TOWARD IMPROVED EMERGENCY CALL SERVICE:
A USABILITY TEST CASE STUDY

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ABSTRACT

This paper describes the initial steps for the improvement of emergency call service. For instance, persons reporting an accident or similar event and the officer receiving the call are often under stress, which distracts the communication process and becomes a barrier to information transfer. We try to identify the main deficiencies when processing a received call and explore alternative ways of recording the main information content. In this regard we performed a usability test case study for assessing the efficiency of recording information either on a blank paper or in a prepared paper form. Implementation details of the usability test are described.

1 INTRODUCTION

In Slovenia we have two emergency telephone numbers the first is "112" (International emergency telephone number) and "113" which is emergency police telephone number. In police structure this service is named Operation and Communication Centre (OCC) and widely recognized by users as telephone number "113" as a police emergency number. The Republic of Slovenia has eight OCCs on regional level and one on the state level covering all eight regional OCCs.
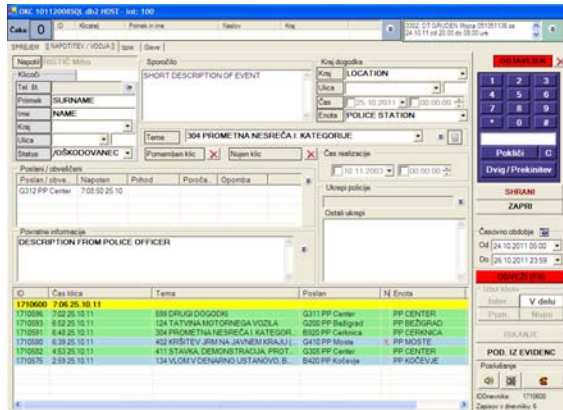

Figure 1: *current GUI OCC screenshot*

The emergency telephone number 113 receives yearly more than half million calls, out of which there are 40% that require police intervention. From the above it is clear that a reliable operation of computer/communication infrastructure and human resources is a prerequisite for efficient performance of OCCs. In this paper we primarily focus on the acceptance of a call, which is only one of the operations performed when someone calls the emergency telephone number 113. Due to stress, communication noise and other factors the process of receiving and recording faces problems and is occasionally error prone. In order to improve the efficiency of the communication we try to identify the main deficiencies when processing a received call and explore alternative ways of recording the main information content. For this purpose we performed usability test case study for assessing the efficiency of recording information either on a blank paper or in a prepared paper form. Implementation details of the usability test are described in the following sections.

2 USABILITY TESTING ISSUES

According to J. Rubin and D. Chisnell [1] "a product or service is truly usable when the user can do what he or she wants to do the way he or she expects to be able to do it, without hindrance, hesitation, or questions". While this definition might sound a bit too broad for our case, we definitely stick to its attribute *efficiency*, which is defined as "the quickness with which the user's goal can be accomplished accurately and completely and is usually a measure of time". In our case the situation is actually reversed. Efficiency means what quality level of the recorded information can be achieved within a given (short) time limited by practical circumstances and is a measure of committed errors. Furthermore, the term error in our case denotes either erroneous or missing information item.

Different testing methodologies can be found in the literature [1-6]. A reader may get a bit confused since there is no established terminology, and it happens that similar techniques are denoted in different ways. We follow J. Rubin and D. Chisnell [1] who define three basic test techniques: exploratory (or formative), assessment (or summative), and validation (or verification) tests at a high level. The above tests are associated with specific points in

the product life cycle. The fourth, the comparison test, can be regarded as an integral part that can be used in conjunction with any of the other three tests. It is not associated with any specific lifecycle phase.

The usability test case study that we performed can be regarded as a comparison test in conjunction with assessment test. In assessment test, basic conceptual model is defined and the test is used to evaluate how effectively the concept has been implemented. In this test, the user performs given tasks, the interaction with moderator is supposed to be low, and quantitative measures are collected as result. The role of comparison test in this context was to compare two alternative solutions. Important feature is that in order to acquire statistically valid results, the alternatives should vary along a single dimension. Usability test performed in our case may seem to be simple and trivial, however we believe that adhering to the above test concepts will allow us to continue our work on more complex issues.

3 TEST PREPARATION

The goal of the designed usability test was to assess two alternative ways of recording information either on a blank paper or in a prepared paper form. From the very beginning we faced the difficulty of making the experiment objective and such that it could be repeated and tested by different persons in the same way.

Initial problem was, how to perform a telephone call. The idea of generating a call together with emotions, stress, mistakes, etc. was discarded due to the difficulties to imitate it in a realistic way. After a lot of discussions we decided to use a recorded telephone call. However, due to additional formal restrictions we could not use real recording from 113, so we prepared simulation of a call to police emergency telephone.

In our usability test we followed the guidelines from Usability.gov [7] and the book of B. Nielsen and H. Loranger [3].

3.1 Documents

Before real testing has been conducted we prepared the following documents: usability test plan, consent for video taping, guide for moderator, reminders for (traffic accident, crime and minor crime), notes, scenarios.

Usability test plan is a document where everything is written about the test, how it will be done, who are the participants, what kind of training do they need, all procedures, ethics, how measurements will be done, envisioning all the possible errors and limitations of a test. It is a document, which is forcing you to think and to prepare your self for usability test and to anticipate mistakes and errors which will occur while the test is conducted.

Consent for video taping is a consent that you can record a testing subject and obligation from your side to tell the participant, what you will do with this recording latter. Consent is a document which can make a lot of problems to disappear if you have it.

Guide for moderator is a document that instructs you what to do and how to do it. It serves also as a reminder not to forget something.

Questionnaires prepared for the participants to put down important information items communicated to them via simulated emergency calls.

Notes, basically this is your grading paper. Here you write what you will grade and what will happen. All questions which you will ask participant are written here. It is a short summary of **Usability test plan**, but it is a specialized document for grading.

Questionnaires – for later analyis you need demographic data and data how, participants comprehend test. From these questionnaires you try to discover how the participants see problem and how they solve it. We prepared many different questionnaires such as demographic, before test and for after test.

3.2 Recordings, scenarios

As mentioned before, neither a real telephone call nor a genuine recording from the 113 centre was an option. So we made our own scenarios. In preparing the scenarios we have taken care to include similar amount od information as it is the case in real life when someone calls the police officer via emergency telephone line.

We prepared fourteen different scenarios and recorded them. Since this was the first time we performed experimets like this, we did not have an idea how much materials we actually needed. So, for the beginning we decided to select four scenarios for our usability testing, and keep the remaining for possible future experiments.

3.3 Participants, locations

The next step was acquisition of participants whose background and abilities are representative for our testing process. Due to a low budget we could not afford any monetary compensation for the participants, so we counted on friends. We searched for four police officers with experience from the work in OCC and four people, who had not experience and knowledge about police. Soon we met another obstacle in that the participants that volunteered to take part in our research at different times and consequently have their free time on different days at different time slots. They also live at different places, some rather distant from others.

Taking into account all these limitations we decided to perform tests at different places and times but special attention was paid to provide the same experience on either location. Three different locations were used including office and home.

Eight participants were involved, among them five male and three female. The average age of the participants was forty one years. The youngest participant had trhirty-two and the oldest fithy-eight years. Half of them work in police and have experience from this kind of work and the other half had no such experience. Two of participants had high education, two higher and four of them secondary education. All of them participated in this kind of testing for the first time. Participants from the police have the average of twenty years of working experience in this kind of work. Only one participant never called to any kind of emergency telephone 112 or 113.

3.4 Equipment

For testing purpose we prepared laptop computer, miniDV camcorder, pencils, blank paper and many printed reminders and notes.

Initially, a **laptop** was planned to serve both as audio player of the prepared scenarios. In addition, we also considered the possibility to use the laptop as a stopwatch. However after some preliminary attempts we decided to use it only for playing the simulated calls.

Camcorder was set to record the participants during the test sessions. It was mounted on a stand, so that we did not need to engage additional moderator. Since an analogue camcorder was used we later had to transform all videos to digital format in order to be able to play them on computer and have control over play, pause, rewind and stop option.

Pencils, blank paper and paper forms were used by participants to note down the information they received from the simulated calls.

Notes were used by the moderator to note down observations of the behavior of each participant.

4 PRACTICAL EXPERIENCE

Before performing real sessions it is necessary to prepare checklist for getting ready. Here again we followed the guidelines proposed in [1]. A checklist includes the schedule with all the necessary details to conduct the session. Before starting a real session you check if the participant had filled out and signed permission to record. Next you explain to the participant the task that he/she is going to perform. Afterwards you move to the testing area and prepare to test. Participant and moderator position themselves according to the prepared environment. And the recording starts.

The sessions were performed in the following way. We tried to follow the same protocol for all the participants. Here, the guide for moderator played a speciall role. All instructions to participants were read from the guide directly. In this way we managed to create a critical distance between the participant and the moderator even if they were close friends.

We explained to the participants that they would listen to four simulated emergency calls and that they would be asked to note down the information they receive. We gave the participants time to ask questions. We noticed that most of the participants felt unconfortable in the presence of a camera, so we tried to relax the situation with nonformal conversation but still focused on the test.

Before the actual start we explained to the participants, what kind of call they can expect (traffic accident or serious crime). We explained, that their task was to produce a document containing all the information necessary for the police dispatch. Then session started. A screenshot of a recorded session is shown in Figure 2.

Figure 2: *A screenshot of a recorded session*

	Scen. 1	Scen. 2	Scen. 3	Scen. 4
# of data items	9	12	12	7
call duration (sec)	17	17	20	13
# of sec. per data item	1,8	1,4	1,6	1,8

Table 1: *Information content and duration of individual scenarios*

Table 1 shows the information content and duration of individual scenarios. The first row gives the number of information items (i. e., important facts communicated by the call that are relevant for the decision on police dispatching). The second row shows the duration of individual simulated calls. The third row shows the amount of information received per second in each case. In some recording some information item repeated, but in the table they are counted only once.

For illustration we give an example of a filled form in Figure 3. The red marks (marked by the moderator after accomplished test) indicate to what extent individual information items have been recorded. Due to the lack of space only a part of the form is shown.

Figure 3: *An example of a filled form*

- ?????	27.10.2012 17:32
- DS	Robi Travnik
- Šmar. 154	Z. ob. → Tržaška
- NN	PN
- fric Aleksander	AC Tržaška
- bel kombi	R master bel
	C4 Lj tablic
M kdaj Šmart 142	Kraja – Merc. Smart 154
Elektronski merilni aparat	Merili inštr.
Fric Aleksander – GRADBIŠČE	Fric Aleksander
Bel kombi – napis elektro fric	Be kombi elektro FLINK

Figure 4: *Four examples of recording on a blank paper*

The examples of noting down the information from the call are shown in Figure 4. Although the notes are written in Slovene it is apparent that the participants shortened words in order to speed up the recording. Questionmarks in the upper left part indicate an unreadable note.

5 LESSONS LEARNED AND CONCLUSION

After the completion of tests we critically assessed the performed procedure and analyzed the results. Expectations that we could control the whole test where not completely met. We could control the initial segments, when we have made interviews and giving instructions, however, in critical moments during test, the participants reacted in their own way. Consequently, some additional measures should be taken in future.

We were also a bit surprised since the majority of participants finished their task in thirty to fifty seconds. For the moderator it was impossible to observe everything and record it in the notes in such a short time. In this regard, video recording proved to be of a great help.

Another remark concerns grading of the achieved recordings. All information items are not of the same relevance for the decision for dispatching police officer on the place of event. So in our future work we plan to add weights to individual information items and thus achieve better estimation of the recordings.

Analysis of the recorded notes shows that filling the forms provides better information content for subsequent processing than the notes on blank paper. On the other hand, filling the forms takes much more time than notes on the blank paper. This drawback will be alleviated when one becomes acquainted with the form after a certain number of recordings.

The described usability test is just the first step toward the design of a new user interface. Further research will be directed toward dynamic organization of user interface adjusted to specific predefined cathegories of events.

References

[1] J. Rubin, D. Chisnell. Handbook of usability testing, Wiley, 2008.

[2] J. Nielsen. Usability engineering, Morgan Kaufmann, 1993.

[3] B. Nielsen, H. Loranger: Prioritizing Web Usability, New Riders, 2006.

[4] T. Brinck, D. Gergle, S. D. Wood. Usability for the web designing web sites that work, Morgan Kaufmann, 2002.

[5] M. Manhartsberger, S. Musil. Web usability. Galileo Press GmbH, 2002.

[6] M. Wiklund, J. Kendler, A. Y. Strochlic. Usability testing of medical devices, CRC Press, Taylor & Francis Group, 2011.

[7] http://www.usability.gov/