Portals can be categorized in two broad categories [4]:

- horizontal portals, often referred to as "megaportals", which cover many areas and target the entire Internet community; they usually contain search engines and access to other information such as regional weather, stock quotes or news updates and
- vertical portals which are focused on one functional area; they offer information and services customized to specific audiences about a particular area of interest.

Our research has been focused on horizontal information portals, specifically broad reach and news portals. The rationale for our choice of portals is the fact that market research findings related to the Croatian web context report that nowadays horizontal information portals are the most visited Croatian web sites cf. [5]. As gateways to the web, they represent starting point in user browsing and/or serve as users anchor site too. Horizontal information portals are also called "general" [6] or "generic" [7] portals because they collect information in one place and provide access to information, functions and services that are relevant to general user interests (news, forum, search engine, weather and travel information, maps, on-line shopping, and a like). Nowadays a number of horizontal information portals work as an engine to gather information from web sites of news agencies and newspapers organizing them in one single place. Accordingly they inevitably replace paper-based/print newspapers which constantly decline, thus undertaking the role of mainstream media for informing.

Information presented on each page of a web portal addresses a very large user group with highly diverse needs, interests and workflows, aspects which have to be reflected by the portal design. Additionally taking into account portal specifics like their complex and hybrid structure along with media specificities, then particular assessment approaches should be employed. In such context, an effective web portal interface evaluation is essential because it identifies design problems to be corrected and also provides guidance for the next iteration of the development process.

Overall, usability is context dependent and is shaped by the interaction between users, tasks and system purpose e.g. [8]. In general employed evaluation methods are grouped into two categories:

- usability test methods; user-based which involve end users, hence including user testing, focus groups, interviews, questionnaires and surveys, as well as
- usability inspection methods, without end users embracing heuristic evaluations and cognitive walkthroughs as frequently used ones.

It is concluded that we should not rely on isolated evaluations, but instead make use of complementing usability techniques and of people with different expertise whom should be involved [9], [10].

In the context of the global trend of web portal specialization, recent research related to usability evaluation is mostly addressing vertical portals such as enterprise or corporate portals [11], travel portals [12], [13], library portals [14], tourist service portals [15], educational portals [16] and a like. Besides usability studies associated with focused portals, there are also ones

situated in specific cultural background, including specificity of the local context that cannot be seen from the global perspective for example [17], [18], [19]. Conducted usability assessments have been usually based on usability questionnaires and (semi-structured) interviews with representative small groups of users (less than ten). Alternatively, when using web questionnaires the user sample was larger (about 100 participants). Apart from (web) questionnaires and (semi-structured) interviews, a number of approaches applied thinking aloud method as well.

Apparently, while there are a number of studies related to the usability assessment of specialized vertical portals, the research related to the evaluation of horizontal information portals has been rather deficient. In such context, the study aiming to explain the individual acceptance and usage of a generic web portal could be offered, where Van der Heijden [7] examined perceived ease-of-use, usefulness and enjoyment. Data was collected by means of online survey. In service quality evaluation of "information presenting portal", for Yang et al. [20] usability has been just one of the assessment components. Concerning news portal evaluation, the study aimed to identify areas of web usability in the news portal industry that may be culturally specific might be highlighted [18].

3. Experience from Previous Study

We have conducted two empirical studies of horizontal information portals (broad reach and news portals), nowadays the most visited Croatian web sites. Both expert reviews and user-based evaluations have been employed, collecting a range of quantitative and qualitative data.

Obtained know-how from the first study (broad-reach portals) has been a valuable learning experience in terms of both, an identification of web portal usability issues and a gain of required experience related to portal usability evaluation [21]. The reported experience indicated that the chosen research instruments, measures and methods for user-based evaluation were adequate. However, it was assumed that the user testing could be improved engaging fewer resources with reduced number of test users (the study involved 30 users). On the other hand, although showing considerable potential, guideline-based inspection raised a number of concerns. Specifically, quantitative (marks) and qualitative (comments and observations) analysis of data from an evaluation form revealed that the form would benefit from few revisions. Some of traditional principles adapted from Nielsen's [22] heuristics showed poor applicability in the web portal context not providing feedback useful for the improvement of portal's usability,

cf. [21]. Additionally, the study engaged ten "instant" [23] or "novice" [24] inspectors. Diversity in quality and quantity of acquired feedback suggested the non-homogeneous group of evaluators concerning their HCI expertise, questioning their ability to carry on an inspection activity with a "reasonable level of performance" (ibid.). In that respect, particular aspects of the applied heuristic-based assessment could be upgraded, here referring to the issues related to the used evaluation form along with the number and selection of the engaged experts.

Accordingly, it seemed reasonable and valuable to perform an additional, second empirical study valuating at the same time the improved approach to web portal usability evaluation [25]. In the second study, horizontal information (news) portals were assessed. This paper addresses just a part of that study, aiming to compare the results of the two heuristic-based usability evaluations; one performed by HCI experts, the other by instant inspectors. In the following, the inspection procedure along with obtained results and interpretation of findings is offered.

4. Expert Usability Reviews

Considering experience from the first study, in the second one inspection was conducted with both instant experts on the one hand and HCI on the other (see Figure 1). We believed that the HCI experts will provide more insightful feedback.

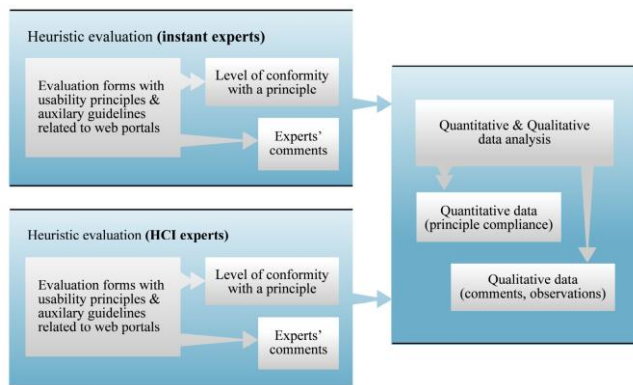


Fig. 1 Approach to web portal expert usability inspection.

4.1 Assessment Procedure

To be in line with the recent study related to a number of people required for the usability evaluation and the "10±2 Rule" [26], the inspection was conducted with eight evaluators; four instant inspectors from the HCI field and four experienced HCI experts.

The four instant inspectors formed a homogeneous group of computer science professionals who learnt the principles of user-centred design and usability assessments. Namely, it is already known for computer scientists to easily learn the evaluation methodologies and apply them successfully, cf. for example [27; 23]. Their age and gender distribution along with the educational background and current affiliation is given in Table 1.

Table 1: Distribution of gender, age and educational background of instant inspectors

<i>Instant Expert</i>	<i>Gender</i>	<i>Age</i>	<i>Educational background</i>	<i>Profession</i>
1	Male	38	Dipl.-ing. degree in computer science	Head of IT service
2	Male	23	Bachelor in web design	Master student
3	Female	40	PhD degree in computer science	Assistant professor
4	Male	27	Dipl.-ing. degree in web design	Master student

In order to conduct thorough study and achieve valuable results, we were very keen in providing resources needed for HCI experts' engagement. We believed that better quality feedback will be gathered comparable to the one acquired through instant specialists' assessment due to their enrolment in the research and the teaching activities at the university. See Table 2 to get an insight of the age and gender distribution along with educational background and current affiliation of HCI experts.

Table 2: Distribution of gender, age and educational background of HCI experts

<i>HCI Expert</i>	<i>Gender</i>	<i>Age</i>	<i>Educational background</i>	<i>Profession</i>
1	Female	43	PhD degree in computer science	Associate professor
2	Male	34	Dipl.-ing. degree in computer science	Web interface designer
3	Female	39	PhD degree in information science	Assistant professor
4	Male	33	MA degree in computer science	Teaching assistant

Complete instructions along with an evaluation form were sent to every inspector. Aiming to identify possible problems in the portal interface design, they had to use their expertise to role-play the behaviour of a typical user, to follow the instructions and mentally simulate the tasks to be performed, mark and comment on the evaluation form.

A general recommendation was to go through the interface at least twice. The first pass (self-guided exploration) helped the expert to get a feel for the "flow" of the interaction. In order to perceive how the web portal was intended to be used by the end-users, a few representative tasks were recommended. The second pass allowed inspectors to focus on specific interface elements as they knew how they would fit into the larger whole, they used self-exploration, too.

In order to supply all necessary information, the evaluation form had to be very detailed and easy to follow. Because some of the traditional Nielsen's [22] principles showed inadequate in the portal context (see [21]), an evaluation form with a set of seven guidelines was provided (see Figure 2). Reduced and more helpful auxiliary guidelines were offered as additional explanations, cf. [28; 29]. As an example, one guideline along with related supplementary ones is presented in Figure 2. Experts had to specify a level of their agreement with a principle and supplementary set of auxiliary guidelines on a seven-point Likert scale and additionally provide a comment to justify the assigned mark. To obtain quantitative relationships in the context of conducted summative evaluation, the Nielsen's heuristics has been "translated" into scale and the score for every portal was calculated as an average mark. Besides, inspectors were encouraged to offer additional notes related to advantages and disadvantages of assessed portals. Observations and remarks concerning the overall inspection procedure were collected.

Four most frequently visited horizontal information news portals were inspected: Slobodnadalmacija-portal (www.slobodnadalmacija.hr), Jutarnji-portal (www.jutarnji.hr), Vecernji-portal (www.vecernji.hr) and 24sata-portal (www.24sata.hr).

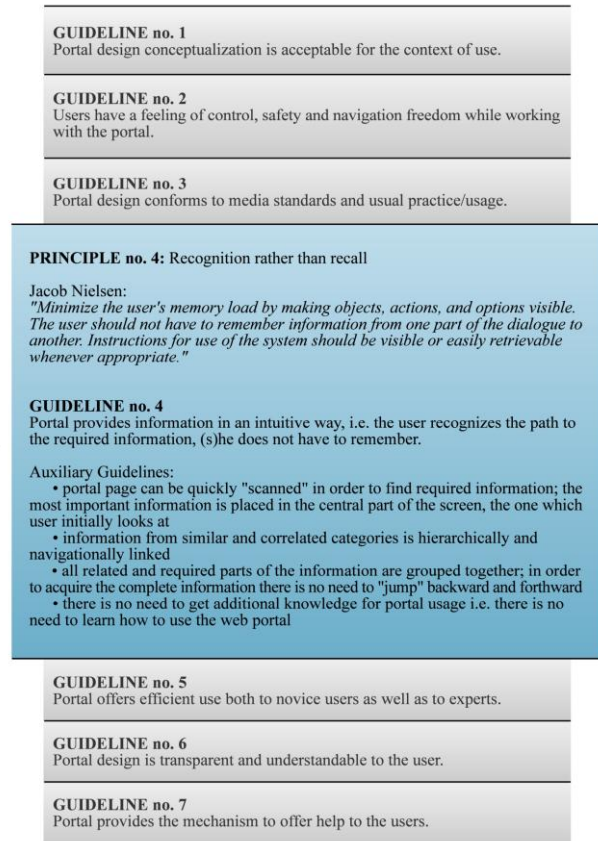


Fig. 2 The set of seven guidelines; guideline no 4, along with original Nielsen's principle and related auxiliary guidelines is offered as an example.

4.2 Results and Interpretation of Findings

Experimental results and findings acquired from experts' inspection are offered in the following. Arithmetic means of marks acquired in the assessments conducted by four instant inspectors' showed that the highest mark was given to the 24sata portal (mean = 5.64), followed by the Vecernji portal (mean = 5.17), the Jutarnji portal (mean = 5.07) and the Slobodnadalmacija portal (mean = 4.96).

Results could be further related to inspectors' comments. For the 24sata portal, user friendliness along with the good adjustments to novice users (offers help in many ways) was emphasized, thus resulting in best scores for the guidelines 1, 5 and 7. Conversely, rather weak feeling of control and a lost on portal were highlighted as weak points causing lowest score for the guideline 2. The Vecernji portal obtained highest scores for the guidelines 2 and 4, and lowest for the 5. It was described as the portal with well structured, categorized information and straightforward navigation, additionally offering feeling of control. On the

other hand, no possibility of portal personalization was highlighted as its weak point. The Jutarnji portal complied very well with the guideline 4, where good visual order and categorization of information was stressed. However, the portal did not comply with the guideline 7 because it does not offer any additional help for the users. Intuitive portal usage was the main reason why the Slobodnadalmacija portal got good marks for the guideline 4. Conversely, no contact information, no FAQ, no impressum along with some identified problems for novice as well as for advanced users caused low scores for the guidelines 5 and 7. Concerning the analysis of the evaluation form, the assessment of the adapted principles and judgment of the quality of inspectors' evaluations was conducted. Criteria for a qualitative analysis was expressed in terms of a mark-span and a value of comments (see the Mark-span and the Info rows in the Table 3).

Table 3: "Horizontal" analysis – qualitative analysis of the adapted principles (according to the feedback from the instant inspectors)

Portals		Guidelines						
		1	2	3	4	5	6	7
Slobodna dalmacija portal	Mark-span	5–6	5–7	5–6	5–7	3–5	2–7	3–4
	Info	H	H	H	M	H	M	M
Jutarnji portal	Mark-span	4–6	3–6	4–6	5–7	4–5	4–5	2–5
	Info	M	H	M	M	M	H	L
Vecernji portal	Mark-span	2–7	5–7	5–6	5–7	3–5	3–5	3–6
	Info	M	M	H	L	M	L	M
24sata portal	Mark-span	6–7	4–7	3–7	4–7	6–7	3–7	5–6
	Info	M	H	H	L	H	M	L

Each guideline was examined analyzing all acquired comments and observations made by the instant inspectors ("horizontal" analysis), assigning low (L), medium (M) and high (H) values according to the quantity and the level of details of comments provided (Info row). For instance, remarks like "there is no mistake" or "not good at all" represent comments of low information quality. Conversely, detailed ones that listed specific observations concerning page layout, fonts, navigation/links and graphics, were classified in the medium and high information quality categories. Remarks classified as

medium quality are "information is not presented in a simple way"; "page layout is consistent"; "portal offers help while working". Examples of some comments categorized as high quality are "navigation on portal is supported horizontally and vertically, there is a visible bread crumb trail, there is no feeling of lostness on portal"; "upper and left navigation bar are not consistent, menus are different thus providing diverse information". The range of marks expresses the lowest and the highest marks given by the experts (Mark-span row). An average mark-span of all experts' marks for every guideline (and for every portal) was calculated. Its value (2.18) showed good applicability of the chosen set of guidelines in the context of web portals. At the same time, it offered a measure of inspectors' homogeneity in expertise. Results suggest that a good guideline is one which is characterized by a narrow mark-span and "provokes" high quality comments, criticisms which identify design problems and at the same time offers solutions.

The same information quality criteria were used while analyzing instant experts' work ("vertical" analysis): number, percentage and quality of comments provided and number of additional observations, see Table 4.

Table 4: "Vertical" analysis – qualitative analysis of the instant inspectors' feedback

Expert ID	Comments			Additional observations
	number	percentage	quality	
1	25	89	M	None
2	28	100	M	3
3	28	100	M	4
4	28	100	H	5

Results acquired throughout the four HCI specialists' evaluations are offered. Arithmetic means of marks revealed that the highest mark was given to the 24sata portal (mean = 5.39), followed by the Slobodnadalmacija portal (mean = 5.25), the Vecernji portal (mean = 4.89) and the Jutarnji portal (mean = 4.64).

Furthermore, in the following acquired results are related to experts' comments. For the 24sata portal intuitive navigation, clear and understandable design, consistent layout and no visual noise were emphasized. The portal design scored best for the guidelines 4 and 6. No search option and inadequate help were stressed as the portal weak points (lowest score for guideline 7). The Slobodnadalmacija portal obtained highest scores for the guidelines 2 and 4, where the feeling of control, good colour coding of categories, information structure and organization were highlighted. Due to no structured help

for the users, the lowest score was for the guideline 7. The Vecernji portal complied very well with the guideline 1 and good linear navigation along with clear and structured categorization was stressed. Conversely, the portal design did not conform to the guidelines 5 and 7. Detected problems addressed lack of transparent functions for advanced users, missing help or FAQ for novice users. Intuitive and easy search for required information were the main reasons why the Jutarnji portal got high marks for the guideline 4. On the other hand, the lowest scores for the guidelines 5 and 7 indicated the lack of options for individual needs, problems with information overload along with relatively poor help options. Again, both the guidelines and the HCI experts' feedback were "horizontally" and "vertically" examined; see Table 5 and Table 6 respectively. The average mark-span for all expert marks was 2.29 indicating once more rather high homogeneity of the sample.

Table 5: Qualitative analysis of the adapted principles (according to the feedback from the HCI experts)

Portals		Guidelines						
		1	2	3	4	5	6	7
Slobodna dalmacija portal	Mark-span	5-6	6-7	5-6	6-7	1-5	4-6	2-4
	Info	H	H	H	L	H	M	M
Jutarnji portal	Mark-span	4-6	4-6	3-7	4-6	3-5	3-6	2-5
	Info	M	H	M	M	H	H	M
Vecernji portal	Mark-span	5-6	4-7	4-6	5-7	1-5	3-6	3-4
	Info	M	H	H	M	H	H	H
24sata portal	Mark-span	4-6	4-7	4-6	6-7	5-7	4-7	2-7
	Info	H	H	H	M	H	M	L

Table 6: Qualitative analysis of the HCI experts' feedback

Expert ID	Comments			Additional observations
	number	percentage	quality	
1	28	100	M	4
2	28	100	M	4
3	28	100	H	3
4	28	100	M	None

5. Discussion and Concluding Remarks

The web portal acts as a single point of access to information and services relevant to person's work or personal interests. Market research findings related to the Croatian web sphere report that nowadays horizontal information (broad-reach and news) portals are the most visited sites. Whether they reach their aim of facilitating users' access to diverse resources and to which extent, remains an open question. In our research, we have addressed this issue by two empirical studies. The conducted evaluations assembled expert inspection and user assessment that integrated a number of empirical methods into laboratory-based testing.

This paper focuses and reports on the expert reviews of the horizontal information news portals carried out in the second study. With the aim of finding empirical evidence (if any) of the possibility of acquiring comparable results, usability inspections were conducted with both HCI experts and instant inspectors.

The important finding of this study is the agreement in the feedback acquired from the instant inspectors on the one hand and the HCI experts on the other. Namely, the analysis of both, the HCI and the instant experts' data, showed high level of conformity on marks appointed to the evaluated portals. According to the evaluation criteria and the provided marks, both groups identified the 24sata portal as the one with the most usable interface design. They all emphasized straightforward navigation, consistent layout, accordance to media standards, intuitive design and easy scanning for important information. High degree of the agreement was related to the Vecernji portal; the instant inspectors ranked it on the second place, while the HCI experts placed it on the third. Furthermore, it is important to point out that for the both groups the average mark-spans were relatively small and comparable (2.18 for the instant and 2.29 for the HCI experts) indicating the high degree in agreement when ranking evaluated portals. Because of the relatively small difference in the average mark-spans, it could be argued about the comparable homogeneity in their expertise.

Moreover, the inspectors offered similar comments for the majority of guidelines. The qualitative analysis revealed that the same portals acquired comparable marks (equally the good and the bad ones) for the guidelines 2, 3, 4 and 5. This means that the both "types" of involved experts identified same and/or similar characteristics which comply or do not comply with the adapted traditional heuristics and auxiliary guidelines. On the other hand, the marks obtained for the guidelines 1, 6 and 7 showed a discrepancy, possibly implying that those adapted

heuristics were not comprehend in a suitable way or that it showed poor applicability in the web portal context. Additionally, we also stress that in the conducted inspection, the guidelines 2 and 5 provoked utmost detailed comments, while conversely the guidelines 4 and 7 provoked least.

To conclude, the reported experiment revealed that in the both rounds of expert reviews conducted with the HCI and the instant inspectors the acquired results are comparable both in quantitative (marks) on the one hand and in qualitative (comments and observations) "sense" on the other. It could be assumed that in future usability assessments instant experts could be engaged. With satisfactory preparations and training computer science professionals would be able to easily learn the principles of user-centred design and conduct valuable web portal inspection, providing good-quality feedback.

On the other hand, we could argue that this claim is based on very coarse criteria, such as means of the seven-point Likert scale as well as three different levels on details of the acquired comments. Also the reason behind the score, instead of the score itself, should be analyzed; the comments themselves, instead of just the details level, should be examined. The value of the HCI expert feedback is not just a yes or no answer on whether a web portal is usable. The major value exists in the detailed analysis and improvement of individual usability problems. Therefore we could also debate about the possible deficient analysis of the provided feedback messages, thus not acknowledging HCI experts' feedback as more useful in terms of improving the usability. Regardless of such potential limitations of the empirical study, we believe that the results of the reported experiment could contribute to improve the general understanding of the guideline-based usability inspections. However, in order to draw general sound conclusions and to examine the robustness and validity of the findings, more studies which would involve a larger number of evaluators should be conducted.

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