Evaluating Interaction with Websites:
Case Study of a Government Website
of the Brazilian Ministry of Labor and Employment

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Abstract. This paper presents a usability evaluation of the MTE (Ministry of Labor e Employment) website in order to measure the effectiveness, efficiency and user satisfaction regarding the website. The participants were 12 users (07 users were female and 05 male). The results indicate that although the education level of all participants and computing experience, many of them have had difficulty in finding information and do not recommend the site.

Keywords: Government websites, ergonomic design, usability, ministry of labor and employment.

1 Introduction

Digital interfaces are already part of everyday life for a large portion of the human population, whether through mobile phones, computers, bank systems etc. Communication and Information Technologies (CITs) attract the interest of many service providers looking to better and more attractively serve their clients.

CITs are also important instruments for the public service sector. The government considers these resources as a way to improve its interaction with citizens. Government sites inform and provide services, saving time and resources and benefiting society. Thus they are essential in democratic nations. Good examples of CIT usage in Brazil include electronic income tax declaration, voting and, more particularly, social security services.

The Ministry of Labor website (Fig. 1) is a channel of communication and service provision for all Brazilians, and can be considered a useful resource since it provides work and employment news, answers questions and provides information about laws, norms, decrees, work relations, statistics, unions, service points and ombudsmen. Therefore, to the site should offer an effective, useful, friendly and receptive interface for its users.

According to Barbosa et al. (2004), a government website is a unique and integrated space where the citizen can obtain information and request services from government agents in a simple, interactive way. There are currently more than 100 government

websites; however, they vary tremendously. While some present an interface based on concepts such as information architecture and usability, other still need effective improvements to facilitate interaction. Agner (2006) mentions that the vast majority of public organs consider their websites as marketing rather than as citizen interface, and for this reason many are designed in ignorance of real user behavior. Such ignorance is the basis of many major problems in Human Computer Interaction (HCI).

Fig. 1. Homepage of Portal of the Ministry of Labor and Employment/Brazil

2   Objective

The objective of the present study was to investigate the interaction of users with the Brazilian Ministry of Labor and Employment website. By means of interaction tests, problems with information access were discovered and mapped and usability analysis was conducted.

3   Theoretical Foundation

HCI is a multidisciplinary area involving Human Factors and Ergonomics whose objective is the safety, efficiency and reliability of user performance, making tasks easier and increasing comfort and satisfaction (PREECE et al., 1994).

This area encompasses study of the relationship between design and technology, i.e., between human aspects and technological systems, conforming to the needs and well-being of humans. It also involves Ergonomic Design, whose concern is to reduce problems between user and technology in order to guarantee products and systems more adapted to human factors. HCI is also associated with Usability, since the problems occur in the interaction between user and system, which may compromise the effectiveness of the task. According to Santos (2000), the development of interfaces must consider the fundamental elements of HCI (user, task, system and environment) to generate higher usability.

A product developed with usability in mind will provide quality user interaction including ease of use, intuitive interface, rapid task performance, a minimum of physical effort and cognitive load, and fewer mistakes, thus guaranteeing satisfaction during use.

Dix and Shabir (2011) believe that, for some people, usability is window dressing tacked on at the end, like an attractive initial screen for a website. However, people do not interact with the screen only, but with the entire system. It is necessary to focus on the user during the entire design process.

Among the forms of usability evaluation, ISO 9241 (from Brazilian norm NBR 9241-11:2002) can be used in projects as a tool for evaluating usability. This norm includes several topics related to ergonomic aspects of software and hardware use. Its 11th topic deals with evaluating global usability by measuring effectiveness (objectives successfully reached), efficiency (tasks completed by units of time and other variables) and satisfaction (using a questionnaire).

There are several methods for evaluating usability, including inspection methods (evaluated by specialists) and empirical methods (evaluated by users). To accomplish the latter, real users performing some pre-determined tasks with the system/product while accompanied by an evaluator, which allows high-level interaction problems to be evaluated that are seldom identified by other methods (DIAS & MÁSCULO, 2005).

In user-centered design, it is important to understand who the users are and what they want to do. On the web this becomes more complex if we consider that there are many users with different purposes. Thus, it is necessary to identify the most significant users and to guide different users to different areas. Due to so many challenges, HCI is an important object of study for the field of Web Design; it involves the study of physical, cognitive and social aspects vital to website development. Design involves carrying out an objective within its restrictions. In HCI, the objective is frequently unclear. It may be based on "what the users want to do", but more details may be necessary to effectively complete the design. A substantial part of the work in HCI is simply finding out what is desired, which is often not clearly evident (DIX and SHABIR, 2011).

4   Materials and Methods

This was a cross-sectional study conducted according to appropriate ethical principles (resolution 196/96 – CNS/MS and Code of Deontology of Certified Ergonomists - ABERGO, 2003). The design and approach were web-based: users interacted with the Ministry of Labor website and provided information about the experience using an online form.

The analysis was based on statistical inference, involving a five-step online protocol: subjects read and accepted the free and informed consent form, filled out an identification and internet use experience questionnaire, took an interaction test involving four tasks and participated in a satisfaction survey. A global exploratory approach was used, basing the analysis on the global usability measurements suggested in Brazilian norm NBR 9241-11 (2002).

The interaction test tasks included questions like: "Suppose you need some information about x, try to find it on the site". The four tasks encouraged the user to visit several areas of the site, and the choice between surfing several pages or going directly via the search bar was left to user discretion. The form required that the user furnish the following information: whether or not the task was concluded and, if so, whether it was concluded easily or with difficulty, the link found that resolved the task, the number of seconds it took to perform the task.

For gather data on interaction and user satisfaction, a questionnaire featuring six statements based on a five-point Likert scale was used: from "strongly disagree" to "strongly agree". The final four questions considered the site's reliability.

The interaction was evaluated with method that measures effectiveness (concluded tasks) and efficiency (tasks concluded within a certain time with or without ease, considering as satisfactory a time up to 80% longer than that taken by the evaluator to perform the task, following DIAS and MÁSCULO, 2005) and satisfaction (a score above 70% on the Likert scale, following OKIMOTO, 2011).

Effectiveness was calculated according to the mean of the percentage of resolved tasks (four tasks), with each task corresponding to 25% (Table 1).

Table 1. Presentation of the score for the calculation of effectiveness

Tasks				
T1	**T2**	**T3**	**T4**	**Overall**
25%	25%	25%	25%	100%

For the efficiency results, part of the calculation was the time taken to perform the tasks (in this case in seconds), which had to be < 80% longer than the time taken by the expert (Table 2).

Table 2. Presentation of the times of each task (expert and satisfactory time)

Tasks	T1		T2		T3		T4	
Time in seconds	Expert	**80% above**	Expert	**80% above**	Expert	**80% above**	Expert	**80% above**
	9	**16,2**	17	**30,6**	15	**27**	25	**45**

A score in percentages, with a maximum of 100%, was given regarding resolved and unresolved tasks and degree of difficulty, with each task receiving a maximum score of 25% (Table 3).

Table 3. Presentation of the score for the calculation of efficiency

Task	T1			
Description	Not Completed	Completed Out of Time	Completed in time with difficulty	Completed in time with facility
Score	0%	8%	16%	25%

The results for degree of satisfaction were obtained by means of a questionnaire with a five-point scale, followed by two questions about reliability. For the first part, a score in percentages was given for each level of the Likert Scale: 0% for strongly disagree, and 12.5% for strongly agree. For the two final questions on reliability, the score was 0% for a "no" and 12.5% for a "yes" in order to have a total of 100% (Table 4).

Table 4. Presentation of the score for the calculation of satisfaction

Affirmative		Score				
		strongly disagree	disagree	neutral	agree	strongly agree
Agreeable Interface	12,5%	0,0%	3,125%	6,250%	9,375%	12,5%
Consistent Areas	12,5%	0,0%	3,125%	6,250%	9,375%	12,5%
Readable Fonts	12,5%	0,0%	3,125%	6,250%	9,375%	12,5%
Constrast Back-ground and Fonts	12,5%	0,0%	3,125%	6,250%	9,375%	12,5%
Labels and Titles Understandable	12,5%	0,0%	3,125%	6,250%	9,375%	12,5%
Information Assimilable	12,5%	0,0%	3,125%	6,250%	9,375%	12,5%

Table 4. *(Continued)*

Affirmative		Score	
		YES	NO
Reaches the goal	12,5%	12,5%	0,0%
Recommends use	12,5%	12,5%	0,0%
Overall	**100%**		

According to Bangor et al. (2009), many universities consider a score of 90% for their products as exceptional, 80 to 90% as good, and 70 and 79% as acceptable. Anything below 70% means usability problems and should cause concern.

5   Results and Discussion

Twelve subjects participated in the study, 7 women with a mean age of 27.8 (SD 3.85) and 5 men with mean age of 28.5 (SD 8.23), all with university-level education.

The effectiveness score was 67% (Table 5), based on the mean of the percentages of the resolved tasks. The result was below the level considered acceptable in Bangor et al. It should be pointed out that only one subject was able to finish the four tasks, and only the first task was resolved by all participants.

Table 5. Presentation of the results of the effectiveness of the interface

Users	T1	T2	T3	T4	OVERALL
U1	25%	0%	25%	0%	**50%**
U2	25%	0%	25%	0%	**50%**
U3	25%	0%	25%	25%	**75%**
U4	25%	0%	25%	25%	**75%**
U5	25%	25%	25%	25%	**100%**
U6	25%	0%	25%	25%	**75%**
U7	25%	0%	25%	0%	**50%**
U8	25%	25%	25%	0%	**75%**
U9	25%	0%	25%	25%	**75%**
U10	25%	25%	25%	0%	**75%**
U11	25%	25%	25%	0%	**75%**
U12	25%	0%	0%	0%	**25%**
EFFECTIVENESS				**AVERAGE**	**67%**
				SD	**0,1946**

The efficiency score was even lower: 30% (Table 6). Only tasks 1 and 2 (to a lesser degree) were resolved within the satisfactory time and with ease, i.e., with a score of 25%.

Table 6. Presentation of the results of efficiency of the interface

Users	T1	T2	T3	T4	OVERALL
U1	25%	0%	8%	0%	33%
U2	8%	0%	8%	0%	16%
U3	8%	0%	8%	8%	24%
U4	8%	0%	8%	8%	24%
U5	8%	8%	8%	16%	40%
U6	8%	0%	8%	8%	24%
U7	8%	0%	8%	0%	16%
U8	8%	8%	8%	0%	24%
U9	25%	0%	16%	16%	57%
U10	8%	25%	8%	0%	41%
U11	25%	16%	8%	0%	49%
U12	8%	0%	0%	0%	8%
EFFICIENCY			AVERAGE		30%
			SD		0,1458

The results for degree of satisfaction with the interface were 38.02% (Table 7), considered unsatisfactory, reflecting both the effectiveness and efficiency measurements. The most dissatisfaction was expressed concerning whether the interface was pleasant, if labels and titles were clear, and if assimilating the information was easy.

Regarding the observations about interaction, many participants thought that the information should be reorganized, and that the search tool should be more efficient in light of the volume of data the site contains. These results indicate that many of our subjects were dissatisfied interfacing with of the Ministry of Labor and Employment website, do not believe that the site is fulfilling its objective, and would not recommend its use. This demonstrates that the interaction between IT and its users must be carefully designed in order to achieve the highest possible level of usability.

Table 7. Presentation of the results of satisfaction of the interface

Affirmative	user 1	user 2	user 3	user 4	user 5	user 6	user 7	user 8	user 9	user 10	user 11	user 12
Agreeable Interface	3,12	9,37	9,37	0,00	3,12	3,12	6,25	0,00	3,12	3,12	3,12	0,00
Consistent Areas	9,37	6,25	12,50	0,00	9,37	9,37	3,12	9,37	3,12	9,37	9,37	6,25
Readable Fonts	9,37	9,37	12,50	3,12	9,37	6,25	0,00	3,12	12,50	9,37	9,37	0,00
Constrast Background and Fonts	3,12	9,37	3,12	6,25	6,25	3,12	3,12	9,37	6,25	3,12	9,37	3,12
Labels and Titles Understandable	0,00	9,37	6,25	3,12	6,25	0,00	0,00	0,00	0,00	6,25	6,25	3,12
Information Assimilable	0,00	3,12	3,12	0,00	6,25	3,12	0,000	0,000	0,000	6,25	9,37	3,12
Reaches the goal	0,00	12,5	12,5	0,00	12,5	0,00	0,00	0,00	0,00	12,50	12,50	0,00
Recommends use	0,00	12,50	12,50	0,00	0,00	0,00	0,00	0,00	0,00	12,50	0,00	0,00
Overall	25,00	71,87	71,87	12,50	53,12	25,00	12,50	21,87	25,00	62,50	59,37	15,62

SATISFACTION			AVERAGE	38,02%
			SD	0,2364

6   Final Considerations

Many government websites are undergoing a reconfiguration process to guarantee accessibility, but the concern should go beyond that, considering information architecture and usability so as to make these websites more pleasant, intuitive, easy to navigate and memorize and with noticeable quality.

Even though this is a preliminary study with a small sample and involving few tasks, the inefficiency of the interface was nevertheless observable, since information requiring more surfing was not easily found, and the search system did not satisfactorily facilitate this process.

Regarding statements about the interface in the satisfaction survey, disagreement predominated. Many subjects concluded that it was not easy to assimilate the website's information, perhaps due to the arrangement of the elements and the grouping of the information.

The importance of usability tests when developing a web tool and the effort that should be dedicated to this theme in government websites is, therefore, clear. In-depth studies evaluating other usability variables in this field could generate important requirements for this type of website.

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