

Understanding the needs of socio-technical interventions for rural communities in areas affected by anti personnel mines

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In this paper we present the preliminary results of our study on understanding and determining the needs for socio-technical interventions in rural communities affected by Antipersonnel Mines (APM). We aim to interview four groups of stakeholders involved in the process of humanitarian demining to inquire about their current practices, information flow, technical and technological barriers and complexity of their environment from an HCI perspective. We seek to find opportunities for improvement and contribution areas to help these rural communities to avoid the risk of being injured by APM as well as contributions to the HCI community in terms of methods and approaches for regional, post-conflict situations.

CCS Concepts: • **Human-centered computing** → **Field studies**.

Additional Key Words and Phrases: HCI, antipersonnel mines, humanitarian demining

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1 INTRODUCTION

Internal armed conflict is a socio-political issue with many implications and consequences. In the Colombian case, regional conflicts had affected low income and rural communities throughout the country causing phenomena such as internal forced displacement, youth recruitment and illegal crops among others. In the aftermath of war, landmines stand out as one of the deadliest, yet, effective strategies of war used by guerrilla groups to achieve control of the territories, to protect illegal crops, and to affect the social dynamics among civilians of the affected zones.[8]

Landmines are certainly a huge issue in countries affected by armed conflict due to the fact that they can remain active for over 50 years after the conflict's end. According to official information from the Colombian government, "In the period from 1990 to February 2021, a total of 11.994 casualties had been reported by Anti-personnel Mines (APM), Unexploded Ordnance (UXO) and Improvised Explosive Devices (IEDs)[1]. The complexity of the demining process which in many cases might last decades puts the civilian population at risk of being killed or maimed by APM. The limitations that are inherent to rural areas (e.g., the lack of infrastructure, limited connectivity, environmental factors, literacy) amplifies the difficulty in the demining process. Our research seeks to better understand the need for information system intervention and contribute to expand the methods and tools in human-computer interaction(HCI)

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for addressing conflict scenarios and complex societal issues [2–5, 7, 9]. In particular, we use inhabitants of certain regions in Colombia as our target to understand the problem.

Colombia has had active conflict scenarios. Therefore, demining technologies have been so far focused on the military population because the confrontation directly targeted members of the military, leaving the civilians aside. However, the estimated number of civilians who are exposed to landmines in rural areas is 15 million people, just in Colombia. It is important to point out that the civilian population is also being affected and the number of casualties by APM may lean toward them at an accelerated rate in a scenario of post conflict. To address this concern, we aim to design and develop technologies that allow civilians to access key information on the demining process.

Humanitarian demining is the process of removing and returning lands cleared from landmines after a conflict has ended. This process greatly differs from military processes which are mainly focused on landmine removal on the go to allow military actions in the field. Humanitarian demining is carried out in a post-conflict scenario, and its main objective is to restore the lands and populations to their normal lives as they were before the conflict [6]. This process involves several stakeholders and poses nuanced challenges for all parties involved. In this study, we aim to understand the current practices, information flow and data privacy challenges, technological barriers, and the complexity in understanding the underlying social and political tension among the parties involved in the humanitarian demining process. These challenges can vary, ranging from trust building in the affected communities to lack of connectivity and low digital literacy of the populations. This assessment will allow us to elicit the needs and opportunities presented from the HCI perspective, to suggest information systems that are able to fulfill these needs in a comprehensive manner.

The general questions we pose are as follows:

- RQ 1: What are the current practices, in terms of Information Flow, Technological barriers and environmental conditions for the development of information tools that help populations at risk to reduce the chances of being injured by a landmine?
- RQ 2: How information technologies might contribute to improve the demining process in Colombia for civilian populations of rural zones?

Our study includes in-depth interviews with key stakeholders from four different groups representing; the official perspective, the victim’s perspective, the deminer’s perspective and the ex-miner’s perspective.

1.1 Positionality

The first author is a male born and raised in Bogotá the capital of Colombia. Although the internal armed conflict affects the society in general its consequences are completely different in rural areas. Presence of illegal armed groups and absence of the government along with several inequality issues and contextual variables make the living conditions particularly challenging in such areas. This fact establishes a distance between the first author and the inhabitants of rural areas that might identify him as an outsider.

In the context of relationships with stakeholders and members of the government, the first author used to work with government institutions and have held a relationship with some of the NGOs that are working in the humanitarian demining process through research. This relationship that have lasted almost five years, facilitates the initial approach to those institution as he is not a newcomer to the field.

The second author also a male, was born and raised in South Korea and acts as a neutral actor in the process. He is based in an academic institution in the United States, his research is mainly focused in human-computer interaction. His main interest is to understand the different perspectives of the stakeholders involved in the process, and his contribution

is to provide an external view of the complexities of the process and avoid bias coming from the first author such as political orientation or personal attachment, in that sense he acts as a neutral party.

2 METHODS

In order to contact our stakeholders we have approached individuals and organizations working in the humanitarian demining process in Colombia through events such as conferences and research panels where the first author have participated as both panelists and participants. One of the most important research events we attended was the International Meeting on Technologies and Innovation for Humanitarian Demining held in Bogota and sponsored by the Colombian government. We participated for 3 consecutive years from 2015 to 2017 and most of the contacts we have established for research come from our participation in those events. We got to know most of the experts in the field of humanitarian demining and government representatives that had been the main source of information and support for getting participants for our study.

We plan to conduct in-depth interviews with four different types of stakeholders 1) **deminers'** perspective: Deminers who are part of members of non-governmental organizations working in Colombia regarding mine action activities. 2) **officers'** perspective: Government and NGOs officers who are part of the demining process in Colombia. 3) **civilians'** perspective: inhabitants of dangerous zones and/or victims of APM. 4) **ex-miners'** perspective: Ex-guerrilla members of the armed groups involved in the mining process.

The interviews will help document and understand challenges and opportunities for data management and entry barriers for the implementation of an information system related to anti personnel mines. In addition, interviews will be held with civilians of dangerous zones to understand what are the main barriers to access information and technology in affected areas. The target regions that we aim to investigate include the following rural areas of Colombia: Algeciras (Huila), Balboa(Cauca), Vista Hermosa (Meta) and Puerto Asis, Puerto Leguizamo and San Miguel (Putumayo). We have developed our initial questions set centered around the following topics.

- **Current practice:** Activities done by the involved stakeholders (Deminers, Government officers, inhabitants of a dangerous zone and Miners-exguerrilla) that explain the rationale and challenges of this endeavour.
- **Information flow and Data privacy:** Focuses on the type of data collected and analyzed. This is relevant not only in terms of the official data collected, but also the idea is to identify information known by the community that is not always considered by the government.
- **Technological barriers:** Challenges that stakeholders are facing daily in the deming process and that are not being solved yet.
- **Complexity of Environment:** The main characteristics of the context to have a better understanding of the different aspects that take place in this reality.

In the following section, we present preliminary result that we gained from a few initial interviews.

3 ONGOING EFFORTS

3.1 Approaching Stakeholders

So far, we have contacted members from the office of the high commissioner for peace affairs in Colombia (Oficina del alto comisionado para la paz). Specifically, they are from the Integral action against landmines department. In addition, we interviewed members of one of the main NGOs working in the landmine issue in Colombia called Colombian Campaign to Ban Landmines (Campana Colombiana Contra Minas). These entities embody two of the main stakeholders

involved in the Humanitarian demining process: policy making, and implementation and deployment of removal actions in the field. Approaching inhabitants of areas previously affected by war is challenging as they usually don't trust people they don't know. To contact them we plan rely in our official partners who have already build relationships in the field as a mean avoid rejection and reduce the risk of low participation in our study. We also plan to approach organizations of the civil society such as victims and other institutions such as women groups and the national parks system. Another important stakeholder group is ex-guerrilla participants, who are nowadays returned to civil life. Approaching them is not an easy task because of the immense damages caused by their actions. In addition, they are considered as a population in high risk of suffering damages from other armed groups who have not reached a peace agreement or even political enemies from different sectors of the society. However, their insights coming from mining experience can provide valuable information on how guerrilla groups work and how they place mines.

We have the safety considerations in the zones where landmines are still an issue, limiting the research methods; the contextual inquiry or ethnographic interviews are not possible. The internal armed conflict peace agreement signed in Colombia in 2016 did not put an end to violent actions in the rural areas, and many of the affected areas are still under control of irregular armed groups. These limitations pose additional challenges to our study that need to be addressed on the go as we are advancing in the interview process. To overcome such barriers, we have been contacting and interviewing officers working for organizations that have already built trust with the inhabitants of the zone.

3.2 Running Interviews

We have conducted three interviews with 2 different groups, deminers and government officers. Through the interviews, we have learn more about the elements involved in a humanitarian demining process and how it differs from from the military process: participants involved in the process and the steps for carrying manual demining. One emergent issue we noticed during the interviews was the trust building process between deminers and civilians in the affected communities. This issue is of special concern for both deminers and government officers as it determines the level of access and information they might have to the territories. Another issue that came to our attention is the complexity of the information flow which involves many different components: the use of Geographic Information Systems (GIS), interviews, presentations to the community, military inherited reports, surveys and email reports.

Another set of findings comes from the environmental conditions of the field, such as inaccessible topology or lack of connectivity, and risks of being exposed to illegal armed groups in the region. We anticipate that such complexities increase when we get to interview inhabitants in the areas as they are the ones who understand the social dynamics and how they have been affected by the regional conflict, and are exposed to the risks of Anti Personnel mines in their land. Regarding connectivity and complexity of the environment, there seems to be a gap between the officials' perspective and the deminers' perspective; deminers often found themselves often in conditions of no connectivity whereas the government officials argued that the majority of the Colombian territory has cellphone or WiFi connectivity.

4 FUTURE WORK

We plan to carry out the project in the following three phases : the discovery phase, the development phase and the testing and evaluation phase. In the discovery phase, we will continue to conduct remote interview studies to better understand the opportunities and needs of the implied stakeholders. The eventual goals in understanding will be centered around developing information systems that reflects the collaborative but complex nature of the tasks required to successfully deliver land free from landmine suspicion. Outcomes of this phase will pave the way for structuring the next phases.

In the development phase, we plan to use double diamond approach[10] to generate prototypes in an iterative fashion. This particular approach was chosen because the first author have experience of using this approach for complex societal issues such as, homelessness in New York City, and design of learning environments for children with Down Syndrome. The results of this experience in terms of rapid prototyping iteration, and user centered design offer interesting insight on how this methodology might be applied in contexts that need special attention due to its complexity in terms of human relationships and empathy generation for stakeholders and final users.

The nature of user centered design is highly collaborative and places the human being at the center of the process. Designing with this approach implies close collaboration with people involved in the process and generates a sense of ownership for all of the stakeholders involved. This characteristics might suggest the use of collaborative methodologies for the design phase. We considered using co-design for having an explicit way to involve our stakeholders in the process. However, this approach is not defined yet as it implies in-person interaction, especially given the current situation of pandemics and low access to internet or low literacy.

Lastly, in the evaluation phase, we will use a qualitative approach to determine the effectiveness and feasibility of the tools developed in the previous phase. Tools developed during this process are intended to deliver information to the population of rural areas regardless of their social status or other factors that might limit access to technology.

There are some risks associated with the implementation of this proposal. On one hand the political instability in Colombia in a post-conflict scenario might cause some delays in the process as well as impede access to certain areas of the country due to violence. On the other hand, there are some warnings associated with connectivity, reluctance to change and bureaucracy that could also affect the regular development of the proposal.

These issues can be tackled by establishing international cooperation between both private and public organizations. For instance, the collaboration established between the Colombian government and academia through the Scientific and Technical Committee, illustrates how such relationships can take steps together by strengthening and encouraging joint investigation. We plan to establish relationships that transcend the political situation by generating cooperation agreements between educational institutions to avoid bureaucracy and guaranty the continuity of the research project.

Finally, COVID-19 is another consideration to take into account in current conditions, this fact can transform the way in which research activities will be conducted.

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