The Turkish Central Doctor Rendezvous System Under Spotlight: A User Study with Turkish Senior Users

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Abstract. The Central Doctor Rendezvous System (MHRS), which is one of the platforms within "Health in Transformation Project" to provide efficient health services, is promulgated by Turkish Republic Ministry of Health. The aim of this multi-method qualitative user study is to test the usability of MHRS web site with senior users. The sample includes 10 senior users. The test procedure is based on three steps: The semi-structured pre-test interview, the task observation phase and a debriefing post-test interview. The participants are asked to execute the pre-selected tasks through think-aloud protocol and the audio/mouse tracks are recorded during the navigation. The findings support the notion that the system comprises fatal problems not only for senior users who -due to relevant literature- already fight an uphill battle when interacting with any web environment, but also for a regular citizen who tries to find healthcare support.

Keywords: Usability · Healthcare · Senior users · User experience

1 Introduction

MHRS is "The Central Doctor Rendezvous System" which is promulgated by Turkish Republic Ministry of Health as one of the elements of "Health in Transformation Project" to provide efficient health services that was begun in 2009 and spread country-wide in 2011 [1]. The system offers two options to get an appointment: Via the call center service or the web site.

For the online service, users have to be enrolled to the system from the web page of MHRS. It is for free, and once someone is enrolled, s/he can register to the system whenever it is needed. MHRS system asserts that an appointment could be taken in three steps: "The first step: You can choose available doctors using search tools on the left side. The second step: You can see the doctors' working schedule when you select a doctor from the doctors' list. The third step: You can choose an available slot from the doctors' working schedule and record your rendezvous." [1].

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This paper aims to investigate the usability of the online MHRS web site with senior users who are aged 55 and over and have specific needs to support user interaction.

2 Theoretical Background

Gualtieri [2] claimed that although there are lots of wrong or misleaded information on the websites and individuals tend to ask about health information to Dr. Google first rather than a real doctor. What she presented as a solution for medical societies or government agencies was to provide facilitated expertise guides through health web sites, and also a strong doctor-patient relationship. On the other hand, using Internet for persuasive health communication is the easiest and cheapest way to expand its effects [3]. Therefore the design of Internet-based interventions that lead to health behavior change should be explored with further studies.

Mobile health activities around the world are helping patients with chronic disease management, empowering the seniors and expectant mothers, reminding people to take their medicines on time, servicing without time and place limits, and improving health outcomes and medical system efficiency [4]. As an example, Huang et al. [5] designed and implemented a mobile health system prototype with real-time monitoring, precise positioning, rapid analysis, visualization display that can be widely used in family sickbeds, geracomiums, empty-nest elders' care, chronic disease patients and other special populations or scenes. The system had a Silverlightbased WebGIS system; a service center to monitor the location and physiological parameters of mobile monitoring terminal users, which makes alarms and reminders through spatial analysis.

Despite Turkey is notable for the majority of young people, elders are also one of the fastest growing segments in the country. According to World Aging Council gerontologist Kemal Aydın, Turkey where the population is getting older so rapidly, is taking the second place just after Indonesia: "*Now we have 6 million elders in population, furthermore we expect it to be around 12 million in 2020.*" [6]. According to the research of Interactive Advertising Bureau (IAB) in 2013, the number of people above 55 years old increased by 20 % due to the previous years. Individuals, who are already experienced users of Internet, are getting older, and www seems to be a part of daily life. Thus, not only health services but also work web environment should be designed considering senior users.

There are some functional limitations associated with aging; commonly accepted ones during the normal aging process are vision decline, hearing loss, motor skill diminishment and cognition effects [7]. A senior-friendly web site is supposed to consider these limitations of the elders. On the other side, there are many seniors who were unsure about web terminology, such as page, homepage, website, or the web. This finding may be associated with the fact that seniors may use web for different reasons and that they may have started using the web without any user support [8]. Estes [8] stated that the web terms and technical jargon are especially problematic when seniors are asked to fill information up a form. The studies also showed that the users in Japan had difficulty in understanding the English web terms. In this context, it is evident that

the localization process should be realized with great care and pass beyond plain translation.

Nielsen [9] collected simple measures by referring to vision, dexterity and memory criteria. He did not take into account the hearing ability because many web sites could be used fine without sound. Nielsen classified design issues and behavioral issues for senior users as follows:

Design Issues: Two most prominent design issues are readability and clickability. Considering the probability of reduced visual acuity which is one of the best known-aging problems, the websites targeting seniors should use at least 12-point font as their default set, and all of the webpages should let users increase text size as desired. Hypertext should be tracking as large and wide text, ensuing readability and making more prominent targets for clicking. Pull-down menus should walk hierarchically to prevent confusion.

Behavioral Issues: Two common behavioral issues that are observed in user studies with senior users are hesitation and discouragement: According to Nielsen [9] senior web users had discomfort and were hesitant in trying and exploring new things on the web, blamed themselves when a problem occurred rather than blaming the system, were more likely to give up on a task, and preferred to use web-wide search engines like Google to find out what they are looking for.

Nielsen [10] had recommendations for making a website easier and more engaging for seniors such as:

- Homepages that capture seniors' attention, in both the layout and content areas.
- Search design that makes finding information easy.
- Navigation considerations for the elderly who have diminished cognitive and motor skills.
- Content and web formatting techniques that help older people process information.
- Text and styles that accommodate people's diminished eyesight.
- Simplification of finding and buying items for the elderly.
- Forms that are easy to complete and not error-prone.
- Ways to reduce the number of forms to help seniors.
- Web address (URL) and browser considerations.

He also suggested offering supportive and forgiving design to encourage seniors for exploration and avoiding navigation changes to make steps catchy [9].

There is also another report, which suggests senior-friendly design of websites conducted by National Institute on Aging [11]. Hart [12] presented these guidelines as 25 usable tips for user experience practitioners [13, 14]. These parameters are as follows: Phrasing, Scrolling, Mouse clicks, Lettering, Justification, Style, Menus, Simplicity, Typeface, Color, Backgrounds, Consistent Layout, Organization of the textual content, Navigation, Help and Information, Icons and Buttons, Text Alternatives, Illustrations and Photos, Type Weight, Type Size, Site Maps, Hyperlinks, Animation/Video/Audio, Back/Forward Navigation, Physical Spacing, Search, Supportive and Forgiving Design.

3 Methodology

The purpose of this study is to explore the usability of online MHRS among senior users. A senior user is defined operationally as the person who is over 55 ages, who is a computer user, who has Internet connection at home/work and lives in Istanbul. Below is the research question of the study:

Research Question: What are the usability issues for senior users in MHRS website?

This qualitative study was based on a multi-method approach, which consisted of a pre-test questionnaire, task observation and a post-test interview. The pre-test questionnaire provided information on demographics and what s/he would expect form an online rendezvous system. The study also employed observation methods of data collection in order to gain better insight on user behaviors and attitudes. The tests were conducted with a PC laptop. Data collection instruments were semi-structured interview and tasks observation. Think-aloud protocol was used to collect behavioral data during the task execution stage. Additional behavioral data was collected by the recording of the voice, video and mouse-tracks of the participants. *Screencast-O-Matic Pro*, which is a program that records voice, video and mouse-tracks, is used as the major data collection equipment. 3 pilot tests were conducted to design the test procedure before the actual study.

The users were asked to terminate 4 different tasks during the task execution stage. First task was to "log in to the MHRS online system". The second task was to "get an appointment from the hospital located close to the home of the user". The third task was to "get an appointment from a pre-selected doctor with the following description: City: *Istanbul (Europe)* – District: *Beşiktaş* – Hospital: *Sait Çiftçi State Hospital*, Doctor: *Chest Deceases and Tuberculosis Specialist Dr. Arzu Soyhan*". The final task was to "cancel the rendezvous".

In this context, a sample of 10 senior participants (5 female, 5 male) were involved in the study. All the participants were over 55 years old (between 55 and 66) and were computer users with different educational backgrounds. One of them was graduated from the secondary school, one another was graduated from the high school and the rest had bachelor degrees. All the participants had Internet connection at home/work and lived in Istanbul.

All of the tests were conducted in the participants' own houses where they could feel comfortable. The tests were conducted by using the same laptop, mouse and online screen-recording program. The researcher adjusted the screen position according to participant's seeing abilities before starting to the user test in order to provide that all of the participants were able to see the screen easily. The participants who were not registered to the system were enrolled by the researcher's herself before the test. The researcher completed the registering process because otherwise the pilot studies showed that the task executions could take so long and result in anxiety on participants. The navigation was directly observed and recorded on a structured observation sheet by the researchers. Final structured post-test interview provided complementary findings.

The analysis framework was derived from the study of Nielsen [9, 10] and Hart [12]. The analysis framework that was derived from these two studies included the following parameters: Visibility and Affordance Issues due to Information Overload, Hard-to-Complete Error-prone Forms and Lack of User Support.

4 Results and Discussion

The findings from the background questionnaire showed that participants used www mostly for e-mail, social media and news coverage. Most of them (n = 8) have never used the MHRS before. Half of the participants had regular medical controls almost every month. The remainders seemed to have trust issues with the doctors and the hospitals. 3 participants stated that they did not prefer to go to hospitals except for emergency cases whereas 2 of them never preferred to go and see a doctor. Their relatives helped them to take their rendezvous when needed.

At the task-observation stage, the low task completion rate revealed the difficulty that the senior participants faced in using the MHRS online system. Only half of the participants were able to log in to the MHRS online system. For second task, only 4 of the participants could get an appointment from the hospital located close to the home of the user. 6 participants were able to get an appointment from a pre-selected doctor in a specific department of a hospital. However, only half of the participants could cancel the rendezvous as part of the final task.

4.1 Visibility and Affordance Issues Due to Information Overload

Visibility and affordance issues due to information overload were among the most common problems identified for older users. Too much material on the homepage made it harder for the participants to focus on relevant material.

As it can be seen on Fig. 1, in the homepage of MHRS, there is a form that has 7 different input fields to be fulfilled, each asking to choose the information from a pre-defined drop-down menu such as the city, district, hospital, district policlinic, clinic, clinic location and the doctor. Each input field has the default inline null text "*Does not matter*". Under the form, there are 3 action buttons written in red, which are "*Clean (the input fields)*", "*Search for rendezvous*", "*Take a rendezvous from your family doctor*". Next to the form, there is a welcome message and a guideline which give information about the rendezvous procedure: "*The first step: You can choose available doctors using search tools on the left side. The second step: You can see the doctors' working schedule when you select a doctor from the doctors' list. The third step: You can choose an available slot from the doctors' working schedule and record your rendezvous*".

On the right hand, there are four buttons located separately from the form that lead to new windows when clicked: "*Past Rendezvous*", "*Account Information*", "*Announcements*", "*Log out*".

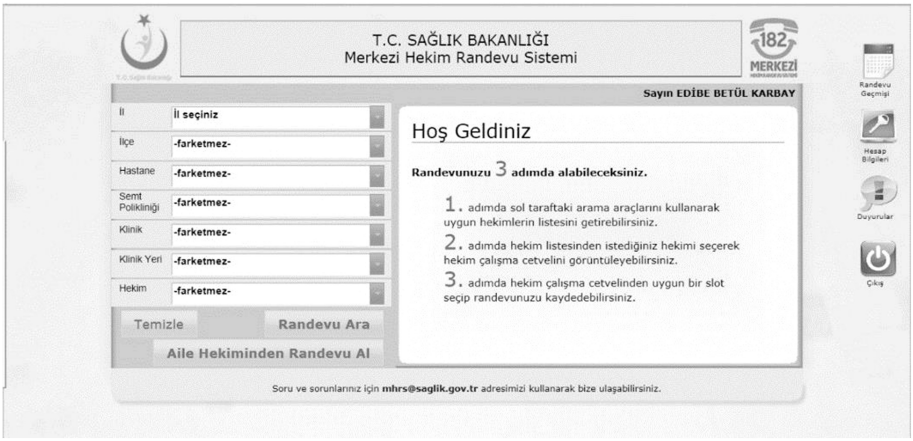

Fig. 1. Homepage of MHRS

As can be seen from the figure above, the users must fill in 7 different input fields in order to take a rendezvous. Besides the ambiguity of the labels in the forms confused the users. The input fields with the default inline null text "*Does not matter*" caused misunderstanding: *"If it does not matter, why I am supposed to fill the form?!*" (SEM), "*It does matter for me but the system does not let me choose one!*" (GUZ; MRH; MER).

There were also problems concerning the information architecture of the forms. Most of the terms were technical and users had difficulty in understanding these terms: "*What does slot mean? What is neurosurgery?"* (MUN). An onboarding process could provide users a better understanding of the system in their first visit.

In addition to that, the input flow in the form was not hierarchically designed although it had numbers that showed steps progressively. The required fields were not indicated. Thus participants thought that they needed to fill out all the input fields, which was not really necessary. In this context, the order of the input fields caused confusion: "*How can I know which policlinic my doctor works today?*" (AYN, MUN, RUH, HAY).

Canceling the rendezvous was the hardest task for participants since they looked for the "Cancel your rendezvous" button, but in fact it was hidden beneath the "Past rendezvous" button. In this sense, it is evident that the users should be provided with the action buttons carrying the relevant labels for the critical actions. Besides, the information in the system should also be supported visually. MHRS suggested visual icons, and cartoons for making the instructions simple, but this approach was not enough to support understandability.

Participants demanded smart customization features rather than an excessive load of information. They wanted the system to recognize them by their ID number and present them the information related with their demands. On the contrary, although they used their ID number in logging into the system, they were either not allowed to choose the department they preferred or they were misled to other irrelevant policlinics such as pediatrics. For example SEM wanted to take an appointment for "Allergic

Diseases", but he was not allowed. Similarly, DUR, MUN were surprised to find out that they were offered pediatrician as an option.

Offering choices to provide flexibility also resulted in confusion. There are two log-in pages in the system, one is provided through a map while the other one is presented with a list of rules. The presentation of both options –mostly with an intention to provide a flexible use- on the contrary caused confusion.

Arranging text size to support legibility without a need to scroll down/up was also found to be important, because participants hardly saw the approval links, which were generally located at the end of the page.

4.2 Hard-to-Complete Error-Prone Forms

Our findings support the notion that forms appear to be the most problematic issues in online MHRS user experience. It is hard to use mouse clicks on the forms. There is a long list embedded in the dropdown menu of each input field. Clicking any of the preferences does not work properly as well.

Senior users had difficulties in using the drop-down menus, which demanded selection from a pre-defined list. The form design was not supportive and forgiving. Once a mistake was done while filling the form, system was locked immediately. When presented with error messages, most of the participants tried a lot to recover the error. They even tried leaving the page and logging in back to clean the filled input fields. However, this unstructured trial-and-error approach mostly caused anxiety, feeling of inadequacy and guilt on senior users, which led to frustration and resulted in the abandonment of the relevant task.

There was also a systematic fail on the input field of the sign in which demanded user ID: The input field required be clicked first to fill up the ID Number. However it was not possible to click in until it was clicked to the leftmost part of the input field. In order to support the completion of the forms, keyboard focus should be on this first input field when the page is loaded.

Finally it was observed that the input fields of the form did not allow filling the form manually in case the dropdown menu didn't work properly. Participants tried to write manually to the form for several times, but the form was not designed due to this input strategy.

4.3 Lack of User Support

The findings showed that the senior participants should be supported with alternative mechanisms that could overcome the constraints caused by limited cognitive and motor abilities.

Some of the participants could not remember their password to log in. And the process to take a new password demanded excessive information based on the use of personal e-mail: "*I'm using the company's mobile phone and e-mail address. Otherwise I would not need them. And the system asks me for this information to remind me my password. What if I leave the job? What am I going to do to reach my account?*" (MUN).

Lack of onboarding in an overloaded homepage frustrated all the participants. MHRS is a technical web page due to medical terms intrinsically. However, there was neither an explanation, a glossary, a video nor a contact to lead people to the policlinic they needed to go. In this context, a live contact that offered online chat could be available for patients.

Location-based features could also simplify and shorten the rendezvous process by presenting the nearest hospitals to the user. For the second task, the user was asked to role-play as if s/he had a physical complaint of coughing and s/he was asked to take an appointment to the appropriate doctor nearby.

Since the system did not have location-based features, it was not possible to know which hospital was the closest one if the town was not well known. As the previous studies [3, 4, 13] showed that it could be possible to support ICT based systems with location-based features.

In this context the participants mostly tried to have an appointment close to their hometown or for a family doctor that they were familiar with. Especially "district" part, which was a required field, did not work properly in the system, and it was not possible to pass to the other input field without entering the district.

It was also not possible to choose a family doctor directly as it was mentioned in the guideline list of the MHRS page. It was impossible to have a rendezvous from the family doctor with the online system.

As a final note the findings showed that a proper reminder could contribute to the user experience. GUZ remarked that senior users could forget about their rendezvous. Therefore MHRS could remind them with alternative options such as telephone, e-mail etc.

5 Conclusion

The purpose of this study was to test the usability of online MHRS web site among senior users. This study revealed that MHRS has serious usability problems that disabled the senior users to use it efficiently. It was observed that the tasks, which could not be completed, were mostly related with the usability issues rather than the senior users' skills and abilities. The only difference between a senior user and a power user would be that a power user would easily understand that system did not work properly, while a senior user mostly felt anxiety, guilty and inadequacy.

Considering the usability problems observed in the study by referring to the analysis framework, the study provided the following implications for the improvement of user experience for senior users in digital health platforms:

- Beware information overload and value visibility. Make it easy to focus on relevant material in every page of the web site. Present information both textually and visually. Do not hide important functions deep within the menus without signifiers.
- Support legibility and readability. Let people adjust text size themselves.
- Value information architecture especially when presenting information with appropriate labels. Know your users. Do not adopt a technical jargon. Speak the users' language and provide consistency for language.

- Enable a hierarchical flow both for navigation and form-filling process.
- Provide easy-to-fill forms, which demand limited clicks, and support efficient data entry. Enable smart defaults and location-based features. Locate keyboard focus on this first input field when the page is loaded. Do not solely rely on drop-downs that cause both direct-manipulation and affordance issues.
- Provide flexible data entry with alternative input models.
- Be forgiving and support undoability in forms. Provide instant error feedback and tell users how to recover the problem as well.
- Present an onboarding process to emphasize the value that the system provides and teach the users to use the system quickly. Possible onboarding features could involve a demo video or a guidance system that provides sufficient information about the illnesses and leads the users to relevant departments and doctors available.
- Provide instant online help when needed. An instant messaging feature could be handy in helping the users.
- Provide reminders and alerts as cues for habitual actions.

Considering the lack of user-centered studies on senior user experience specifically in Turkey, this study contributed to the relevant literature by providing findings to improve the usability of digital health platforms for senior users. In order to a gain more insight on various aspects of senior user experience, further empirical studies with larger groups in diverse platforms should be conducted.

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