Using expert evaluation to assess the usability of the CNAS-SIUI Portal

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ABSTRACT
Recently, the number of e-Health applications that aim to streamline relationships between relevant institutions, physicians, health professionals and other interested entities has increased. One of these applications is the Integrated Information System of the Romanian Health Insurance (CNAS-SIUI Portal). The main objective of this paper is to assess the usability of CNAS-SIUI Portal using expert evaluation. The results revealed several usability problems that were mainly related to the difficulty to access the user account section, to patient authentication to the electronic health record and the lack of voice alternative to create the account for blind people.

Keywords
Usability, usability inspection, usability heuristics, eHealth, eHealth portals.

INTRODUCTION
The Internet is a major source of health information whose resources on this issue have increased over time. The reasons for which people search for online health information usually revolve around wanting to be well prepared and informed before meeting the doctor and/or searching for support or answers to specific problems [18]. eHealth portals imply delivery of information and health services via internet or related technologies [21] and are used by health professionals to get more health information than they receive in the patient-physician relationship. That is why eHealth applications can be useful in providing better quality of life in a cost-effective way [1].

The increasing number of people consulting the Internet for health information and the variety of information available on different health sites bring the following issues into attention: usage and trust.

Trust in eHealth portals can be influenced by different visual factors: the interface of the website, well-known images or well-known trusted logos [21]. For example, it is possible that the user starts trusting the sites that are visually appealing and mistrust the sites with poor visual designs.

The usability of health web portals, considered a key quality attribute for the success of interactive applications, is another important factor in the health domain [9, 11, 12]. Portals that respect this requirement have consistent interfaces which are easy to learn, effective to use and enjoyable from the user's point of view [7, 17].

The purpose of this study is to explore the usability of CNAS-SIUI (The Integrated Information System of the Romanian Health Insurance), a Romanian health portal, and to investigate up to which extent this portal is supporting health professionals in accessing the health information they need.

The rest of this paper is structured as follows: the following section presents some related work in the area of eHealth portals/websites and usability evaluation. In section 3, the case study is presented. The paper ends with the conclusion section.

RELATED WORK

eHealth portals
E-health is a dynamic field at the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies [5].

As an extensive integrated system, the healthcare system captures, stores, manages and transmits information related to the health of individuals or the activities of organizations that work within the healthcare sector [13].

As shown by the Swedish Ministry in the National eHealth Strategy [22], the national eHealth "is about how all societal actors can come together to improve information management within the healthcare and social services for the benefit of the patient, the staff and decision-makers throughout the sector".

Health information plays an important role for health professionals in what regards making and understanding the significant decisions regarding their medical care and health status [6]. Most times, this kind of information is accessed on health portals. A portal is a website that offers specific services which assist people to navigate the internet [3]. Portals provide a wide range of services: search facilities, community building utilities, access to commercial offerings and personal productivity applications [4].

Saeed M. (2009) [19] was interested to explore the usability of Landstinget Blekinge (www.ltblekinge.se) health portal and to investigate to what extent is the portal supporting the citizens in accessing the health care services. In doing so he selected fifteen citizens. The usability test was conducted individually, in the same environment. The findings showed that the health portal has the potential to be effective for citizens in accessing health related information and services, supports the users in taking care of their health and helps them in accessing health services and health related information in an easy to access way. However, the results suggested also that the portal is not very effective with the set of tools and interfaces that were available at the time of the usability test.

Other authors [23] were interested in investigating the online trust of health care web portals in Asian countries. The evaluation of these portals was carried on a sample of 127 users, and the results shown a significant relationship between usability and perceived credibility of healthcare web portals.

When evaluating the credibility of healthcare web portals from the consumer's perspective [10], a great deal of influence was found to be based on the overall visual appeal of the sites. Healthcare experts emphasized more on the name reputation of the sites, site operators or affiliates, information source and company motives. The authors underlined that in absence of expertise, consumers tend to evaluate the credibility of a site based on looks and ease of use.

Usability evaluation

For a website to survive on the Web it must answer to some specific usability requirements. If a website is difficult to use, if its homepage lacks clear information regarding what users are allowed to do on the website, if the information is slightly readable or lacks structure, then people will surely leave the website.

In other words, when dealing with an interface problem, users don't have the time nor the willingness to read the website's manual or to try to figure out what has to be done. Thus, the first action the user takes is leaving the website. This happens due to the existence of a variety of websites that have similar purposes and respond to users' needs.

The feedback from users can be used to assess usability and preferences of particular apps. Findings on usability and feasibility testing are welcomed since they play an important role in determining what systems are acceptable to use. For example, some health professionals might agree with the use of smartphones while others might not prefer or afford them. Therefore, the existence of an alternative option in the clinical tool set is important.

The objective of the usability evaluation is to identify usability problems, to help developers fix these problems, thus improving the usability of the interactive system. Nielsen [14] has defined the usability problem as an aspect of the user interface which might create difficulties for the user.

Taking into consideration the severity levels, the usability problems are rated as follows:

- Major: failure to accomplish the task goal or a significant loss of data or time;
- Moderate: has an important impact on task execution but the user can find a solution;
- Minor: is irritating the user but the impact on the task's goal is not important.

A good practice requires fixing the severe and moderate usability problems before the first release of an application.

The main categories of usability evaluation methods are: the inspection methods (expert evaluation) and the user testing.

Usability inspection is carried out taking into consideration a set of widely accepted usability principles that experts use when evaluating the user interface. Inspection methods can be applied in the early stages of the development process and are less expensive (depending on the evaluator's expertise) [2, 15, 24].

The usability inspection provides two kinds of measures:
- Quantitative: the number of usability problems in each category;
- Qualitative: detailed description of individual usability problems.

CASE STUDY

The CNAS-SIUI portal

The Integrated Information System of the Romanian Health Insurance (CNAS-SIUI Portal) is a key factor in the development and improvement of medical and pharmaceutical services, representing a solution for improving the management of the national health insurance fund and for the provision of quality medical and pharmaceutical services to insured persons.

CNAS-SIUI is extremely important for the elaboration of health informatics, for the uniformity of health data reporting and processing system at national and county level.

At the same time, SIUI is aligned with the national computerization strategy and can easily be in line with the regulations of international organizations with which permanent data exchange are taking place.

The website is structured as follows:
a. Home page: with information regarding the technical support and updated versions of report applications for SIUI (contracting, reporting, billing, settlement), SIPE (electronic prescription), CEAS (Electronic Health Insurance Card), DES (Electronic Health Record), installation kits;
b. First page: short overview of the National Health Insurance House;
c. Online services;
d. Technical support: contact details for SIUI, SIPE, CEAS and DES;
e. About SIUI: short overview of the Integrated Information System of the Romanian Health Insurance (CNAS-SIUI Portal).

There is also a section for user login (user and password) with the following two options: create a new account and request a new password.

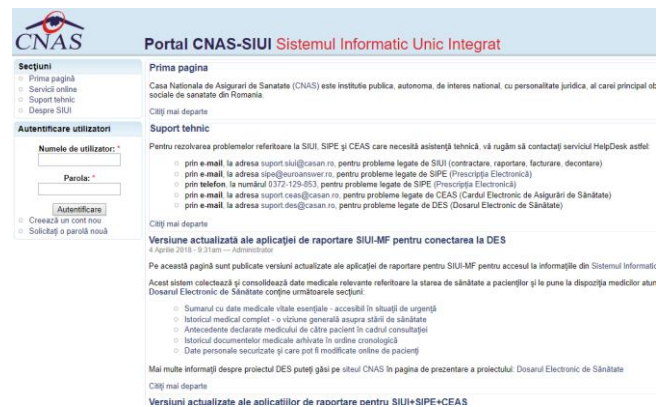In Figure 1, the home page of the application is presented.

Figure 1. The home page of CNAS-SIUI

The main objectives of CNAS-SIUI are: to elaborate health informatics and to assure the uniformity of health data reporting and processing system at national and county level.

The users of the CNAS-SIUI portal are health professionals.

Method

The task-oriented expert evaluation of CNAS-SIUI implied four experts that tested the portal in a task-based approach with the purpose of anticipating the difficulties of a real user.

Before starting the evaluation, the evaluators received the evaluation tasks and the set of usability heuristics.

The usability problems have been documented with a set of 25 usability heuristics. The objective of heuristics is to explain and document each usability problem and to train evaluators. Thus, the task-oriented character of the evaluation resembles the heuristic walkthrough [20].

The evaluation was performed in two steps:

- *Individual evaluation*: each evaluator tested the application independently and recorded the usability problems for each task;
- *Collaborative consolidation*: removing the duplicates, removing the false usability problems, agreeing on a list of unique usability problems, agreeing on the severity rate and finalizing the description.

The consolidation per task of each usability problem was based on the "similar changes" principle [8]. The following information has been recorded for each usability problem: context, anticipated difficulties, cause, suggestions for improvement, usability principle (heuristic) violated, and severity.

Table 1 presents the evaluation tasks that were used in the present case study.

Table 1. The evaluation tasks

No.	Task
1	Create an user account on the platform
2	General information on the electronic health file
3	Finding news about reporting applications for vendors

The set of 14 heuristics used to explain and document the usability problems are presented in Table 2 [16].

Table 2. The set of usability heuristics

User guidance	
1	Prompting
2	Feedback
3	Information architecture
4	Grouping / distinction
User effort	
5	Consistency
6	Cognitive workload
7	Minimal action
User control and freedom	
8	Explicit user actions
9	User control
10	Flexibility
User support	
11	Compatibility with the user
12	Task guidance and support
13	Error management
14	Help and documentation

Evaluation results and discussion

The number of problems detected by each evaluator, after the individual evaluation, varied from 8 to 14. In the second step, the individual problems have been analyzed in order to eliminate the duplicates and the false problems, agree on the severity, and produce a common problem description. A total number of 4 problems have been discarded as false problems.

Overall, the collaborative consolidation resulted in a total of 30 usability problems, as shown in Table 3.

Table 3. Usability problems per task and severity

Task	Total	Major	Moderate	Minor
1	16	5	6	5
2	8	1	5	2
3	6	1	3	2
Total	**30**	**7**	**14**	**9**

In total, *seven major problems* have been detected:

1. The system does not allow password recovery;
2. Difficulty to access the user account section;
3. The Online Services menu is inactive on the platform;
4. The CAPTCHA characters are not legible (readable);
5. There is no voice function to guide the creation of the account for blind people;
6. The patient can't authenticate to the electronic health record;
7. The quick search option is not working.

Other important usability problems relate to the fact that the portal does not send the account activation nor the account creation confirmation emails.

In the event of an error message displayed when filling in the paragraphs of the account registration form, the system does not allow the name, surname, password, and password confirmation to be retained.

Also, there is no search facility available in order to find the information on the portal in real time, according to a search criterion. The Quick Keyword Search Box is not available when the user is not logged in.

Other *moderate usability problems* that were identified are: the information is only available in the news section, the content structure does not include the main users grouped by category, and "Help" menu is not included on the platform.

The *minor usability problems* are mainly related to compatibility with the user, impossibility to increase/decrease the text, and the instructions for completing the user account form are far too short and with a grammatical topic that is slightly non-specific to the Romanian language.

Table 4 shows the usability heuristics that have not been respected per severity. Most of the important usability problems are related to minimal actions (9), user control (6), info architecture (3), task guidance (3) and compatibility (3).

Table 4. Number of problems per usability heuristic

Heuristics	Total	Major	Moderate	Minor
Prompting	2			2
Feedback	1		1	
Info Architecture	3	1	1	1
Workload	2	1		1
Minimal actions	9		6	3
User control	6	3	3	
Flexibility	1	1		
Compatibility	3	1		2
Task guidance	3		3	
Total	**30**	**7**	**14**	**9**

CONCLUSION

In this paper, we used the usability inspection to evaluate the CNAS-SIUI (The Integrated Information System of the Romanian Health Insurance), a Romanian health portal.

Overall, the CNAS-SIUI portal is far from being usable. A large number of usability problems has been found. The first priority should be fixing the major usability problems, especially those related to creation and accessing the user account, from both perspectives: ordinary users and users with special needs, followed by user testing in order to provide a complete evaluation report regarding the usability of the CNAS-SIUI portal.

Acknowledgement

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