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Design and Usability Implications for using the CrowdTasker Mobile Application in Crisis and Disaster Management

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Wien, 12. Dezember 2016

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Abstract

This work describes my efforts in improving a mobile application for supporting the coordination of volunteers in crisis situations. I first delineate the theoretical foundations of crowdsourcing and crowdworking in the field of Crisis and Disaster Management, as well as several examples thereof. Then I describe the current state of the CrowdTasker, which is an infrastructure that enables crowdsourcing of simple tasks to volunteers via an application on their smartphones and collecting the information thereby generated. In order to describe a set of improvements for the mobile application component of the system, I analyse its design and the feedback gathered from volunteers using it in previous field experiments. Lastly, I describe the process of implementing these improvements and evaluate them with test users in a laboratory setting. After analysing my findings, I draw conclusions on the effectiveness of the conducted adaptations, and give an outline for further changes.

Contents

CHAPTER 1

Introduction

The term *crowdsourcing* was coined by Howe in his 2006 article where he describes the shift from costly professional products and work, to cheap ones made available by the masses (hobbyists and enthusiasts) via the Internet [How06]. The term was quickly adopted as multiple businesses emerged following this principle. Most notably the Amazon Mechanical Turk[1] micro-task market website, launched in 2005, does not merely focus on offering a specific product generated by the crowd, but instead offers the crowdsourcing of any micro-task a company might require. Due to this development anyone with an Internet connection can turn into a temporary worker for cheap. The concept of micro-tasks is a very straightforward one. The principal purpose is to split a big task into several smaller units that are easier to process. These small units are then easy enough to be solved by any person, regardless of their training or expertise. This can be of great advantage in crisis situations, where a crowd of (untrained) impromptu volunteers is at the authorities' disposal. Hofmann et al. exemplifies this by recounting the events of the 2002 flood of the Elbe in Germany, wherein spontaneous volunteers helped fill sacks with sand, which were then used to build a provisory dam [HBS14]. Their task was a simple and straightforward one, and could be fulfilled faster than usual because of the added manpower provided by them. Neubauer et al. define crowdtasking as a form of crowdsourcing, but with the difference that crowdtasking refers to tasking selected known volunteers qualified for certain scenarios [NNJ+13a]. Crowdsourcing instead does not target a specific group, but rather equates to an "open call for participation" [How06].

In the field of Crisis and Disaster Management (CDM) researchers are currently exploring how to harness the possibilities of crowdsourcing in order to improve the preparedness of organizations and communities. Especially the ubiquity of smartphones provides an appealing entry point into the subject. For this reason researchers try to develop tools that can make use of this (already present) technological infrastructure to benefit CDM

[1] https://www.mturk.com

operators. One such tool is the CrowdTasker (CT) system which originated from the Resilience Enhancement by Advanced Communication for Team Austria (RE-ACTA) project.

In this work, I will first describe different approaches to crowdsourcing in CDM. Additionally I will describe the CT system and its functionality as well as its reception (gathered after field tests). After analysing the reception of CT during field tests and experiments, I will use feedback gathered in order to design improvements to the CT system with respect to its usability. Afterwards follows the description of the implementation of these changes. Finally this works describes the user test conducted in order to asses the utility of the changes performed, as well as gathering insight into potential future changes.

CHAPTER 2

Theory and Methods

In this chapter I will describe theories and methods relevant to the CT system. Moreover I will be describing the CT system itself, as well as other related or similar applications and systems. Additionally, I will also describe the findings gathered during one of the most recent field experiments of the CT application, in order to gather feedback relevant to the later improvement steps.

2.1 Crowdsourcing in Crisis and Disaster Management

In the past years the concept of crowdsourcing has gained increased attention in the CDM field. This was caused by the advent of certain disasters and the spontaneous forming of helping crowds, both on site, and via the Internet, as the following examples will show. In the aftermath of the Haiti earthquake in 2010, one of the issues encountered by the authorities was the consequential change of the landscape and locating areas of emergency [ZGSG10]. In response the Humanitarian OpenStreetMap Team, together with their community of volunteers, mapped roads and points of interest in order to help the local authorities to deploy more reliably. Munro also describes the Mission 4636 initiative born in the aftermath of the same catastrophe [Mun13]. In this initiative, because of the failing of the conventional emergency reporting systems a new emergency SMS code (4636) was established to collect emergency reports and data from the populace. The coordinators of the initiative then relied on over 1000 volunteers online, from the Haitian diaspora, to translate and interpret these messages in order to provide better assistance to those in need. But volunteers are not only found online, also on site volunteers are numerous, although more difficult to make use of. Hofmann et al. describe how the flood in central Germany in 2013 brought a huge number of spontaneous volunteers to help the authorities [HBS14]. Hofmann et al. also explain how these volunteers, since they were self-coordinated via social media, did not have accurate information and therefore often showed up in places that already had too many volunteers, leaving other locations

in need of manpower. Liu describes this as one of the issues spawned from "disaster convergence" [Liu14]. An issue that "occurs when too many people physically converge in the affected region creating liability and personnel management issues for official responders". But to dispel the uncertainty on the utility of crowdsourcing we can look at the description of the crowdsourced water quality control experiment in rural India, provided by Schimak et al. [SHP15]. In this initiative volunteers are given a test kit, with which they can test their water for bacteria. They do not need any particular knowledge to use the test kit, but only to follow basic instructions and report back the results as a description of the colour the water has taken after testing. With this initiative the costly centralized collection of water samples from a wide area and the following tests in a laboratory are circumvented, and the time needed to perform this huge task is greatly reduced. The potential advantage of harnessing this sudden increase in manpower during crisis situations, has incited multiple approaches to the issue. Liu for example felt the need to formulate an extensive framework to formalize crisis crowdsourcing [Liu14]. Her framework is applicable to any crowdsourcing process (during a crisis), in order to bring order to this so far unordered and improvised process.

Other projects instead have a more practical approach. Both Hofmann et al. and Flachberger et al. define an approach that makes use of smartphones as an interface and tool for spontaneous volunteers to receive and carry out tasks with. They believe that in this way the crowd of spontaneous volunteers can be directed efficiently and be put to good use, under the assumption that nowadays most everyone owns a smartphone [HBS14] [FNRC15]. According to Hofmann et al. there are already several projects that support crisis operators via their mobile device. These projects have already produced a variety of applications that attempt to support crisis operators and coordinating volunteers [HBS14]. But all of these applications are used to coordinate the operators themselves or previously registered and trained volunteers. The purpose of their paper instead is to make an efficient use of spontaneous volunteers, which often do not possess any training or specialization. They analyse the requirements that should be fulfilled by such a system (a system making use of spontaneous volunteers). In order to gain these requirements they look both at the requirements set by rescue operators and the requirements set by users. These requirements are divided into categories: (1) Identification: A user must be able to register into a volunteer database in order to be able to provide help during crisis situations. (2) Choice: Each user must have a profile which describes their skills, in order for the rescue operators to be able to chose the best volunteers for a specific emergency. (3) Allocation: Operators must be able to monitor volunteers in the field. (4) Communication: There must be a way for operators and volunteers to communicate with each other. Moreover Hofmann et al. also mention the importance of keeping the privacy of personal volunteer data. They then use these requirements in order to delineate the exact build of their Hands2Help system.

2.2 CrowdTasker System

Next to Hands2Help there is another approach making use of smartphones for crowdtasking (as illustrated by Flachberger et al.): the RE-ACTA project [FNRC15]. The RE-ACTA project is an Austrian national research project that has dedicated itself to improving national resilience in crisis situations by means of Information and Communication Technology (ICT) [SHP15]. The International Federation of Red Cross and Red Crescent Societies (IFRC) defines resilience as follows: "The ability of individuals, communities, organisations, or countries exposed to disasters and crises and underlying vulnerabilities to: anticipate, reduce the impact of, cope with, and recover from the effects of adversity without compromising their long-term prospects." [oRCS12] In order to achieve this the project invested its resources into researching best practices for volunteer work and volunteer work systems. It has analysed these best practices in order to determine the most relevant requirements for an ICT system that supports volunteer work. And finally developed a prototype system for coordinating volunteers. The project was later incorporated under the umbrella of the European Driving Innovation in Crisis Management for European Resilience (DRIVER) project[1], which collates several projects with the same purpose. There it was re-branded as CrowdTasker (CT).

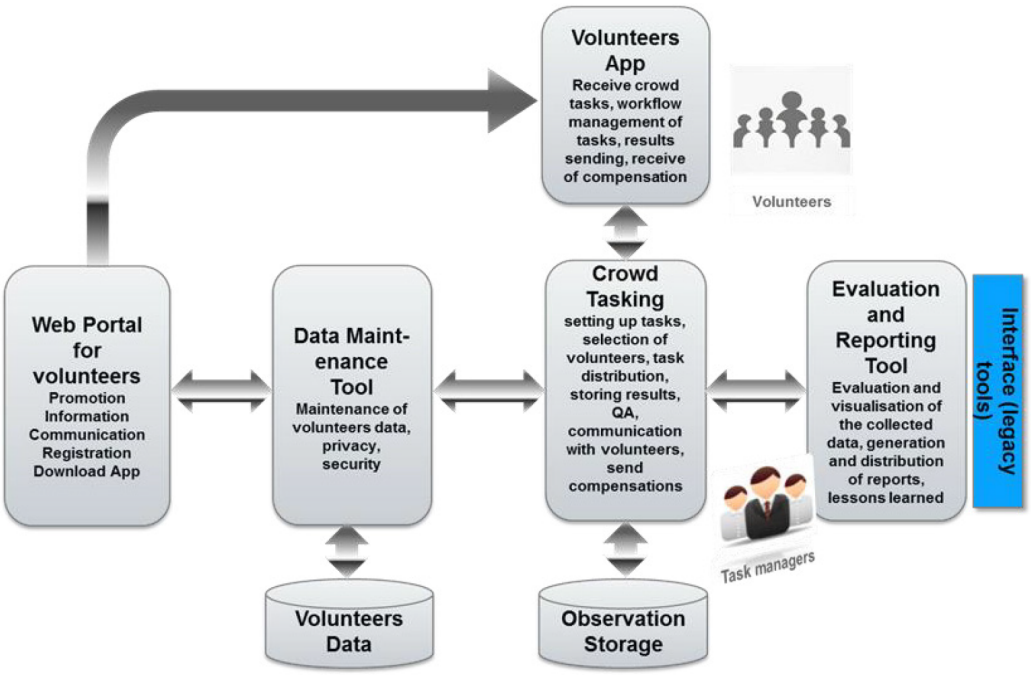


Figure 2.1: Concept of the CrowdTasker volunteer management system from [NNJ+13b]

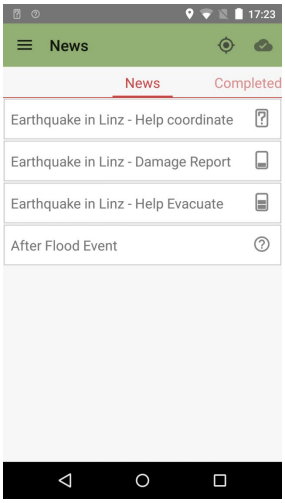
[1] http://driver-project.eu/ as of 21.11.2016

The main concept of CT is to have the crisis management authorities in control of a tool that can send (micro-) tasks to any volunteer that downloads and installs the CT application. The CrowdTasker mobile application (APP) is available on the CT website as well as the Google Play Store, on their smartphone and registers to the CT platform via the app.

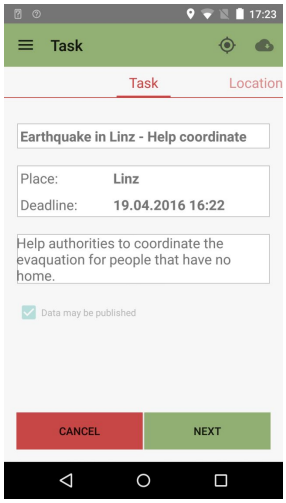
The advantage of applying such a concept (micro-tasks) to crowdtasking is that a crowd of untrained people without expertise can still be of great value in crisis situations by working on such smaller tasks. Even simple information gathering tasks can be of huge help to disaster relief authorities. The CT system is comprised of two main components working together. The APP, which is an Android application running on Android smartphones sporting Android 4.2 or higher, and a web application called the CrowdTasker web-based application (CTA). The CTA serves as a management platform for the CT system and functions as the entry point for operators. Using the CTA they can create activations, tasks, and notices as well as assigning them to the volunteers.

Now we will define these terms, as they are relevant to the APP, and will be featured often in the following paragraphs. All of the following descriptions are taken from the CrowdTasker website[2]. This site will probably be subject to change after this work is complete. Activations are precursors to tasks. They have the purpose to inform volunteers in a defined area and/or with specific skills that their help might be required and check for their availability. Once active, volunteers are enabled to receive tasks pertaining to that activation and may fulfil them. Furthermore tasks are composed of one or more task steps. These tasks steps can be of five different types (that can be seen in Figure 2.2d): Type (1) is the photo task. In this tasks step the user of the APP has to take a picture and can add an optional description text in order to accomplish the task. The motif required to photograph is indicated in the title and description of the photo task. In type (2), the numerical value task step, the user has to respond to the instructions of the task step by responding with a numerical value. Type (3) is the single choice task step. Here the user has a question or task and can respond by selecting one of a series of given answer possibilities. Type (4), the multiple choice task step, is akin to the previous one, but allows for the user to select one or more of the provided options. Finally task step type (5) is the free text task step type. Here users may freely write an answer to the given instruction or question. When assigned a new task the users are first faced with the task detail screen (seen in Figure 2.2b). Here they can see all the details on the task to be accomplished, and decide whether to accept or decline it. The detail screen is in a tabbed view with a map view next to it indicating the area in which the task is to be accomplished (as shown in Figure 2.2c). If accepted, the user is taken to the task steps, which are also packaged in a tabbed view. Here the user can accomplish the task steps and submit the accomplished task. But before a user can receive tasks he/she is faced with an activation first. The activation also has the same layout of detail screen and map as the task has. If the activation is accepted, then the user is enabled to receive the tasks related to that activation. Both tasks and activations received by the user are shown in

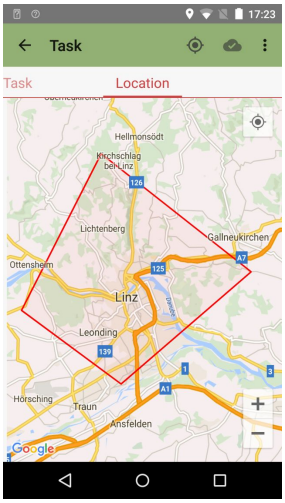
[2]https://crowdtasker.ait.ac.at/ as of 21.11.2016



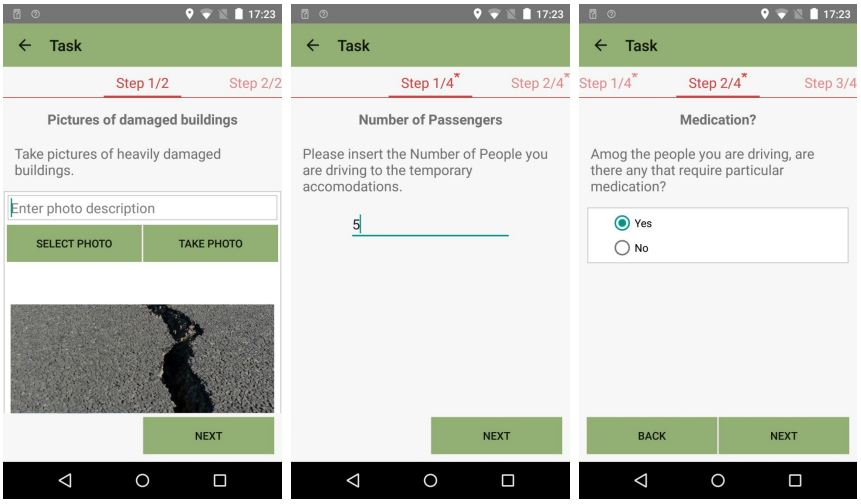
(a) The newsfeed

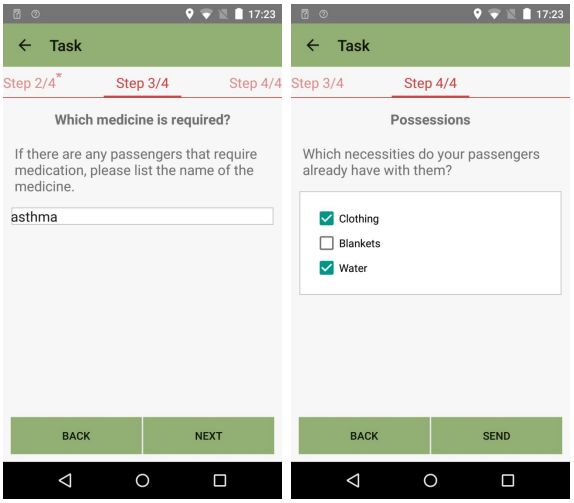


(b) Task detail page



(c) Task map





(d) The five different task steps

Figure 2.2: Screens from the CT mobile application before implementing any changes.

the newsfeed of the APP (Figure 2.2a). Notices instead function as simple informative messages alerting of certain danger zones or other events relevant to any user within a certain perimeter. They also sport their detail page tabbed along with a map of the area relevant to the notice. The Data generated by users solving tasks on the APP is then gathered by the CTA platform and sent to another application for evaluation.

We have seen there is a lot of material on crowdsourcing in general and some projects are trying to manage crowds via their smartphones by issuing micro-tasks to them. But the works describing these projects only concern themselves with the formalization of crowdsourcing and crowdtasking and the technical description of the artefact they want to create. Now that such projects have been technically realised and tested it is time to take the next step: design and usability.

The CrowdTasker Field Experiment Feedback

In order to test the viability of the CT System an experiment was conducted in February 2015 [Con15]. The test was held in and in the surroundings of the civil protection emergency centre of the Austrian Red Cross (ARC) in Inzersdorf. This experiment served to assess the viability of the CT System and all of its functions. Over the course of several hours, twelve test users, taking the roles of nine volunteers and three coordinators, were involved in the experiment in which the volunteers were responding to the emergency-scenario of an earthquake. These testers were all affiliates of the ARC. The three taking over the roles of coordinators were experienced in Community Engagements, whilst the others were mostly comprised of actual volunteers. The coordinators were in charge of three volunteers each and were tasked with assigning tasks to the volunteers, who in turn had to fulfil those tasks. After the experiment each group was subjected to a semi-structured interview in order to gather feedback.

In the following we will look at the feedback given by various test users after the above mentioned experiment. We will note improvement points based on these feedbacks and evaluations, leaving out those points that have already been improved or corrected during the time between the report and the the writing of this document. Based on the aforementioned feedback relating to one of the first experiments of the CT system (APP and CTA) we were able to extract relevant changes to the design of the system, which would improve its usability. According to the users accepting activations should result in either immediate assignment of tasks or in at least showing a notice informing the user that the activation was received and that more information/assignments will follow [Con15]. This would bridge the time of uncertainty the users are left with when waiting for tasks after accepting an activation. A much requested feature according to the test users would be a help for navigating to the locations tasks are supposed to be accomplished in (should there be a specific location for the task). Currently each task comes with a map view with an area relevant to the task drawn onto it. It also features an indicator for the users position, but holds no navigational information. The report also mentions as a critique to the task-step layout that there might be a wish to be able to view all of the input information before sending. This might be a good practice for

computer applications, but it is a bad practice in smartphone applications because of the small display and the already existing feature of navigating back to previous task-steps.

The user interface of CTA is not intuitive and this creates the need for some getting used to the workflow. It would be better to render the experience more intuitive and seamless in order to facilitate the operability of CTA by new operators during a crisis. An unintuitive interaction on the CTA platform pertains to the activation of volunteers when creating an event. On the activation screen, where operators are faced with multiple filters to narrow the number of volunteers to be activated, the expected result of not using any filters would be to simply activate all volunteers. This behaviour is experienced when using most lists with filters. In the CTA however, not using any filter prevents the operator from submitting the activation. Whilst it is good design to maintain commonplace notions and interactions, it is also a pivotal element of design to define constraints in order to prevent users from committing errors involuntarily (such as an ATM machine returning the card before dispensing the money, in order to prevent the user from forgetting the card in the machine). In this case activating all volunteers would simply not make any sense, thus the operator is made to select filters in order to determine the optimal crowd to task. Therefore this perceived error in design will not be mended, as the application is working as intended. When using the CTA an operator could lose track of where in the work flow he/she is operating in. As such it would help to have a navigation aid when using this tool.

2.3 Micro-Tasking and Micro-Learning

Based on the feedback gathered after the field experiment held in February 2015 in collaboration with the ARC, we are able to draw a number of conclusions on the utility of crowdtasking and micro-tasking in crisis situations [Con15]. The reception of the system (APP and CTA) was mostly positive. Most APP users found the application easy to understand and use. In fact in multiple experiments we found that the volunteers sometimes liked to interact with the application for entertainment, particularily with its less serious tasks, which were usually issued before actual testing in order to ensure the correct functioning of the application on different devices. The assignment of micro-tasks via smartphones worked mostly well. Users received the tasks and were able to complete them with ease because of the small effort required to complete it. There were some devices where the application did not work on, but it is expected for prototypes not to be perfectly compatible on all devices. In this stage of the experiment the mobile application used to give the user information on all tasks and notices, even those not assigned to the user. To most users this constituted irrelevant information and was even perceived as bothersome. This reduction or minimization of deployed information is actually to the benefit of the micro tasking and micro learning aspect of the application. Bruck et al. define micro-learning as follows: “Micro-learning [...] combines micro-content delivery with a sequence of micro interactions which enable users to learn without information overload”[BMF12]. This further supports the utility of reducing the information overhead. The APP in its current form (with its unrelated content removed) provides a strong

micro-learning aspect along with its micro-tasking functionality. Its micro-tasks have a strong micro-learning effect as the use of the application is easy and the instructions should be direct and explicit. As such a volunteer can easily learn to perform and perform simple tasks via the APP. Moreover this allows us to use this micro-learning aspect in order to teach the use of the APP through the accomplishing of tasks. It can also be easily used to issue special training tasks whose aim it is to train the users in the utilization of the APP. This would serve to keep the users trained at using the APP and consequently prevents the eventual hurdle of them not being able to solve a task because they forgot certain functionalities of the application. In order to even further improve the user's ability to learn, train and solve tasks through the application we need to further refine the interface and workflow of the application in order to render it as intuitive as possible, removing any hurdles from the utilization of the APP. It should feel and be as seamless as possible, without alienating any demographic. On the operators' side of things the system was perceived as very useful for quickly gathering a high amount of information. The assignment of micro-tasks allows for the users to be able to solve tasks for low effort and the operators to gain a high amount of data to work with because of the number of volunteers fulfilling the tasks. Operators also appreciate the hierarchical situation the system creates. They can craft specific tasks with instructions and boundaries in which the users may act and solve the tasks, thus gaining a consistent high amount of quantitative data. This solves an issue that is often found when crisis management operators try to gather data from self-organized groups of volunteers. In these cases the form of the data varies from user to user as they themselves decide what, when, and how to post information. This results in the crisis operators having to put in a lot of manpower going through the unordered information just to determine what might be useful. This is also why even though some test users of the application have expressed a wish for the option to be able to compose and send a message of their own initiative to the crisis management operators it will not be implemented as a feature. Because in this case it would again require a lot of manpower just to sort this information out, rather than making use of software to automatically represent the quantitative data gathered through the basic functionality of the APP.

CHAPTER 3

Improving the Usability of the CrowdTasker Application

In this chapter I describe the adaptations I have implemented on the CT System. I first describe the preliminary design process, in which I determined what changes might improve the CT mobile application, based on both, the feedback from previous tests of the application and my own judgement. Then I will summarize the implementation process and the features that were implemented or changed. Finally, I provide an overview of the user test done in order to evaluate the application.

3.1 Designing Improvements

After attentive use of the application, I decided to focus on the following points for improvement: The flow of having separate screens within the APP for accepting a task, for viewing its details after accepting, and for the subsequent task-steps (accessible only through the task-detail screen) feels a bit roundabout and unnecessary. As such I would propose to reduce everything to two activities. One for accepting the task and one for task details and task steps, paged in the same view. The transition should be seamless giving the user the impression of a single process. To achieve this the basic layout of the different task views will be changed. Accepting a task will move the user over to a paged view of the task steps, which also contains a page for the task details. As such the user will not have to move through the task-detail view every time a task is selected from the news list, since details and steps are located in the same view. This change can be seen in Figure 3.1. Another relevant change for this view is the repositioning of the map which shows the polygon relevant to the task. Having the map in a paged view, as it is now, creates a conflicting interaction within the application; even more so after the above mentioned change. Namely swiping the screen navigates to other pages, but swiping on the map navigates the map, forcing the user to make use of the back button in the

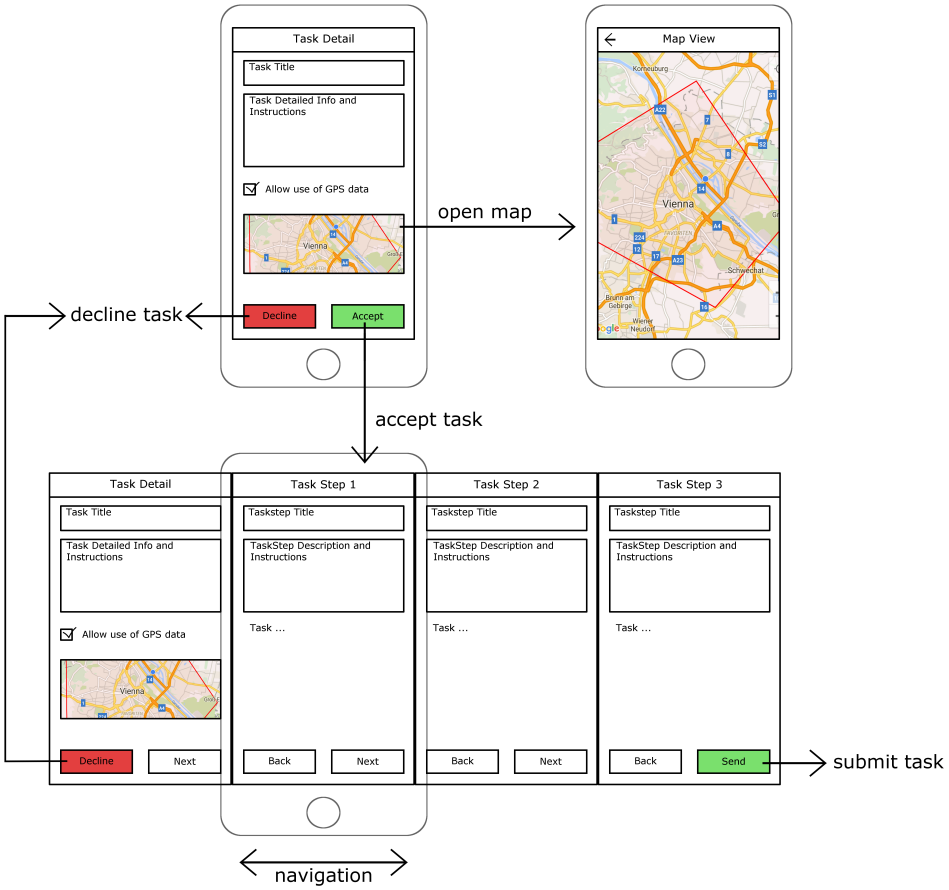


Figure 3.1: Mockup of the concept for the new task layout.

action bar or tapping on the pager heading, after possibly moving the map off centre, in order to go back to the previous view. To prevent this and spare the calculation time for the map page . We propose to move the map onto the task-detail page in form of a miniature of the map. This miniature can then be tapped to be expanded into its own view. In order to maintain consistency across the APP this will not only be used for the task detail view, but also the event detail view and the notice detail view. This new layout can also be seen in Figure 3.1.

A useful addition to the application would be to expand the functionality of its action bar icons. This bar is meant for icons with which to interact, but is mostly used just to show the status of some features. I would posit to keep these icons and their status indicator function and expand their functionality by making them clickable. Thus they would open whichever settings page is relevant to the feature they depict the status of. This is already implemented for the Notice alert icon, which links to the notice list. The Global Positioning System (GPS) status icon should then link to the GPS settings of the

phone and the mobile data status icon should link to the mobile data enabling page in the phones settings.

Figure 3.2: New icons for representing the progress of tasks.

A test user once mentioned that she mistook the task status icons for battery charge icons. Therefore we would like to replace the old icons to improve readability. The new icons can be seen in Figure 3.2. The structure of activations and tasks whilst central to the designed data structure, is not an intuitive one to the regular user. I designed a solution making use of how the events and tasks are depicted in order for the user to gain an immediate understanding of the structure, without having to perform a major restructuring of the data structure. The idea is to group tasks under the events they belong to, much like a folder navigation view on a computer. An example can be found in Figure 3.3.

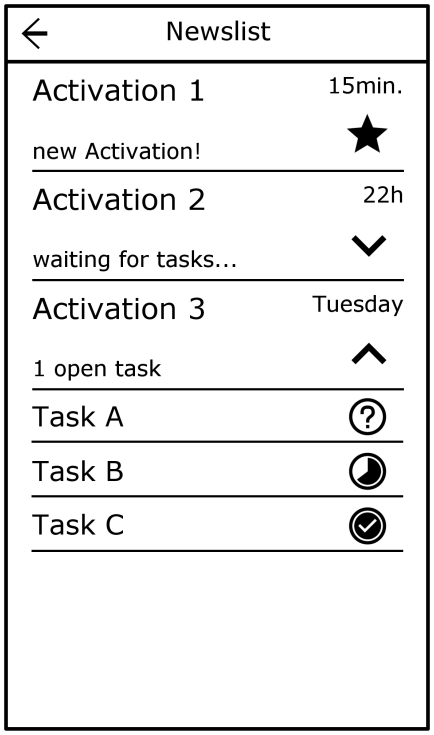


Figure 3.3: Mockup of the newslist concept.

It is good practice to show the user a brief tutorial on a fresh installation of the APP. This has the advantage that users do not need to be introduced to the operation of the APP by an instructor, nor have to consult an instruction online since they can learn through the APP itself. Usually APP tutorials have the form of an overlay of information describing the various elements seen on the screen. But given our strong micro-learning tool it lends itself to utilize its event and task system to teach the user how to operate the APP. As such I plan to have a permanent tutorial event with tutorial tasks, which explain in the description how the workflow works. It will be automatically assigned to any new account logging into CT. Moreover it provides the foundation for a monthly (or any time interval) exercise task

which aims at keeping users exercised with the use of the APP even when no crises occur. The accomplished tutorial will be moved into the history tab after being solved, where it can be reviewed if users need to, and if they wish not to make use of the tutorial they can decline this event as they would with any.

Whilst Google material design instructs us not to use buttons for horizontal navigation, especially when the paged view of multiple views is already implemented we will not remove this additional form of navigation. The reason behind it is simply that not every user recognizes the possibility to navigate task-steps by swiping laterally. Especially in the older demographic which is less tech savvy this is an issue. Therefore in order not to exclude anyone from an efficient use of the application we decided to keep the double navigation possibilities.

The CTA tool has some minor ease of use issues. Some elements are not very intuitive such as the assigning and signing off of tasks. The empty starting page is also a bit confusing to the layman. Moreover if purposefully done so, it is possible (although it would obviously serve no purpose) to create paradoxical tasks. All these factors define unintuitive interactions. But in contrast to the APP the CTA does not have to be intuitive. The CTA tool is designed as a tool for trained operators, and we can assume that they will be instructed on the use of the tool. Thus there is no need for the same ease of access as for an application designed for any spontaneous user.

Planned Changes

Based on the feedback gathered from users during the Experiment mentioned in Section 2.2, as well as our own analysis we can plan the most relevant changes that should be applied to the APP and which ones we should focus our efforts on. We divide these changes into must-have changes, nice-to-have changes and won't-have changes. Must-Have changes are major changes that affect the operation and workflow of the APP. These are pivotal to our work and must be implemented in order to achieve a perceived change in the product. Nice-to-have changes instead mostly constitute improvements in the presentation of information and/or aesthetic and require relatively low effort to implement, but provide great improvements to the application from a user perspective. Won't-have changes instead represent changes that produce less utility and are not necessary, or changes that require too great an effort to implement for the utility they provide. The planned changes, as well as the estimated effort for implementing them, can be viewed in Table 3.1.

Priority	Change	Estimated Effort
Must-have	Task layout	Medium
	Map access	Low
	Newslist reform	Great
Nice-to-have	Extend functionality of action bar icons	Medium
	New task status icons	Low
	In-APP tutorial	Low
Won't-have	Navigation assistance	

Table 3.1: List of changes to be applied to the APP

3.2 Implementing Improvements

Based on the previous work on the CT APP, we posit that the previous version of the code is too convoluted and inefficient to be further expanded. Due to this we decided to rebuild the APP partly from the ground up, taking over certain elements of the previous code that do not conflict with the new design and changes. The files taken over from the previous version of the APP are credited properly in the code.

3.2.1 Data Management

The first step was to create a service running in the Background of the phone. This service is in charge of implementing and running a LiveQuery. The LiveQuery is basically a form of query in the Couchbase Database Service, that not only queries the existing data but also queries data that has been added or changed. In other words it allows the program to gain live updates on changes in the local dataset. This is useful because new tasks assigned to the user are pushed to his/her dataset. So this system allows for the APP to receive and process new tasks. The service managing all the changes also conducts a series of lists in order to keep track of all new and active tasks and all active notices. These lists are kept in the SharedPreferences of the APP. The choice of using SharedPreferences over other systems for keeping track of the lists of active tasks was made because of its flexible and quick use. Moreover the data saved in SharedPreferences persists across sessions, which means that the APP does not have to compute the lists again after restarting, which results in a shorter loading time of the data. The Android guidelines discourage the use of SharedPreferences for large datasets, as it puts a strain on the entire Application. The choice in this case was made in favour of this system under the presumption that the lists will not grow to a substantial size, since only active tasks are listed, and there will not be many tasks that are active simultaneously. This way of storing the lists might be subject to change in the future, depending on the future requirements of the CT system.

3.2.2 Layout and Usability

Notifications in Android are "[...] a message you can display to the user outside of your application's normal UI."[not16] They are used by the APP in order to inform the user about new tasks and new notices in his/her proximity. Drawing these notifications is taken care of by the NotificationMessageManager class rather than a background service. Whenever the dataset changes in a way that would change the form of the notifications, either through direct changes on the dataset as dictated by the server or changes done by the user, this class is called upon to change the notification content. The newslist has been structured as devised in the design phase. The list for accomplished tasks instead has been phased out, as it did not prove much useful to the users. The way tasks are displayed and the workflow of accepting and displaying tasks has been adapted to the planned design. Additionally there have been some changes to the way task information is conveyed in the task-detail screen. The description field has been removed since users reportedly did not read the description. Instead the task-detail screen now shows a list of all task-steps with an identifying icon for the kind of task-steps they belong to, as can be seen in Figure 3.4. With this the user will have a quick overview of what the task requires of him/her before accepting or declining. These icons have also been incorporated next to the task-step title to keep the nomenclature of task-steps consistent. In order to keep the look of the APP consistent, the listings for "time" and "place" have been replaced by icons. This is to avoid the conflicting look of having text for general information entries and icons for the task-steps list entries. Therefore now all entries are identified by icons. To further adapt the consistency of the APP the layouts for activations and notices, which also have "time" and "place" entries, plus some additional values, have also all been converted to icon-identified entries. In this way the look of the APP is maintained across the entire application, since these screens are similar. The way the map is incorporated in this screen has also been adapted as described in Section 3.1.

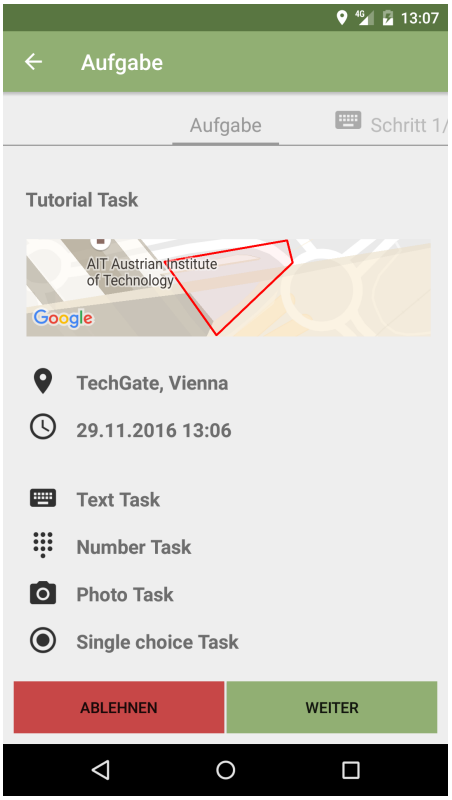


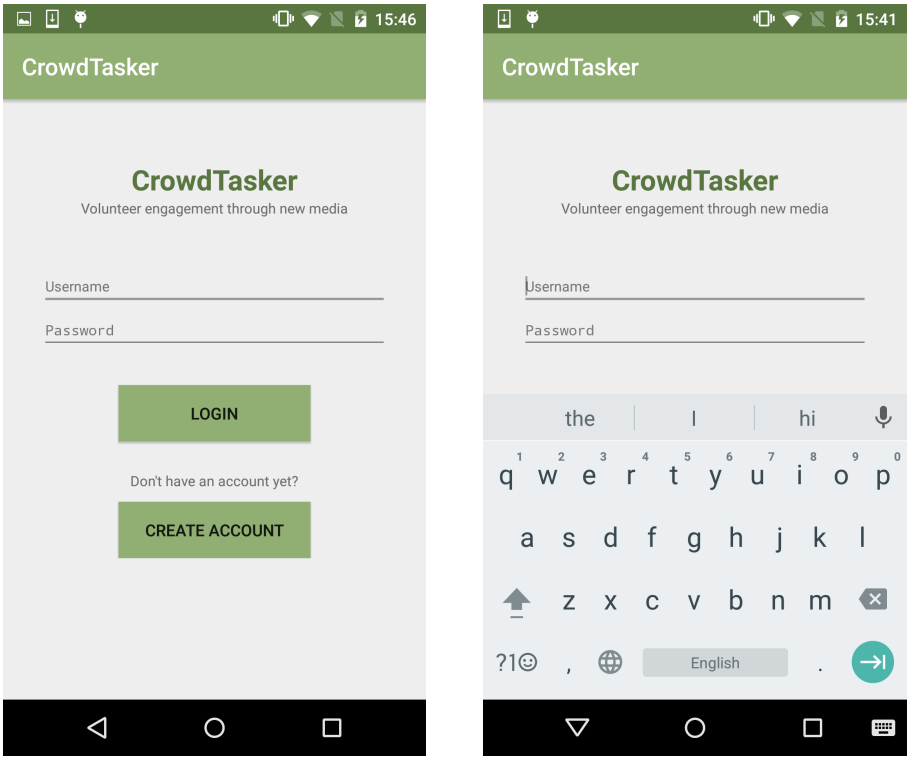
Figure 3.4: Screenshot of the new task detail view.

3.3 Evaluation

In order to assess the changes done to the CT application, the APP was tested with eight potential users. Four of these test users were affiliated with the ARC. Their input is particularly useful as it provides the point of view of personnel regularly involved in crisis situations and the management thereof. Moreover the ARC counts towards the potential operators of the CTA application, once it is completed and operational. Additionally two of the ARC test users had already been confronted with previous iterations of the app, which might provide useful insight on what has improved what has worsened. The remaining four testers do not belong to, or volunteer at, any rescue organization and have not undergone any crisis management related training. They were chosen to provide the point of view of potential regular users from the populace, that would spontaneously register as volunteers through the APP.

Despite the strong call for outdoors testing that the APP would instigate the choice was made in favour of an indoors testing environment. Motive for this decision was the nature of what was being tested. Contrarily to the previous CT tests that were conducted in the past (see Section 2.2), this test did not focus on determining whether the features work properly in the field. This test rather inquires specifically on the usability of the APP interface, assuming that the application works correctly. Therefore there was no specific gain from performing the test outside. Conversely there is an advantage to an indoor test, namely it facilitates the observing of the users interacting with the application. This is of importance in order to observe and capture the genuine reaction of the test users being confronted with the application for the first time. Any difficulties they encountered, any unexpected behaviour or behaviour contrary to the intended design was noted. In the case of the ARC personnel the test was conducted in the offices of the Austrian Disaster Relief Center. They performed the test together in the same room, at the same time. The remaining test subjects were tested in the offices of the Austrian Institute of Technology (AIT). Two of them also performed the test together, whilst the remaining two were tested individually. The only reason behind this division was purely because of the time availability of the test users. The test users were given access to the application either on their personal android smartphone or were provided with a smartphone for the duration of the test. A series of tasks were created specifically for the test. The tasks created aimed at having the users experience all of the core features and modified aspects of the application. The area of activation of these tasks was set on top of the test locations, in order to have the test users receive these tasks on their smartphone as if in actual use.

Immediately after the users performed the test and accomplished the tasks assigned to them via the APP, with their memory still fresh, they were interviewed individually on their impressions of the application. The guideline that was prepared for the interview was in the form of a structured interview. Nevertheless whenever users went off on a tangent they were not brought back on topic, as such tangents can often provide unexpected insight. Also there was no hesitation in improvising questions if they seemed opportune or potentially fruitful. One interview was held in English and the remaining seven were held in German. Therefore the guideline was written both, in English and



(a) Login screen. (b) Login screen covered by keyboard.

Figure 3.5: Login screen of the CT mobile application.

German for these interviews. The English and German interview guidelines can be found in the appendix. As with the test the principal aim of the interview was to determine the usability of the APP. For this reason most of the questions focus on the difficulty and feel of utilizing the APP. What the users imagine could be improved upon and what features they feel they are missing.

3.3.1 Observations

In the following a description is given of all the design-relevant observations noted during the experiment. Any observed, purely technical, bugs and system errors will not be mentioned here as they do not pertain to the research question, but are noted elsewhere for further development and improvement of the APP. Any errors in design instead are most relevant and will be discussed.

A severe, and easily avoidable design issue pertains to the login screen (As seen in Figure 3.5a). When opened the application shows the login screen, with the virtual keyboard deployed in order to allow the user to type in the username immediately (seen in Figure 3.5b). This however created the issue that the virtual keyboard hid the registration button. Most users tried to input a username and password, hit the login button and

expected to have a followup registration offer, while others just asked for the login data. All test users were affected by this with the exception of one, who used a tablet instead of a smartphone for the test, which did not hide the registration button because of its greater screen size. Moreover after finding the register button, one of the users tried to input their desired username and password before hitting the register button. The assumption of this user was that the application would carry over the input data, since the register button had the same aesthetic as the login button. Therefore she assumed both must interact with the username and password text field in a similar manner. The simplest solution for this problem would be in first line to keep the virtual keyboard tucked away when opening the login screen, which does not impair the usability of the application, since the login screen should rarely be visited in the intended use of the APP. As for the issue with the registration button the input data could be carried over onto the registration screen, or alternatively the visual of the register button could be modified in a way that would intuitively suggest that a different process is initiated upon pressing. Despite everyone having an issue at this step none of the test users reported this as an issue during the following interview.

Another difficulty with the APP that most users experienced was with the long waiting time for the first task to be displayed on the application. Because of the current technical setup it can take up to three minutes for the first task to be assigned to the device. While the empty newslist states that "There are currently no entries to show. Once new entries become available, you will see them listed here." the novel users still expect to be able to interact with the newly installed application right away, as they would with any APP on their smartphone, rather than putting it away and wait for tasks to be assigned. This is made even worse by the fact that during the test their directive is to accomplish the tasks assigned by the application. Thus there needs to be a clearer statement on the empty newsfeed, inviting users to set aside the application until notified by the application about a new task. Alternatively, or additionally, the tutorial task could be programmed in a way that it would appear on the newsfeed right after the first login. This would allow the user to be occupied until the first tasks arrive or be informed by the tutorial itself on how the waiting time works, since there probably will not be many tasks continuously available in a real life scenario.

Another fallacy observed in the newsfeed pertains the tutorial task. The tutorial activation and task were built using the same tool used for building any activation and task within the CT system. Therefore they underlie the same rules. Being the oldest of the activations it appeared at the bottom of the newslist. Most users were observed naturally going through the tasklist from top to bottom, thus accomplishing the tutorial task last. This could have been easily avoided by simply placing the tutorial on top of the list.

Another observation was that one of the test users was not aware of the navigation drawer during most of the test until it was pointed out to them. This is probably just caused by user utilizing an iPhone privately, therefore not being used to the navigation pattern of Android phones. In fact the navigation drawer layout is almost exclusive to Android, whilst Apple phones make use of a different navigation pattern.

Two users utilized their private smartphone for the test. Both of them did not have GPS location service turned on on their phone by default. Instead, as they explained, they would just turn it on whenever an application called for it, since the GPS location service has the downside of draining the phone battery faster. This is probably one of the most common ways smartphone users handle their phone and should be taken into consideration for the future design of the CT APP. For this test this was relevant since these users did not think of enabling GPS location service, because neither me, nor the application instructed them to. Therefore they did not receive any tasks until they inquired if they should activate it. For the sake of further improving the APP this has a double-pronged implication. Currently the application makes use of both network location service and GPS location service. Whilst the application is contempt with the position provided by network positioning (which is less precise) for assigning tasks and sending out notices, it requires GPS location for submitting tasks. Therefore, in order to ease the drain on the battery, a shift towards network positioning for all requirements of the APP might be appropriate, using GPS only when available. It would also be wise to implement a specific notification apt to inform the user that some form of location service is needed for the application to work, and should always be on, when the APP is running in the background. There is no foreseeable way for this application to not make use of any location service and still function as intended. This is such an important topic that one other user, utilizing a provided smartphone with previously enabled GPS positioning, has also thought of and mentioned it.

Two of the users had a tendency to ignore any description text. That includes activation description and task step description. After skipping, the text still remains readily available to be consulted again, but I felt it was necessary to remark this behaviour as it opens the question for alternative ways to convey the description, that would incite more attention and interest.

The change with the map view did not seem to carry any relevance during the test. Only two users ever entered the dedicated map view. This could be because it is not intuitive enough or simply because there was no necessity to look at the map during the in office test. Therefore this change, whilst surely prettier, could neither be sanctioned nor refuted by the experiment. One of the users that did enter the map view noted during the test that it is missing a “back” navigation button in the action bar as it is found in the other views of the application. This was of course a forgotten implementation point, that will be rectified.

Another feature that went undiscovered was the possibility of viewing the activation details again by long pressing the already accepted activation. This is no surprise as the feature was relatively hidden, and should be mentioned in a tutorial in the future.

A remark by a user during the test was regarding the number task type. Namely that the input field would block inserting a comma, and rather allow a dot for indicating the decimal places. This is a correct functionality as it avoids using different formats for writing numbers, but it is a wrong number format for German spelling of numbers. This can be solved by implementing a keyboard input dependent on the language setting of

the smartphone, then converting the input into the standard format used by the program for representing numbers.

The perceived disposition of the users towards the application was mostly positive. The two youngest of the testers treated the application test almost like a game and had fun accomplishing the tasks. Also one other user remarked the application test and the application as being fun. Otherwise most test users had a more dutiful approach to the application test.

3.3.2 Interviews

Here the results of the interviews will be summarized and sorted according to their topic. When asked to give a general impression of the application the feedback was mostly positive. All users remarked that the application is easy to use and serves its purpose. One user seemed thoroughly enthusiastic about the application, whilst two seemed to be more on the disinterested side.

The newslist being the pivotal screen of the application was the most important of all the applications aspects whose effectiveness and design had to be ascertained. When asked to judge the structure of the newslist, five out of the eight test users commented that it is well segmented. A valid point made by one of these users, belonging to the ARC was regarding the relevance of the used newslist structure for the average user. He posited that the current structuring of activations and tasks makes a lot of sense to those involved in the project as it reflects the underlying structure of data, but it is not really of much importance to the average user on the street. The remaining three users instead shared the sentiment that the newslist structure was confusing at first and then became more understandable the more they utilized the application. One of them mentioned she had difficulty to navigate the tasks and would feel more comfortable if pressing on an activation would simply open a new view with the list of tasks, rather than having both on the same view in an expandable list.

There was an issue all test users had difficulties with at the start. That was the long waiting time for the first tasks to be shown on the screen, already discussed in Subsection 3.3.1. This long waiting time spent expecting to get new tasks, without knowing that it is the normal procedure of the application made them uneasy during the wait as they expected there to be a mistake, and they had to be reassured it would be functioning normally during the experiment. therefore some users wished for an additional indication by the APP indicating the correct functioning thereof. As for the sequence of the tasks, three users voiced a concern. Namely that the tutorial task, apt at teaching the users the way to operate the APP, was left unnoticed for some time because of its bottom placement. Therefore the test users wished for a topmost placement of the tutorial task. One user, belonging to the ARC, even noted that he would wish for a priority feature. A priority feature that would allow the operator to set the priority of the task, which then dictates the order in which it is shown to the user in the application newsfeed. One additional feature one user wished for after accomplishing all of the tasks

and being faced with empty activations, was to be informed that all currently available tasks were done. Otherwise she found herself in the same situation as with the starting screen where the activations are empty and sport the "waiting for tasks" description. Which caused her to expect more tasks to be incoming presently.

When asked to give an impression of the tutorial task five users reported that they liked it and found it useful, whilst the remaining three did not find it useful. The next important layout change was pertaining the task layout. One of the users did not like the way task steps are presented at all and said that they are a bother to be accomplished if the user wants to just accomplish a single step further ahead in the sequence. Thus the user wished for a function where the tasksteps list at the beginning of the task, in the task detail tab, could be used to navigate to the listed steps by selecting them.

Two test users also felt that the icons used to classify the task steps by type of task to be accomplished, should be traded in for icons apt to characterize the nature of the task steps. For example if a task asks for the user to check if their neighbours are in good health, the icon should be in form of a house, referring to the nature of the request, rather than the icon of a checkbox, referencing the fact that the task is accomplished by submitting a multiple choice task step.

Two test users had an issue specifically with the photo task step. The current form of this layout is as follows: first description input field on top, followed by the photograph, followed by the buttons for taking and choosing a photograph, and lastly the buttons for navigating the task steps. Both users were of the opinion that the order of the description and the photograph should be reversed in order to be able to peruse the input description text before sending. Additionally one remarked that the "take a photo" and "select a photo" buttons should be removed after choosing a photo, since they are not needed anymore. Two different users instead called for an additional button for removing the chosen photograph without having to replace it with another, in form of an X button in the corner of the picture for example.

A useful comment by one user regarding the depiction of tasks in the newslist was, that he felt unsure about his progress in accomplishing tasks, since they would vanish from the newslist after being accomplished. He suggested having the latest accomplished tasks still in the newslist for some amount of time, to prevent confusion. In fact multiple users were confused about accomplished tasks as they felt like the application did not give clear feedback upon accomplishing a task. Some even explicitly claimed the need to at least give a "thank you" to users that have accomplished a task, in order to have them know that the task has been accomplished. It is difficult to evaluate this information given that there is such a pop-up upon task completion already. It seems the pop-up does not convey its message clearly enough, therefore it must be reworked in some way.

When asked about the extent of their familiarity with the application features all users claimed to be familiar with all the important features. The important features mentioned refers to the newslist, activation, tasks and all the different task steps. Most users did not feel the need to explore the APP further, as it was not required of them by the test nor by

the application during the test. Only one user, who was particularly enthusiastic about the application, explored all the features and properties of the application. Still all users reported to be very proficient at operating the core functionalities of the application. The fact that the less prominent features were not explored means either that users should be introduced to them, in a dedicated tutorial task for example, or that the overall appeal of the application should be heightened, in order to induce the users to want to explore all of the applications functionalities.

When asked if they would use the APP themselves in their everyday life, six out of eight test users said yes, as they found the application serves a good cause and can be useful to help in crisis situations. Two users however said that they would not make use of the application and gave the following reason for it. One of the users had a concern with the use of GPS location service. The concern being that it would drastically increase the battery consumption of the smartphone, to keep that feature of the phone activated. Therefore in order to convince this user to utilize the application, the application would have to be refactored to make use of features that generate less burden on the phone battery. The other user contrary to using the application had a very interesting motivation for it. She felt like having the APP installed on her device meant, that whenever there would be a request for her help she would feel obligated to accomplish that task. She would feel obligated to accomplish that task regardless of whether she has time and/or motivation for it, because of the social pressure to help in a time of need, and eventual negative sentiment when refusing to help.

Finally the test users were asked about what features they would wish to see added to the APP in order to improve it. Two users had a desire to get some form of feedback to know how the submitted data was used, and what was achieved with it, in order to have confirmation for their efforts. The simplest way to implement this would be to maintain a blog featuring articles describing the latest operations in crisis management, in which the submissions through the CT APP have helped operators. Keeping this direction of features, two other users mentioned that there would be a need for some level of reward for the users, starting with a “thank you.” One of these users further elaborated, saying the application needs to be more interactive. More precisely the APP should provide the possibility for the user to not just accomplish tasks but also be able to show off his/her accomplishments. For example by showing a list of accomplished tasks and even getting rewarded points for accomplishing tasks and being assigned virtual medals based on those points. This would then motivate the users to keep utilizing the application for longer, as they are rewarded for doing so. Another user instead had another approach to involving users into the use of the APP: He wished for regular training tasks, once a year for example, in order to keep the users up to date and trained at using the application. Two users wished for a chat feature within the application. One of them proposed a chat for people in each others vicinity to communicate, in order for volunteers to better coordinate among themselves. The other user instead, belonging to the ARC wished for a chat which can only be opened by an operator, as a direct line from operator to user. This would enable operators to make special requests based on the data submitted

by certain users. He also voiced a wish to have the possibility to call the user, over internet or mobile network depending on the current availability. Another proposed feature was to include an emergency button, so that the user can call for help from within the application. One of the users wished for a more detailed profile page, where more skills can be selected. One other user expanded on the same concept but in a rather interesting way. He proposed to implement the possibility of indicating not only what the personal skillset is, but also being able to inform on the willingness of effort. More precisely: the user should be able to indicate a priori, for what type of tasks he or she is willing to assist the operators. For example whether they are willing to perform tasks that require a lot of physical effort or just simple tasks that are to be accomplished from home. The more enthusiastic user of the application suggested that there could be a lot more different task steps that could be useful. He suggested the uploading of GPS coordinates as an example for such additional task steps.

CHAPTER 4

Conclusion and Future Work

In the introduction of this work (Chapter 1) we saw how crowdsourcing enables anyone with an Internet connection to be a viable micro-task worker. The CT system makes use of this concept, and utilizing the nowadays ubiquitous smartphones as an entry point for volunteers, provides a strong tool for coordinating and tasking even untrained volunteers. This was also confirmed in the experiment described in Section 3.3, since both, users of the ARC and average citizens, were able to accomplish tasks using the CT application. This is supported by the feedback gathered from the previous CT field test (Section 2.2), in which the APP was received mostly positively. The same holds for the feedback gathered in the evaluation of our improved version of the application, indicating that the changes performed did not result in a downgrade of the application.

With the actuated changes to the newslist, we managed to reduce the confusion some users had with understanding the relation between activations and tasks. But it could not be removed entirely as the new structure brings forth its own understanding hurdle, albeit easier to comprehend after some use. One of the users criticised this structure as it held no meaning for users. But entirely removing the activations brings forth its own issues. it would create a more simple user experience and users would probably feel more comfortable with the flexibility of not having to commit to an activation in order to see its subsequent tasks, deciding to join from task to task. But on the other hand this approach, which does make the application easier and more comfortable to use, is a loss of control on the operators side of the system. The structure was designed this way in order to allow the rescue operators to efficiently manage spontaneous volunteers. And the activation is an important step in this process as it serves to filter users and keep track of how many users might be active accomplishing those tasks. As described in Section 2.2, activations are precursors to tasks, and enable the subsequent assignment of tasks to those users that are interested in helping during a specific event. If the tasks were to be assigned directly there would be no way for the operators to obtain an overview of how many volunteers are moving in a potential crisis operation area. And maintaining overview and

control of personnel is at the very core of any rescue organization, as they are all built upon a chain of command structure. The only case in which removing activations would come back into consideration would be if users start using them in ways that break their intended design. To name an example: if we detect a tendency by users to just accept activations in order to look at the follow-up tasks, without subsequent accomplishing of tasks. This would mean that the number of accepted activations does not reflect the number of active users anymore, which might result in some issues that would require reconsidering the current form of activations. Another issue with activations was already found in Section 2.2 and concerns the long waiting time for tasks to be shown on the smartphone, after accepting a task. This issue has been reconfirmed in our user test and will surely be one of the future improvement points to be implemented.

In Section 2.3 we noticed that the assignment of micro-tasks could also be used for micro-learning purposes, e.g. through the use of specialized micro-tasks. The implemented tutorial makes use of this property of the application and teaches the use of the APP by using the tasking system provided. This feature was mostly perceived as useful. Moreover this approach can be expanded in the future to inform the users on more topics, as well as creating a training regimen for the users, so that they would not forget about any features.

Another issue might be the navigation drawer. We assumed from the start that being part of standard Android navigation it would not cause any issues in being used, but given the relatively low number of items in the drawer a future change with the APP might include changing the way of navigating between the main screens. Another important technical issue to be tackled in the future is the high battery consumption of the application. We should aim to make the application more battery efficient, so as to enable users to keep it always active in the background without worries. A feature that was requested by some users during the field test described in Section 2.2, was a possibility for the operators and the users to communicate through the APP. This feature is still missing and still being requested by some users.

An important unexpected element to the application is its fun factor during testing. Both the feedback from the old field test and the new user test, report that some users had fun accomplishing the tasks. Given this trend it would make sense to expand on it by including the concept of gamification into the application. Gamification would render the APP more interactive and cultivate a feeling of pride in helping through the CT system. I believe this would greatly help in finding regularly active users, especially among the younger users.

In conclusion it can be asserted that the changes done to the application were mostly positive. They improved the usability of the application, while keeping the main functionalities. Apart from further technical adjustments of the program to weed out any errors, there will be a need for further development in the design, in order to further improve the workflow and the representation of information. To achieve this the feedback delivered by the test users, described in this work, is a solid start. Both, as a reference for refining the existing features and as an inspiration for future ones.

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Acronyms

AIT Austrian Institute of Technology. 17

APP CrowdTasker mobile application. 6, 8–23, 25, 26

ARC Austrian Red Cross. 8, 9, 17, 21, 23, 25

CDM Crisis and Disaster Management. 1–3

CT CrowdTasker. 2, 3, 5–8, 11, 13, 15, 17–20, 23, 25, 26

CTA CrowdTasker web-based application. 6, 8, 9, 14, 17

DRIVER Driving Innovation in Crisis Management for European Resilience. 5

GPS Global Positioning System. 12, 20, 23, 24

ICT Information and Communication Technology. 5

IFRC International Federation of Red Cross and Red Crescent Societies. 5

RE-ACTA Resilience Enhancement by Advanced Communication for Team Austria. 2, 5

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Appendix: Interview English

Introduction (before test)

- Short Introduction to the project:
  - Name: CrowdTasker
  - Aim: Coordinating volunteers through the app in crisis situations
  - Utility was already tested, focus of this test is the usability
- How do you contribute to the project and application by participating
- After testing the functionalities of the app I will hold a short interview
- Do you have any more questions before we begin?
- Please use the app now, test the workflow, solve tasks that speak to you.

CrowdTasker after refactoring Interview

- Thank you for participating
- Now I have to hold a short interview in order to later be able to evaluate all the feedback. It will not take more than 15 minutes.
- Is it OK to record the interview? (Data will not be published and only be used for analysis)
- General Information: Age? Education? Knowledge in Crisis and Disaster Management or First Aid?
- How would you describe the usability of the app?
  - Bad, useful, good, . . . ?
  - Is the structure of activations and tasks understandable?
  - Are there elements/interactions that bothered you
  - Are there certain interactions that you would improve?
- Do you think you have an overview of all the features of the app? Can you name them?
- What do you dislike about the app (be brutal)?
- Would you use this app in ordert o help in crisis situations?
  - If no: because oft he app?
  - If yes: Have you already acted as a volunteer?
- What features would you wish tob e integrated?
  - If he/she would not use the app (see above): What should the app be able to do in order for you to use it?
- Any Remarks?

Appendix: Interview German

Introduction (before test)

- Kurze Einführung zum Projekt:
  - Name: CrowdTasker
  - Ziel: Freiwillige in Krisensituationen über die App mit Aufgaben zu beauftragen
  - Nutzen wurde schon getestet, Fokus von diesem Test: Bedienbarkeit
- Was tragt ihr durch eure Teilnahme zur Entwicklung der App bei bzw. wie helft Ihr mir/uns damit
- Nachdem ihr die Funktionalitäten der App getestet habt werde ich noch ein kleines Interview mit jedem von euch/in einer Gruppe halten.
- Habt Ihr noch Fragen, bevor wir beginnen?
- Optional: Ist es für euch in Ordnung, wenn ich eine Video-Aufzeichnung von eurer Interaktion mit der App anfertige?
- Bitte nun die App verwenden, den Workflow testen, Aufgaben lösen die dich/euch ansprechen

CrowdTasker after refactoring Interview

- Danke für die Teilnahme
- Jetzt muss ich für die Auswertung noch ein kurzes Interview halten. Es wird aber nicht länger als 15 Minuten dauern.
- Ist es OK eine Tonaufzeichnung zu machen? (Darauf hinweisen, dass Daten nicht veröffentlicht werden und nur dir zur späteren Analyse dienen)
- Allgemeine Daten: Alter? Ausbildung? Kenntnisse in Erste Hilfe und Krisenmanagement?
- Wie würdest du die Bedienbarkeit der App beurteilen?
  - Schlecht, zweckdienlich, gut, . . . ?
  - Aufbau von "activations" und "tasks" verständlich?
  - Gibt es Elemente / Interaktionen, die du als störend empfunden hast?
  - Gibt es bestimmte Aspekte der Interaktion, die du verbessern würdest?
- Bist du der Meinung, eine Übersicht über die verschiedenen Funktionen zu haben? Kannst du mir die Funktionen aufzählen, die dir noch in Erinnerung sind?
- Was gefällt dir nicht an der App (sei ruhig brutal)?
- Würdest du persönlich diese App verwenden, um im Katastrophenfall zu helfen?
  - Falls nein: liegt das an der App?
  - Falls ja: hast du dich bisher schon einmal freiwillig engagiert?
- Was würdest du dir noch an Features wünschen?
  - Falls er/sie die App nicht verwenden würde (siehe oben): Was müsste die App können, damit du sie verwendest?
- Eigenen Anmerkungen?