

# Usability Testing for e-health Application: A Case Study for Sana/Open MRS

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**Abstract.** This paper presents the conduction of a usability test with users of Sana/ Open MRS system. These users are Medicine students that performed four tasks, using distinct scenarios. As part of a bigger research, the objective of this procedure was evaluating user's opinions and from these results, supports system developers in new interfaces.

**Keywords:** e-health, usability testing, user's evaluation.

## 1 Context

Everyday mobile technologies and its apps are part of our lives. Address books, mobile banking, GPS, and search information at the internet are some examples that describe what is possible to do nowadays with a mobile phone, using 3G or 4G technology.

Human factors/ ergonomic researches can and must play an important role during the development process of these technologies. Together, the appropriate test environment and its tools can lead to a significant data interpretation that will contribute to make these applications safer, more usable, and better accepted by final users.

As Gorlenko & Merrick (2003) mention the concept of mobile interaction is related not only to the device mobility, but also the users' mobility: the equipment must be portable and must allow the users' mobility during the interaction. Ballard (2007) affirms that the word "mobile" refers, fundamentally, to the user and not to the device or application.

Usability concept and usability testing are common terms when talking about to users' interfaces and human factors/ ergonomics interventions.

The starting point of this research is Open MRS system. It's a collaborative project in open code for software development that focus in care taking in underdeveloped countries. Based on concepts of data liberty and sharing, this system allows access and modifications to its code, besides its use within other systems or products. Open MRS is a web based platform, but can also be implemented in one unique computer or server.

As shown in Figure 1, Open MRS homepage is simple. After logged in, user can see a navigation bar in the top of the page, which options are: *Home, Find/ Create Patient, Dictionary, Cohort builder, Sana, and Administration.*

When used alongside the mobile application Sana, developed by MIT, it works as an electronic health (e-health) recorder, which allows a data collection of health information that can be accessed from a mobile application. This system is the central of this research gathering professionals and students from Design, Engineering and Medicine areas. The main objective of this study is a usability evaluation of this mobile application - Sana - based on Open MRS - taking into account its public, the assistant doctors. In this way, a usability test was carried out with three Medicine students.



**Fig. 1.** Sana/Open MRS homepage, after log in, where navigation bar can be seen

## 2 Method

To ensure the development of user-friendly products, it is important to guarantee that needs and limitations of users are taken into account throughout the whole development process (Rubin et al., 2008). According to these authors, “usability testing employs techniques to collect empirical data of the interaction of representative end users with the product by completing representative tasks in a controlled environment”. In a usability test, the usability of a product is evaluated by means of user trials, with the aim to analyze or improve the usability of the evaluated product.

A usability test is a good way to identify usability problems in this case. According to Rubin et al. (2008), some test steps must be considered:

- Develop a test plan;
- Choose a testing environment;

- Find and select participants;
- Prepare test materials;
- Conduct the sessions;
- Debrief with participants and observers;
- Analyze data and observations;
- Create findings and recommendations,

Following these steps, and focusing the firsts, research plan consisted of plan a test that, when using mobile app Sana, the user can record individual patients personal data, data related to his/her visit, symptoms and diagnostics. This record is sent to Open MRS, setting a databank - this was the test environment.

When considering the participants, subjects in this field study, albeit being familiarized with Sana app, they don't have a deep knowledge on Open MRS, using it merely as a databank for recorded data.

From this point of view, the main proposal of the usability test was to verify their performance with the system - if they need to use Sana app, they must also be capable to complete simple tasks on Open MRS, as finding a patient record, editing it and organizing it. To do this, some parameters determined by the group of Systems Engineering helped researchers to define the scenarios and tasks to be accomplished. Participants were contacted and tested during August 2012, in the Ergonomics Lab, at PUC-Rio.

The research problems and proposed scenarios used in this test are in Table 1.

**Table 1.** Research problems and scenarios used in usability test

Research problem	Scenario description
Search for a patient's record	Using Open MRS/ Sana, find the last registered patient
Access and edit a record	You've just diagnose a patient and registered him at Open MRS/Sana. At the end of the appointment, the patient told that is also a dizzy feeling. It's good edit patient's record, and add this information. To do this, use the term "giddiness" in the item "other complaints".
Search patient record	Your patient John Smith called, once he needs the name of the medication you've prescribed. To answer him, you will need to open his register, and check which is the medication that you wrote down. Find John Smith's record and medications registered in Open MRS/Sana.

Test materials – as scenarios, debriefing formulary and the online system - were prepared before the test began. After arriving, participants did a cooperative evaluation, using four scenarios to perform the tasks. When concluded, subjects answered a post-test questionnaire, and also gave their personal impressions and/or comments about the system, using a debriefing formulary.

**Fig. 2.** Patient *Search* page of Sana system, where user can find records of patient already registered or create a new patient

Archive	Status	Patient ID	Patient Name	Age	Sex	Procedure	Date Taken	Contact Number	Media Summary
<input type="checkbox"/>	In Progress	123456	Martins, Cristiano	29	F	Primeira Etapa	03/06/2012 10:33		
<input type="checkbox"/>	In Progress	678929	Nascimento, Viana, Susana	77	F	Primeira Etapa	03/13/2012 12:15	555555555	
<input type="checkbox"/>	In Progress	681384	Goncalves do Nascimento, Marivalda	39	F	Primeira Etapa	03/16/2012 10:54		
<input type="checkbox"/>	In Progress	22641866	Nascimento, Celia	64	F	Primeira Etapa	03/16/2012 10:55	555555555	

**Fig. 3.** SANA *Queue* page in Sana system, that users must navigate to find patients already registered and access their data.

### 3 Some Results

During tests volunteers showed a surprising self-assurance while using the system. They mentioned that a couple of days before test, they logged in the system and tried to understand how it works. So, during test, this familiarity interfered in tests results, once all scenarios were concluded in an easy and fast way.

But besides this, participants referred that what happened during performing the scenarios was that they memorized which was the sequence of actions, once interface wasn't intuitive, nor easy to understand or navigate.

Testing using scenarios was also important to point out ambiguities in the website, as sections that can be reached using different tags and the lack of integration between the App Sana and Open MRS website. If patient isn't recorded with his all data in Sana App, data related to the appointment can't be created in Open MRS website.

Answers after test and debriefing showed some similarities concerning the opinions of all participants. Open MRS isn't an attractive or stimulating interface to interact, once it's difficult to be used, and sometimes, too and unnecessarily complex. All of them agreed that a tutorial is needed to learn how to use it and they also believe that learning process is slow. None of them said that felt confident while using the system.

During debriefing phase, participants emphasized general problems in the website, as the need of too many steps to conclude simple tasks, a confusing interface and non-intuitive navigation. But some other points were more specific:

- The need of register medications and illness in a section named "*Dictionary*". Just after each register is inserted in database, these information can be an option to be included in patients records;
- To insert these data in the system user must do it manually, what constitutes an effortful task;
- Manage patient records is also a problem, once there's no way to delete some of them, or access a record that is filed;
- There is no way to create patients records during appointments using Open MRS website - this system can be used just to register patients. To create the appointment, is necessary use Sana App. So, during appointment, doctors must use a mobile device, they can't use a laptop or desktop computer.

## 4 Final Comments

This usability testing - using the cooperative evaluation - shows that Open MRS offers valuable resources to the attending physician, but its interface is not ready to this public yet.

Once its language and architecture are more suited for developers than the actual physicians, this system appears to be unnecessarily complicated, which restrains its insertion in the medical practitioners' routine. Considering the usability test results, new ideas of applications and further tests are to be expected.

## 5 Next Steps and Future Research

### 5.1 Survey of Apps that Focus the Communication and Information Sharing between Doctors and Patients

Aiming a better comprehension of available tools that allow information sharing between doctors and patients, the next step of this research is a survey to identify applications (apps) that are focused in m-health.

The objective of this phase is identify, among apps available at *Google Play Store* – that offers apps to Android system – which are the apps that allow patients record their personal data, and if he/she wants, share them with his/her assistant doctor. Apps that are directed to doctors will be also considered, pointing out similarities and differences with Open MRS/Sana. *Google Play Store* was chosen once Android system is the base of the system used in Open MRS/SANA system.

All apps found in this phase will be organized and analyzed, and shared with all members of the research team.

## 5.2 Future Usability Test of Open MRS/SANA

Once the research team includes developers that are working with technical aspects of Open MRS/Sana system, after putting together all this information, it is desirable carry out another usability test with real users.

This new evaluation has as objective compare and evaluate users opinions suggestions and performance after changes in this system, from users perspective

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