LUNA: HCI for Supporting Abused Women in Mexico

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Abstract

Cases of domestic violence around the globe can no longer endure at this day and age. The World Health Organization estimates one out of three women in the globe being subjected to either physical and/or sexual intimate partner violence or non-partner sexual violence in their lifetime [51]. In most Latinamerican countries, the numbers are worse. In Mexico, 43.9% of women aged 15 years and older (19.1 million) reported being victims of intimate partner abuse over the last decades [20]. HCI seeks to tackle this problem and does so successfully in some regions of the world. For LATAM, this technological battle is full of opportunities. Women in Mexico City that suffer domestic violence seek help at LUNA, government centres dedicated to offer free services such as psychological advice, legal assistance and refuge to all women. However, as an NPO, LUNA is understaffed, underequipped and underbudgeted, making it challenging for employees, managers and directors to perform effectively. In this paper, I present a dashboard designed with a participatory approach (by including users along the whole design process) that has proven to enhance employee's quality of service by improving the usability of their registration system. Moreover, this dashboard offers a friendlier visualisation of the victims' data for an improved follow-up service and allows a more efficient interdisciplinary collaboration. This tool equips the LUNA director with the means to analyse their data properly as to identify patterns that will lead to better strategies and executive decisions, as well as to demand the proper budget and assistance they require. The dashboard features serve as the evidence required for policy creation in Mexico, allowing the opportunity for social change on scale. By referencing studies on Data & Bureaucracy and Gender Violence, this paper aims to add to the discussion in LATAM to tackle domestic violence through HCI.

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AI	Artificial Intelligence
ADIP	*Agencia Digital de Innovación Pública*- Digital Agency for Public Innovation
CHI	Computer-Human Interaction
CRU	*Cédula de Registro Única*- Unique Registration Card
CSCW	Computer Supported Collaborative Work
DA	Domestic Abuse
DCS	Design Case Study
FAQs	Frequently Asked Questions
HCI	Human-Computer Interaction
ID	Identification
IT	Information Technology
JUD	*Jefa de Unidad Departamental*- Head of Departmental Unit (Manager)
LATAM	Latin America
MIT	Massachusetts Institute of Technology
NPO	Non-Profit Organisation
PD	Participatory Design
STS	Science and Technology Studies
TA	Thematic Analysis
UNAM	*Universidad Nacional Autónoma de México*- National Autonomous University of Mexico
UNDP	United Nations Development Programme
USA	United States of America
UX	User Experience

1   Introduction

With an estimation from the World Health Organization of one out of three women in the globe being subjected to either physical and/or sexual intimate partner violence or non-partner sexual violence in their lifetime [51], and a global 38% of all murders of women being committed by intimate partners [52], this problem that affects a vast percentage of the world's female population and those surrounding them must be tackled. Not only is violence against women a public health issue but also a violation of women's basic human rights. These violent acts come with short- and long-term physical, mental, sexual and reproductive health and economic consequences that affect women, their families and their societies.

Violence against women is defined by the United Nations as "any act of gender-based violence that results in, or is likely to result in, physical, sexual, or mental harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life." [50]. Evidence revealed that domestic violence against women and girls accelerated due to the recent global pandemic of COVID-19 [8]. Both social and economic pressure, such as loss of income and extended domestic stays surged the incidents of domestic violence. With social isolation and restricted movement during quarantine, battered women are forced to live in confined spaces with their abusers. Many of them cannot even consider seeking help or calling the police, knowing their aggressors might eavesdrop on their phone calls and thus exacerbate the situation. Some of the challenges and opportunities that arose during this global pandemic regarding gender violence will be addressed in a further section.

Some of the common factors associated with the gender violence phenomenon include lower levels of education or gender equality, exposure to abusive behaviour during childhood and weak legal systems [54]. These are all societal areas that can and should be improved to fight gender violence at the root in order to prevent cases instead of fighting the symptoms of already existing cases. This prevention is to be conducted through any means possible, including research and HCI. Research allows the proper collection of evidence to document, measure and understand gender violence as to better define, initiate and monitor national and international action. The understanding of this phenomenon also leads to an improved policy design for preventive measures. HCI tools help strengthen the response to gender violence. A few examples of HCI

tools that are being implemented and used around the globe will be described in the Related Work section. Most of these tools include the limitations of functioning partially exclusively in the country where they were developed, since when it comes to the time to act upon an identified case of violence, the way to proceed will depend on the local authorities and regulations. Moreover, both scientific research on HCI and technological developments that tackle domestic violence in Latin America, where we have alarming rates of femicide and a high level of naturalisation of violence, is almost non-existent [43]. The majority of these projects are being developed in the global North which gives researchers and designers the opportunity to engage in the vast opportunities of this Latin American environment. This work seeks to close the gap on research scarcity on HCI and domestic violence in Mexico and LATAM.

1.1   Problem & Motivation: Domestic violence in Mexico

Women in Mexico City that suffer domestic violence seek help at LUNA, government centres (under the control of the Secretariat for Women's affairs) dedicated to offer free services such as psychological advice, legal assistance and refuge to all women without discrimination. However, as an NPO, LUNA is understaffed, underequipped and underbudgeted, making it challenging for employees, managers and directors to perform effectively.

After conducting research with LUNA directors, managers, employees and main stakeholders through a Participatory Design approach (by including users along the whole design process), I was able to learn about the current, protocols, challenges and opportunities within their environment. With the acquired knowledge after analysing data from qualitative research methods such as interviews and surveys, I was able to design and develop a set of tools that consists of a dashboard and a database that has proven to enhance employee's quality of follow-up service by improving the usability of their registration system. The dashboard offers a friendlier visualisation of the users' data for an improved follow-up service and allows a more efficient interdisciplinary collaboration. This tool equips the LUNA director with the means to analyse their data properly as to identify patterns that will lead to better strategies and executive decisions, as well as to demand the proper budget and assistance they require. Moreover, the dashboard features serve as the evidence required for policy creation in Mexico, allowing the opportunity for social change on scale. For the success of this project, it was of great importance

that the user group (employees, managers and directors) were involved throughout the design process. From the beginning, while defining requirements in the pre-study, through the prototyping and iteration phases, and all the way to the end, when the tools usability was evaluated in order to ensure tools appropriation. My proposal of this set of technological tools for supporting women working against gender violence cases in Mexico City, as well as their evaluation and impact, will be described in detail in following chapters.

1.2 Thesis Structure

This Master Thesis compiles the work of this two-year Research and Design Project in the following structure. First I introduce the problem and motivation, mentioning as well a brief description of the methods used during the study, the designed tools and their impact. Next I describe Related Work on HCI vs Gender Violence and Data & Bureaucracy + HCI as to inform the reader about existing HCI tools that relate to or are similar to the ones I developed. I then present the Research Question on Chapter 3 and offer an overview of the Study Background on Chapter 4 in order for the reader to understand where the research was conducted as well as who the main stakeholders within the project environment are. Afterwards the reader can find the Methodology section on Chapter 5 which includes a thorough description of the Research Methods used. The following chapter, Chapter 6 includes a description of the developed technological tools and their features. This is followed by Chapter 7 with the Findings Section of the tools appropriation and evaluation methods; starting with the Pre-study Findings and continuing with the First Evaluation Findings through the first survey wave, the Pilot Study and the Final Evaluation Findings gathered through a second survey wave. Chapter 8 comprehends the Discussion section where my contribution is contextualised and put into perspective. Afterwards, on Chapter 9, I comprise the Limitations and Future Work surrounding this project. In the last section, the reader will find the Conclusion Chapter followed by the References chapter for further informational purposes and the Appendix for further analysis of useful documents regarding this research project.

2 Related Work

This chapter will cover two main topics: 1. HCI vs. Gender Violence and 2. Data and Bureaucracy. A literary review of these topics is crucial to provide the necessary knowledge of the phenomena that surround my research project and understand what is being done through HCI to improve service protocol to fight against domestic violence in institutions around the globe.

LUNA works with delicate data from their users and dwells in a bureaucratic system. The work they do is aligned with feminist ideals such as empowering women and fighting domestic violence in Mexico. A review of past research surrounding these topics serves not only as inspiration, but also to close the gap of literature scarcity in LATAM and open a discussion on gender and domestic violence topics in the Global South. In order to make progress in any discipline, we first have to understand where we find ourselves as humankind.

2.1 HCI vs Gender Violence

According to the United Nations, around 30 percent of women have been victims of domestic abuse globally [51], a problem arising oftentimes from 'unbalanced power relations within society' [43]. The suffering includes physical, mental, sexual and/or reproductive health consequences and the way out of that unbalanced situation dwells within the systematic complexity of a so-called wicked problem. A woman's way out relies mostly on her *agency*; her ability to take life decisions, including the emotional, health and economic aspects. Based on HCI literature, some existing approaches to understand and tackle this global problem through technology will be presented in this section.

The fight against systems of power and gender oppression through waves of feminist movements throughout nations in the 20th century, brought about the political ideology of feminism [43]. Since then, it has been influenced by theories, movements and disciplines that have impacted its development. HCI is one of the disciplines that aims to add to feminist values and theory. It was only in 2010 when Shaowen Bardzell [1] started to popularise the quest to bridge the gap between feminism and HCI, with the initial main goals of understanding the role of technology

for gender equity and social justice, and highlighting the values of feminism in HCI. Bardzell's and other recent feminist HCI researchers [e.g., 45, 12, 14] also aim to develop the frame that will evolve into feminist HCI theory in order to empower women in their environments. Built around these authors' research and according to Bardzell, feminist HCI proposes to follow six interaction design qualities: 1) pluralism, which considers a wider range of potential users than universalism; 2) participation, allowing users to engage actively in the design process; 3) advocacy, representing unheard voices; 4) ecology, considering the impact on the ecosystem; 5) embodiment, concentrating on HCI's material attributes; and 6) self-disclosure, discovering and tackling foundational assumptions in design models.

Throughout history, society has constantly, sometimes inadvertently, been unaware of their support for inequitable power structures. Feminist HCI work allows us to comprehend the relevance of gender, which is often overlooked [45], for technology development and to even the disparity in society. Without realising it, society has also catalogued certain technologic appliances such as washing machines as not so technologic, as well as rendered their use almost exclusively to women [45]. Also unknowingly, research within the social sciences has been conducted without a proper consideration of the participant's gender. Whether gender may be relevant for a certain study or not, according to [45] the majority of CHI papers have simply overlooked the conscious decision to consider gender in the first place. This implies that some researchers were just lucky that gender was not a key factor in their study, while the rest were biassed and unprofessional. This is not the case with current participatory study [14], in which they included over a 1,000 mothers in the design process to improve a breast pump, finally giving attention to the unexplored life phase of motherhood. This study highlights the importance of Feminist HCI, pluralism and participation. It also helps close the gap in women's participation in technology.

Different technological tools that aim to tackle domestic violence are being developed around the globe [36], some of them focused on detecting violence signs. A Spanish mobile app called Enrédate sin Machismo (get tangled without Machismo) [5] consists of an interactive game to test the user's knowledge on healthy relationships. After completing the different levels, which consist of a series of multiple answer questions, the player gets awarded. On the contrary, there is

an opportunity for reflection in order to try again. 1 in 3 be free is an educational tool developed for New Zealand with which women can detect signs of being in an abusive relationship, learn more about different types of abuse, and get connected to their government's supporting services [29]. Woebot is a Facebook chatbot that offers behavioural therapy [17]. It holds daily brief conversations with its users and sends them videos and mental health advice tailored to each user's needs. Studies found that Woebot decreased symptoms of depression and anxiety after just two weeks. Other technological projects include protection devices and alarms like [22], a bra that shocks abusers, with the irony of leaving the responsibility of their safety to women instead of addressing societal attitudes and behaviours.

Other technological tools focus on tackling the consequences of abuse. Hollaback is a collective storytelling platform where victims of street harassment write about their experiences in order to heal and draw societal awareness [15]. This technology is available for over 15 countries around the globe. In LUNA initial interviews as well as during the psychological sessions, an important aspect of victim's service is to give them the opportunity to talk about their experiences.

HCI research in regards to interfaces for governmental services offers numerous successful examples. One of them is a community sourcing system called CommmunityClick [31]. This tool, designed for a town hall in the USA, was validated through interviews with expert organisers who confirmed its "utility in creating more comprehensive and accurate reports to inform critical civic decision-making". Another example is GuardDV, a proximity detection device that alerts survivors of domestic violence and the authorities of the abuser's proximity [33].

Most of these tools include the limitations of functioning partially inclusively in the country where they were developed, since when it comes to the time to act upon an identified case of violence, the way to proceed will depend on the local authorities and regulations. There is no one-fit-all platform or concept to follow for every different country but these examples are relevant sources of inspiration and add to the growing toolkit to combat domestic and genre violence.

Some of these technologies have similarities to the services provided by LUNA. The detection of signs and communication to supporting services is also what is being done by LUNA, only on-site and with the aid of a social worker instead of remotely. The Hollaback storytelling platform is similar to LUNA procedures of interviewing and listening to victims in therapy sessions, with the same difference as in the last example of the remote vs on-site attention. The main goal is to offer a space where these women are listened to and acknowledged for what they have been or are going through.

All of these technological projects have the best intentions to aid the fight against domestic abuse (DA), nonetheless, willingly or not, sometimes technologies are used as the means to worsen or empower the abuser-abused interaction [19, 56]. First off, it has been stated that the fast pace of technology development and the social worker's technological literacy, as well as their knowledge to advise for their digital safety, are all factors that hinder the use of technological tools to battle DA [35]. Digital technologies can and are being exploited by domestic abusers to monitor, harass and expose (to name a few examples) their victims [18].

Research is also being undertaken with the goal of engaging, through HCI, with the so far ignored actor in the domestic violence interaction, the perpetrator. Choice-Point is a web-based application that allows abusers to embody fictional characters in a domestic violence scenario in order to practise their empathy skills. This system acts as a behaviour change intervention, helping users to understand the roots of their violent behaviour in order to take responsibility for and shift it in a healthy way.

Scientific research on HCI and domestic violence in Latin America, where we have alarming rates of femicide and a high level of naturalisation of violence, is almost non-existent [43]. One exception is [5], where a system to support the identification and denunciation of violence against women in Brazil through a web application called Estamos Juntas (we are together) is presented. Its main two goals are to help users identify abusive relationships and to support them in the process of suing their abusers.

2.2   Data & Bureaucracy + HCI

In their book Sorting Things Out, the authors reflect on how large-scale coordinated work is impossible without lists [6] of topics that have to be classified. These classifications are the result of negotiations between pertinent actors who must try to find the perfect balance between generalising too much at a lower cost or getting valuable qualitative data at a higher one. These negotiations regularly happen in a highly bureaucratic environment with quite different points of views and interests. What's more, in social work similar to the one being undertaken by LUNA, these classifications often mediate individual human suffering cases as a collaborative tool to aid and benefit others.

This data is then used by different groups (stakeholders) to tackle problems from different perspectives or angles. Just as the authors of the mentioned book state, "these advantages can only be fully exploited if the various sub organisations agree on how to collect and code information" [6]. This agreement has been reached within the different dependencies that are involved in tackling domestic violence in Mexico City. But, these different groups have different bureaucratic structures (e.g. confidentiality) as well as different technological infrastructures (better or worse equipped, faster or slower internet connection, etc). Depending on the social world this tool inhabits, different challenges and opportunities arise that have to do with data administration, user needs, legal action, unreported crimes, statistics, early detection and prevention vs. high risk cases, data granularity, etc.

Current research sustains the importance of collecting data to create effective policy [12]. Moreover, scholars foresee changes in policy making with the aid of technology [38], including faster, better supported decision-making through the analysis of more precise and predictive information. The most relevant limitation here regards policy-making frameworks related to the collection and use of every country's privacy laws. An example of technological solutions regarding data is the use of ehealth in Governments around the globe (i.e. UK and Estonia) [23, 49]. This digitalization of health related data makes information sharing faster and more efficient than paper-based data due to homogenisation [10]. Although studies in the USA prove that even though policy is being created based on data decisions, it still lacks the analytics skills to translate data into useful knowledge [23]. Before this research project, the data collected by

LUNA, which belongs to Mexico's Secretariat for Women's Affairs, was mostly quantitative (i.e. how many first time visitors in each LUNA per month, how many psychological advice sessions were given, etc). By having qualitative data, LUNA managers and directors are offered a chance to detect a range of opportunities and formerly unnoticed patterns that will challenge existing structures, hence opening new discussions with the ranks above them.

Without noticing it (though sometimes pretty evidently) we as citizens are entangled in bureaucratic procedures that are grounded on structural violence in which social inequalities are backed up by a threat of force and translated into bureaucratic procedures that tend to blind the violent act in the first place [21]. Is the root of this systematic problem to be ruled by violent threats or could our judiciary systems improve the way they make use of their authority? Most of our organisations nowadays have a hierarchical power structure that is based on labour seniority or political astuteness instead of innovation or productivity [25]. Within this arrangement, power and strategy is in the hands of a few senior leaders, while the rest are mainly fighting to climb higher in the hierarchy. The problem is if the few senior leaders get stuck in old ways, these strategies could be outdated. And so directed by outdated goals, employees compete with each other to climb the ladder that keeps this wheel spinning, at times even forgetting about the real goal of the organisation. Thankfully, the higher ranks from LUNA and the Secretariat for Women's affairs are indeed in their majority women, evading all sorts of patriarchal bureaucracy issues [47]. The only man higher in hierarchy than the Secretary for Women's affairs is in fact the President of Mexico. Nevertheless, data that gets to them does not have the same emotional value as when the victim comes for the first time to get interviewed. They mainly see numbers on charts. On top of this they are still tied to bureaucratic protocols. Do bureaucrats care more about evaluating growth, perhaps following a more economic model or commercial ideal than the actual goal of the government bodies which is to aid individuals in the different aspects of their lives within their society? [21] HCI and other computer based disciplines have the potential to countermand the undesirable traits of bureaucracy such as hierarchical power and rigidity of rules. They can help reinvent the way things are done to make them more efficient, get closer to citizens and ensure better interdependency collaborations [40]. Although, and contradictorily due to their reforming nature, the intervention of these disciplines can also endanger the correct appropriation of the technology and hence the success of the project [30].

Bureaucratic institutions have also a tendency to not collaborate with the best intentions but to shine over others. They tend to hoard information and take action that is rewarded with benefits like budget approvals or with a more personal reward like a bonus or raise [42]. They also try to keep appearances in order to legitimise their role in society and their goal of success at the expense of distorting the truth [7, 39].

3   Research Question

Once being informed by the current problems and solutions from the state of the art, the purpose of my research is to answer the following questions:

Can HCI improve the follow up service protocol to fight against domestic violence within an institution lacking a proper technological infrastructure? How can the degree of interaction and assistance be adapted to the abilities and competences of the users so that the technology is accessible and also finds acceptance?

This research was conducted with LUNA centres in Mexico city (described shortly in the Introduction Chapter and with further descriptions of their background and main stakeholders in the next chapter). The improvement in LUNA follow up service will be measured through participatory evaluation methods described in the Methodology Chapter. The same chapter will include a description of the PD Methods used to achieve acceptance of the developed technological tools by the end-user.

4 Study Background

In this section I will describe the LUNA project collaboration and the different involved stakeholders.

4.1 Project Collaboration

As mentioned before, LUNA belongs to Mexico's Secretariat for Women's affairs. LUNA is a part of Mexico City's network, a group of government agencies that work together to support battered women (hospitals, police stations, attorney's office, etc.)

Figure 1 (below) displays three of the main stakeholders regarding this project: a) the United Nations Development Program (UNDP) Acceleration Lab, who since the early 2020 have been developing a digital agenda for the prevention and care of family and domestic violence in Mexico City within LUNA in the framework of the health emergency by COVID-19, funding this type of projects; b) the Digital Agency for Public Innovation (ADIP), who are in charge of supervising the implementation of data management policies and technological infrastructure projects in Mexico's government; c) the Civic Innovation Lab from the National Autonomous University of Mexico (UNAM), with a vast portfolio of civic tech projects implemented in governments around the globe. Throughout the research project, I had weekly meetings with the head of UNDP Acceleration Lab, Luis Fernando Cervantes, and two of his colleagues along with the director of the UNAM Civic Innovation Lab, Dr. Saiph Savage and one of her Lab's programmers, who was in charge of coding. These meetings helped us coordinate activities with the numerous stakeholders and allowed Luis and Saiph to guide my research. My collaboration with UNDP as an external consulter has granted me access to periodical meetings with ADIP representatives such as the General Director of Digital Government, and with the Secretariat for Women's affairs representatives such as the General Director for equality and gender violence. These meetings were key for me to understand the environment in which the technological tools I design will dwell. The next diagram shows the environment in which this research project took place.

Figure 1. LUNA project collaboration.

5   Methodology

This Chapter will describe the Methodology used throughout my Master Thesis Research Study which was based on a Design Case Study research approach described in the next subsection. During this project, an iterative approach was followed to develop the technological tools through repeated cycles. The cycle does not start with requirements and design, I first learned exactly what was needed, through the research phases, for the successful delivery of the next iteration. By establishing collaborations with the main stakeholders of the project I was able to understand needs, challenges and requirements in order to properly design the technology in hand for its ecosystem. Using different qualitative data gathering research methods which will be described in detail throughout this chapter, with the target users and other relevant stakeholders, allowed me to take into consideration all of their feedback, working with them towards change.

The development plan was carefully designed to allow feedback and participation of the main stakeholders of the project through weekly sessions. Following King's (2020) advice, the co-creation activities like interviews and other exercises were designed to last from one to one and a half hours for ensuring good attention spans [34]. Interviews were conducted individually and group sessions included no more than 10 participants. Interviews were audio recorded and transcribed for analysis. All activities were conducted via Zoom conference calls except from the shadowing exercises which were done on-site and the manager interviews which were conducted the same day as the shadowing exercises. The surveys were sent out and answered digitally. The scientific documentation and analysis of all the gathered material was pseudonymised and the scientific publication of this Master Thesis work was anonymised. The example databases I received from the LUNA director were either empty or filled up with made-up information. The data collected by the new LUNA database is safely stored in a server provided by ADIP with the collaboration of UNDP Acceleration Lab in Mexico City. Appropriate measures have been considered in order to protect the gathered data through the technological system and to allow only authorised persons in their team and other relevant actors (such as IT employees) to access it. All of the qualitative methods used in the conducted study will be described in detail in the following subsections.

5.1 Design Case Study

For this human-centred design project I used the perspective of 'grounded design' described by Wulf et. al (2018) as: "...a long term view of the design process, arguing for user engagement from the very earliest stages of design policy, including methods for understanding user practices to inform initial design policies up to and including processes of appropriation as technologies are embedded in contexts of use" [57].

This perspective is divided in three main phases: Pre-Study, design process, and appropriation and evaluation [58]. In the empirical Pre-Study phase the goal is to gain an understanding of the end-user current practices, perspectives, needs and opportunities. The second phase uses the findings from the Pre-Study to design the technological tool(s) or system and refine them through iterative cycles with the collaboration of the participants. In the third phase the goal is to guide end-users to a technological tool appropriation and conduct an evaluation that will reflect the changes in social practices within the users' environment.

5.2 Pre-study Methodology

Through interviews, surveys, shadowing exercises, a workshop and a pilot study, I followed a mainly qualitative research approach with the aim of understanding LUNA protocols, systemic challenges and main stakeholder's perspectives. I will describe each method in the following subsections.

5.2.1 Interviews

I started the pre-project phase by carrying out semi-structured interviews with both UNDP and UNAM labs. The UNDP Acceleration Lab helped me understand the challenges faced by the LUNAs and was my key to enter the LUNAs ecosystem. As mentioned previously, this lab has been collaborating with external actors towards developing a technological agenda for LUNA since the early 2020. More specifically, I interviewed UNDP Acceleration Lab Director (male), and two colleagues (male and female). They supplied me with the findings of their research and all the documentation needed to begin to understand LUNA's goals. From UNAM's Civic Innovation Lab, I conducted interviews and got an overview from two experts in the field of

designing and producing technology for governmental institutions with the scope of helping society, specifically vulnerable audiences. They were key in understanding what already exists and how we could innovate while satisfying the LUNA requirements and needs. I interviewed UNAM Civic Innovation Lab Director (female) and IT Engineer (male).

I then conducted semi-structured interviews with government actors that are key stakeholders for this project such as the LUNA general director (female), sub-director (female) and head of IT (female). This gave me a clear view on their limitations, and the possibility to identify opportunity areas. They also shared important documents with me such as examples with made-up information of their databases and records as well as the reports that the LUNA general director creates and presents to higher ranks during their meetings.

Furthermore, I had virtual meetings with UN Women specialists and officials from Mexico's Secretariat for Women's affairs to make a deeper sense of the challenges and be able to outline a strategy. Through these participatory cycles, stakeholders were broadly questioned about:

a) the objectives of technology regarding remote services,
b) the objectives of the user experience regarding remote services,
c) the biggest challenges faced during the LUNAs' remote service protocol,
d) what materials or technological tools are currently available for them,
e) how the protocols of the different services they provide proceed.

I carried out a thematic analysis [9] of the interviews to discover the different types of problems, opportunity areas and technological proposals that I identified within LUNA, their networks and key actors. Subsequently, a workshop was held between the UNAM and UNDP Labs in which I presented the analysis' most relevant discoveries. With the collaboration of the two laboratories, we were able to identify the most relevant problems, areas of opportunity and ideas within the scope of this project. I then presented the workshop findings to all the stakeholders involved in a virtual meeting in which we voted for the most desired project based on LUNA needs: a virtual dashboard.

5.2.2 Shadowing

After the decision to develop a dashboard was made, I made visits to four LUNA centres in different areas of Mexico City. There, I carried out a shadowing exercise, or observation in a work situation, to validate the discoveries made so far. Afterwards, I conducted 45-minute long interviews with each one of the four Managers (*Jefa de Unidad Departamental,* JUD) which allowed me to consider their points of view on the dashboard and database. The participating LUNAs were picked by the director based on their technological infrastructure and their JUDs technological literacy. The JUDs received me with a great willingness to collaborate. They were very kind and gave me valuable insights. When I mentioned the idea of the dashboard I noticed a lot of enthusiasm and received feedback on issues that I should take into account for its success.

5.2.3 Surveys

During the design process I designed and sent out surveys to LUNA employees and JUDs in order to make sure I received their constant feedback after which I iterated. The functions and features of the database and dashboards were validated by this participatory approach that helped me refine the final design of the digital tools. The first wave of surveys was sent after I presented the dashboard's first prototype.

5.3   Design & Prototyping

The design phase was based on my pre-study empirical analysis. Through my interviews and observations, I discovered there are three types of LUNA users: a) those who come asking for basic information, FAQs, and who aren't in an urgent situation; b) those who find themselves in a medium to high risk danger level and seek immediate assistance; and c) those who require urgent assistance due to homicide risk. For the first type of user, a technological tool like a chatbot would be an excellent supporting tool that would lower LUNA employees' workload. I will address this in the future work section. For user types b and c, face-to-face human assistance is required and would thus be better supported through a different type of tool such as a database and dashboard with different functions that I will describe in the developed tools chapter.

In this way, and after having analysed the JUDs interviews and the shadowing process findings, I decided to: 1. improve and homogenise the internal database for LUNA daily activities, 2.

develop a dashboard for each one of the LUNAs and 3. develop a general dashboard for the management (which englobes the information of all centres).

In order to design and develop the tools, I continued having weekly meetings where I had fruitful discussions and received feedback from experts from the UNDP Acceleration Lab and UNAM Civic Innovation Lab as well as some occasional meetings or email communication with the main project stakeholders. I also worked closely with an IT engineer from the UNAM Lab and LUNA head of IT in order to develop the tool according to LUNA infrastructure requirements through an iterative development approach [44]. The UNAM IT engineer was in charge of writing the technological tools' code.

5.4 Appropriation

According to Pipek, Müller et al. (2008) one of the most appropriate types of system appropriation for users that are not so tech-savvy is by acquisition and training [41]. This corresponds to the learning by doing approach and it is exactly the approach that I followed with the potential users of my system in order to ensure not only quality feedback in a real live setting for working iteratively on improvements but also the proper appropriation of the system itself. The way I did this was through a pilot study that will be described next.

5.4.1 Pilot Study

After the implementation of the technological tools, training was conducted in the form of a pilot study, in order to ensure their correct appropriation. It lasted a month and it consisted of weekly meetings with q&a sessions followed by a final wave of surveys. Four LUNAs (the same that participated throughout the project) were selected for their participation with the final version of the databases and dashboards. The participants included managers, employees, the general LUNA director and other relevant stakeholders for support (i.e. LUNA head of IT). During these sessions I first presented the technological tools by parts (not all features at once), gave participants clear and simple instructions of tasks and allowed them to try them out for a week at a time. I afterwards received feedback on those tasks, which I used to iterate, before continuing with the next dashboard and database features. The four managers, general director and head of IT participated actively in the four sessions and were very motivated to see the final results.

5.5   Final Evaluation

The tools' final evaluation gave me and the study participants the opportunity not only to evaluate the final developed tools but also to reflect on the learnings gained with this collaboration's experience. This phase took place after the pilot study ended.

5.5.1   Final Surveys

Following the grounded design approach (Wulf et. al 2011, 2017), I sent a second wave of surveys to assess the quality of the tools based on the change in practices that derived from their use [53] during the pilot study. The surveys of the second wave consisted of approximately 20 questions concerning the final design of the digital tools. The goal was to receive a final set of comments with which to conduct a final iteration in order to secure tool appropriation and satisfaction to the last detail. The survey was sent out to the managers and employees of the very same LUNA centres that participated throughout the study, closing with the pilot study by testing and critiquing the final result.

6 Developed Tools

In this section I will describe the developed tools in detail along with their features supported by images. The user information on all of the images has been made up and serves merely as a visual aid.

6.1 Database

As mentioned before, there is information captured by LUNA employees on three occasions: during the Initial interview, while filling out the CRU, and when adding a new user- or follow-up information- into the internal database of each LUNA. These databases were all different in the LUNAs I visited, with the particularity that most of them used Excel. Since the employees are already familiar with excel sheets, and considering their technological literacy, I decided to keep Excel as the host of the new and official internal LUNA database. This way I designed the tools by working with what users already have or use and building up from that instead of trying to convince them to use something they will probably reject due to resistance to change [1].

The databases that employees put together for each of their LUNAs were not making use of the worksheet features. They weren't making use of formulas, dropdown menus, validation cells; the employees merely added categories into the columns and added information in the cells. This way of working resulted in documents being very long, dull and hard to read or have a quick glimpse on a user's case. They were not intuitive or aesthetical, they had room for mistakes (writing whichever word with no data validation), and they were not user friendly when adding follow-up information. A strategy they were trying to follow in one of the LUNAs was to write new information in red so others would know it was recently added, nevertheless, this meant that some rows with heavy text (i.e. comments) were so long that they took the whole screen space with information that was no longer as relevant. To sum up, and based on the interviews' analysis, their databases were not functional, legible or beautiful.

Figure 2. Former LUNA database example.

Figure 3. New database with made-up data.

This image of the new database offers an entire view of the database. As opposed to the old databases they had, this excel sheet lets you get a glimpse of the basic aspects of users' cases: User name and id number, relationship with the aggressor, felony, and whether she is a newcomer, a follow-up case or an "open case". In one of the interviews a JUD explained to me, they never change a case's status to closed. That would mean they no longer consider this woman a user- and they would love for her to not have the need to come ever again, but she might- that is why whenever they stop hearing from a user, regardless of the circumstances, they change the case's status to "open appointment". This is particularly useful to hide or filter open appointment cases so they are not in the foreground unless required.

6.1.1 Database Features

Sections

The database is divided into four main sections defined by colour that can be expanded when necessary. 1. The yellow section contains the user information such as name, age, occupation, etc. 2. The blue section contains the aggressor's information such as name, age, occupation, whether he or she has access to weapons or drugs, etc. 3. Section 3, in light purple, includes all the information regarding the deed like place and date, type of felony, case summary, type of violence, etc. 4. The last section, in pink, focuses on the case follow up, and includes the user status, risk level, risk level change, psychological and legal attention, comments, etc. This is the section with which employees will be working the most. The first three sections of the database include information that is not particularly used for giving follow-up. This means the employee can choose to work with those sections hidden (unless she needs to go back to check some specific information on the case) and with the last section, follow-up, expanded.

ID number & Timestamp

I added a formula so that when registering a new user, she automatically receives an ID number. Also, there is a timestamp for data entry so the employee does not have to manually add the registration date.

	A	B	C	D	AF	AG	AH	AI	AJ	AS	AT
	PRIMER APELLIDO	SEGUNDO APELLIDO	NOMBRE/S	ID	NUMERO DE VICTIMAS INDIRECTAS	EDADES VICTIMAS INDIRECTAS	FECHA DE ALTA	^=	RELACION CON EL AGRESOR	^=	DELITO
	Robles	Morales	María	001/21	2	61,31	2021-01-14 20:30		EX CONCUBINO		VIOLACIÓN
	Morales	Garcia	Lupe	002/21	3	1,47,70	2021-01-14 20:30		PAREJA		VIOLENCIA FAMILIAR
	Garcia	Morales	Rocío	003/21	3	33,57,87	2021-01-14 20:30		PAREJA		VIOLENCIA FAMILIAR EQUIPARADA
	Morales	Perez	Brenda	004/21			2021-01-14 20:30		PAREJA		VIOLENCIA FAMILIAR

Figure 4. ID and timestamp appear automatically.

The whole worksheet has data validation in order to avoid data entry mistakes. When a value like age is required, the cell allows only a numerical entry. I added drop-down menus where possible in order to make the data entry quick and simple. In the old databases, the employee had to write by hand whether the user was employed, unemployed, etc; giving room for ambiguity. Now, employees can pick an option from the list. Whenever there is the possibility to pick more than one option from a list, I added checkboxes that can be checked with the mouse or spacebar.

PRIMER APELLIDO	SEGUNDO APELLIDO	NOMBRE/S	ID	OCUPACION	POLICIA, MILITAR, ETC	DEPORTES DE CONTACTO	PADECE ALCOHOLISMO	CONSUME DROGAS	ACCESO A ARMAS	^	D
Robles	Morales	María	001/21	EMPLEO INFORMAL	☑	☐	☐	☐	☐		VIOLACIÓN
Morales	Garcia	Lupe	002/21	EMPLEO FORMAL	☐	☑	☐	☐	☐		VIOLENCIA FAI
Garcia	Morales	Rocío	003/21	EMPLEO INFORMAL	☐	☑	☑	☑	☐		VIOLENCIA FAI
Morales	Perez	Brenda	004/21	EMPLEO INFORMAL	☐	☐	☐	☐	☐		VIOLENCIA FAI
Sanchez	Juanes	Juana	005/21	EMPLEO INFORMAL	☑	☐	☐	☐	☐		VIOLENCIA FAI
Alvarez	Perez	Maria	006/21	DESEPLEADO (A)	☐	☐	☐	☑	☑		VIOLENCIA FAI
Perez	Montes	Alejandra	007/21	EMPLEO INFORMAL	☐	☐	☐	☐	☑		VIOLENCIA FAI
García	Laurez	Brenda	008/21	EMPLEO FORMAL	☐	☐	☐	☐	☑		VIOLACIÓN (V.
Martinez	Pérez	Luisa	009/21	DESEPLEADO (A)	☐	☐	☑	☐	☐		VIOLENCIA FAI

Figure 5. Drop-down menu and checkboxes.

NOMBRE/S	ID	ATENCION PSICOLOGICA	ATENCION PSICOLOGICA	ASESORIA JURIDICA	ASESORIA JURIDICA
María	001/21	☑	Recibió terapia con la Dra. Sandra	☑	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor
Lupe	002/21	☐		☑	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor
Rocío	003/21	☑	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor	☐	
Brenda	004/21	☐		☑	Esta semana el caso de juana se elevo a la suprema corte de justicia
Juana	005/21	☑	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor	☐	
Maria	006/21	☑		☐	
Alejandra	007/21	☐		☐	

Figure 6. Psychological and legal attention summaries.

Figure 6 shows the section where psychologists and lawyers will be able to add the most relevant information on their users' progress. If the box for psychological attention is checked, the cell next to it turns white, allowing the space for an entry. When not checked, the cell remains pink and does not allow any text.

Similarly to the psychological and legal attention boxes, one can check a box whenever there is a risk change. When that is the case, the cell next to that turns white, indicating the employee to select the new risk level. After that, we can see the follow-up cell where employees can add what was done and what the next steps are, and who registers that week's follow-up so that employees know which colleague to contact for any clarifications.

Figure 7. Risk change and follow-up.

History

In order to keep the follow-up section clean and up-to-date, a timestamp was implemented so that every week, the follow-up section (in pink) will be wiped and on Monday morning, the employees will have a white canvas to work with. This information shall not be lost, it will be continuously fed into the dashboard and will be available there or in the history sheet shown in the image below. Notice the users' names are repeated. Every row indicates each time the user has received follow-up and shows the visit or call details. This weekly calendar is adjusted to the JUDs' responsibility of giving feedback (when pertinent) to all users by Friday evening so that the director has all the information available then.

	A	B	C	D	E	F	G	H
1	**Nombre**	**Primera atención**	**Atención subecuente**	**Cita abierta**	**Canalización**	**Atención psicológica**	**Atención psicológica**	**Asesoría jurídica**
2	Alvarez Perez, Maria	FALSE	TRUE	FALSE	Lorem ipsum dolor s	FALSE		FALSE
3	Alvarez Perez, Maria	FALSE	TRUE	FALSE	Lorem ipsum dolor s	FALSE		FALSE
4	Alvarez Perez, Maria	FALSE	TRUE	FALSE	Lorem ipsum dolor s	FALSE		FALSE
5	Alvarez Perez, Maria	FALSE	TRUE	FALSE	Lorem ipsum dolor s	FALSE		FALSE
6	García Laurez, Brenda	TRUE	FALSE	FALSE		FALSE		FALSE
7	García Laurez, Brenda	TRUE	FALSE	FALSE		FALSE		FALSE
8	García Laurez, Brenda	TRUE	FALSE	FALSE		FALSE		FALSE
9	García Laurez, Brenda	TRUE	FALSE	FALSE		FALSE		FALSE
10	Garcia Morales, Rocío	FALSE	TRUE	FALSE		TRUE	Lorem ipsum dolor :	FALSE
11	Garcia Morales, Rocío	FALSE	TRUE	FALSE		TRUE	Lorem ipsum dolor :	FALSE
12	Garcia Morales, Rocío	FALSE	TRUE	FALSE		TRUE	Lorem ipsum dolor :	FALSE
13	Garcia Morales, Rocío	FALSE	TRUE	FALSE		TRUE	Lorem ipsum dolor :	FALSE
14	Hernandez Méndez, Jesusa	TRUE	FALSE	FALSE	ba bla bla	TRUE	Recibió atención	FALSE
15	Hernandez Méndez, Jesusa	TRUE	FALSE	FALSE	ba bla bla	TRUE	Recibió atención	FALSE
16	Hernandez Méndez, Jesusa	TRUE	FALSE	FALSE	ba bla bla	TRUE	Recibió atención	FALSE
17	Hernandez Méndez, Jesusa	TRUE	FALSE	FALSE	ba bla bla	TRUE	Recibió atención	FALSE
18	Martinez Paredes, Javiera	TRUE	FALSE	FALSE	Lorem ipsum dolor s	TRUE	Lorem ipsum dolor :	FALSE
19	Martinez Paredes, Javiera	TRUE	FALSE	FALSE	Lorem ipsum dolor s	TRUE	Lorem ipsum dolor :	FALSE

Figure 8. User history timestamp.

Instructions

The Excel document counts with an instructions sheet with which current and new employees can solve any questions they have regarding the data entry requirements. The sheet includes every section and column with their instructions and an example.

	A	B	C
19	**NUMERO DE VICTIMAS INDIRECTAS**	RESPUESTA *AUTOMÁTICA* DE LA BASE DE DATOS	2
20	**EDADES VICTIMAS INDIRECTAS**	LAS EDADES SE LISTAN *AUTOMÁTICAMENTE*	67, 70
21	**FECHA DE ALTA**	RESPUESTA *AUTOMÁTICA* DE LA BASE DE DATOS	13/01/2021
22	**RELACION CON EL AGRESOR**	ELEGIR LA RELACIÓN CON EL AGRESOR DE LAS OPCIONES LISTADAS	PAREJA
23	**NOMBRE DEL AGRESOR/A**	CAPTURAR EL NOMBRE COMPLETO DEL AGRESOR	MARIO LÓPEZ GARCÍA
24	**EDAD DEL AGRESOR**	CAPTURAR LA EDAD EN NÚMERO SIN LA PALABRA AÑOS	43
25	**OCUPACION**	Capturar: EMPLEO FORMAL (recibe una remuneración estable por su trabajo), EMPLEO INFORMAL (no recibe una remuneración estable por su trabajo), o DESEMPLEADO (no cuenta con un trabajo).	EMPLEO INFORMAL
26	**POLICIA, MILITAR, ETC**	MARCAR LA CASILLA EN CASO AFIRMATIVO	☑
27	**DEPORTES DE CONTACTO**	MARCAR LA CASILLA EN CASO AFIRMATIVO	☑
28	**PADECE ALCOHOLISMO**	MARCAR LA CASILLA EN CASO AFIRMATIVO	☐
29	**CONSUME DROGAS**	MARCAR LA CASILLA EN CASO AFIRMATIVO	☐
30	**ACCESO A ARMAS**	MARCAR LA CASILLA EN CASO AFIRMATIVO	☑
31	**DELITO**	Aún cuando no exista Carpeta de investigación, es necesario que coloquen el delito por el cual la víctima directa acudió a la luna, indistintamente del lugar de donde la enviaron para la Luna. SI CUENTA CON C.I. ANOTEN EL DELITO POR EL QUE SE INICIO LA CI.	Violación
32	**FECHA DE LOS HECHOS**	Si tiene carpeta de investigación, es necesario que coloquen el número y si no lo tienen, que al menos agreguen en qué agencia se inició.	7865432
33	**LUGAR DE LOS HECHOS**	Es MUY importante que agreguen LA CRU y si por alguna razón no pudieron capturarla, CAPTURAR NO. Si sí se agregó, dejar vacío.	34787820

Figure 9. Database instructions.

Tools interconnectedness

The data from each database will automatically feed the dashboard that I will describe in the next section. The general director will be able to see the dashboard of each LUNA separately as well as a general one with the feed from all databases.

Diagram 2: LUNA Dashboard
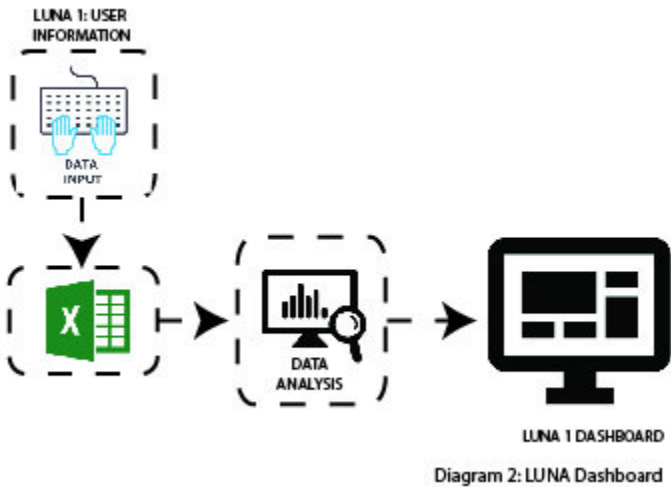
Figure 10. Diagram: LUNA Database transfer to Dashboard.

Diagram 3: General Dashboard
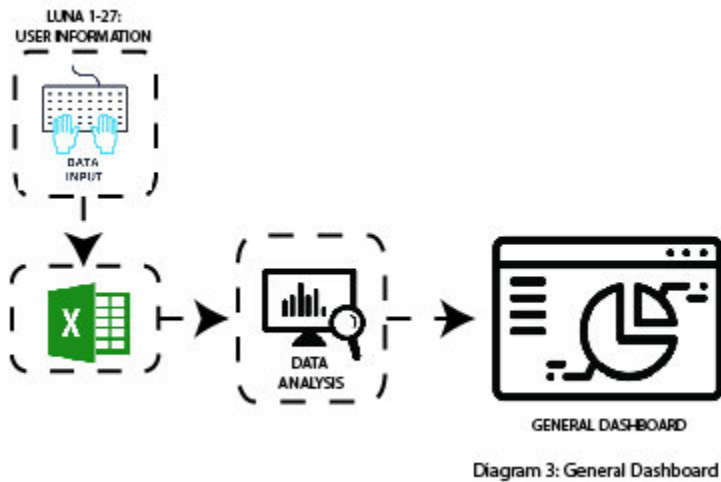
Figure 11. Diagram: LUNA Database transfer to general Dashboard.

6.2   Dashboard

The dashboard's first objective is to reduce the workload of the workers at the LUNA centres by making it easier to access data and follow cases. The second one, to provide a robust and reliable database handle for LUNA-management teamwork, allowing an automatic and homogenised access to follow the cases from every LUNA in Mexico City. The individual LUNAs' dashboard will help to provide a more efficient case follow-up, and the general one will facilitate and increase the quality of data analysis by the LUNAs' leaders for decision-making based on them. As David Nettleton (industry leader) emphasises, the dashboard's utility extends beyond monitoring "the current situation"; it also "allows a manager to… make provisions, and take appropriate actions" [12].

The next three images show the LUNAs' dashboard. A clear and intuitive dashboard was designed so that employees can take full advantage of its features. It was designed with the three critical characteristics for effective visualisation according to government experts on visualisation: interesting (arousing curiosity), functional (designed to be practical and useful) and with integrity (based on strong moral principles) [14]. The dashboard was divided into two main sections: summary and follow-up.

The first section, summary, shows the general status of the cases (by risk level or in general) in a certain period of time chosen by the user of the dashboard. The coloured boxes at the top show the number of women they are giving service to by risk level, as well as the total number of users. Clicking on one of the boxes allows the employee to see the data of that specific risk level which highlights important information for the employees and director to work on specific strategies.

The first table shows newcomers and follow-up users on a monthly basis. The second table displays the services given by each LUNA by colour (blue: home visits, purple: psychological therapy, orange: legal assistance, violet: legal advice. These numbers will help employees and the director demand the government for the necessary help. LUNAS are understaffed, and with these graphs they will be able to properly calculate how many more employees they need in

order to comply with the demanded services. Also, these graphs will replace the director's handmade charts, saving valuable time and effort on her side and allowing her to dedicate herself to other important tasks that require her attention on a daily basis. She will also have the opportunity to compare and contrast different data such as risk level change from different combinations (i.e. femicide to medium, medium to critical, critical to femicide) with just a few clicks. During her weekly meetings, she and her team will be able to study such graphs in order to compare and contrast, analyse patterns, recognize the consequences of specific choices, plan strategies and demand the necessary funds and assistance.

The last two graphs (Sankey graph and coloured boxes) show the most relevant measurement of service success: risk level change. With this tool, employees will be able to see whether they are doing a good work on decreasing the risk of their users. As of now, employees do their tasks and offer the best service they can. However, they do not set monthly goals, for example, decreasing the risk of a certain percentage of their users. This tool will serve as a measuring mechanism and will give them the encouragement to reach specific goals since it is proven that goal clarity positively affects employee performance [36]. The dashboard can show employees any kind of risk level change, allowing them to analyse specific cases to understand which strategies work best for each specific risk level. These last two graphs show basically the same information but in two different formats. I decided to leave both graphs since through the surveys, I discovered different working styles and ways in which they would use each graph.
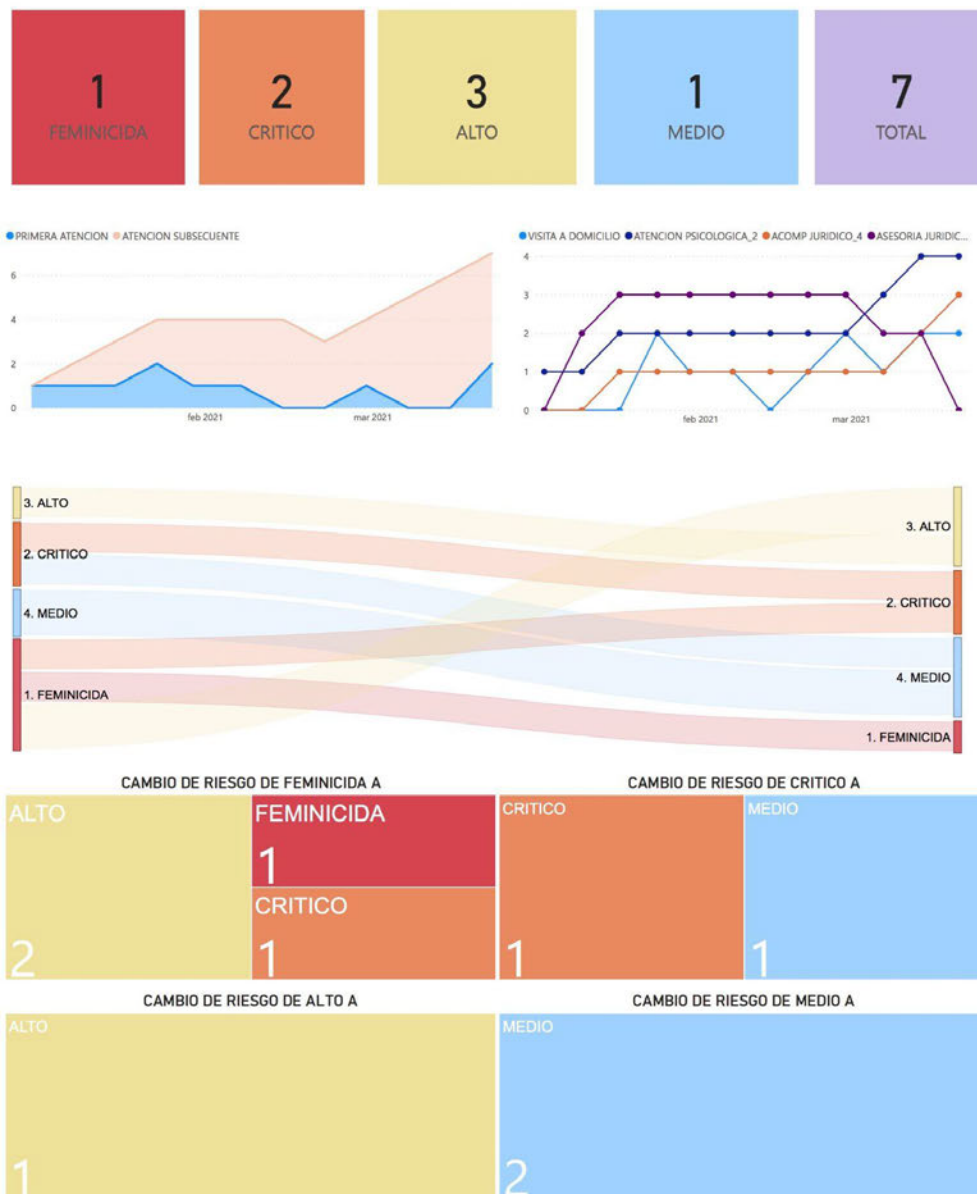
Figure 12. Dashboard: general statistics.

The second section, follow-up, will streamline and improve the quality of follow-up to the cases of LUNA users. This section allows one to easily locate cases with the search engine and arrange cases with the help of different filters including: week count, name, initial risk, current risk, date of first contact, etc. Likewise, it offers to take a quick look at each user's profile or see their complete history with just one click. This, in order to have a quick overview of specific users' cases to see where they left off and what actions follow.

This tool aims to positively impact LUNA's teamwork. With this new database, lawyers and psychologists will be able to feed a short summary that will be automatically reflected in the dashboard, allowing for every employee and JUD to collaborate more efficiently. This tool will allow everyone in the LUNA to quickly find a user with the help of the search tab and know exactly where she is in her process, what was done last, what is being done and what follows.

Figure 13. Dashboard: specific case follow-up.

Inspired by the feminist HCI goal of empowering women's knowledge, this technology aims to empower the director. If the technology proves to be successful, she will be able to show her knowledge in a more professional way with the aid of the charts, tackling the gender gap of women's technological participation in work environments [34]. She will also be able to better visualise LUNAs' data, allowing her to identify patterns and thus make better executive decisions. This tool will finally equip her with the arguments to demand the Governmental dependency that is responsible for the LUNAs, the adequate budget and assistance they require. Employees will also be empowered. They will be aided to collaborate better together and offer a more intuitive user service, making it possible for them to help more women and more efficiently.

Another benefit that this dashboard offers is the opportunity for LUNA employees to have a glimpse of their impact. They will be able to see graphs of how many women they have helped for example on a monthly basis which has as its main goal to motivate LUNA employees to continue working as they do. This satisfaction, together with the messages of mental health care, will give them the necessary motivation to continue with their commitment and daily performance without forgetting their own emotional well-being.

These tools support the feminist HCI quality of advocacy [8] since they aim to empower social justice by advancing women's rights. They also aim to improve the way the data is collected and used in order for every LUNA employee to be up to date with each particular case so that victims do not have to go through the hard experience of having to repeat statements they already talked about, to name an example.

7 Findings

This section includes the project's pre-study and final findings along all the phases and methods used. The goals were: a) to discover whether the follow up service protocol to fight against domestic violence within an institution lacking a proper technological infrastructure could be improved through HCI tools; and b) to find out whether and how these tools could be adapted to the abilities and competences of the users in order to achieve acceptance and appropriation from their behalf.

7.1 Pre-Study Findings

I consider the first round of interviews with main stakeholders, general and sub-director, and head of IT to be the pre-study of this research project. These interviews took place before any design decision was made regarding which technological tool(s) would be developed. This phase's goal was to gain an understanding of the challenges that LUNA workers face and examine how these challenges affect their performance in order to identify opportunities for designing technologies that support their work.

A second stage of the pre-study consisted of LUNA visits or shadowing exercises where I also conducted interviews with three LUNA managers (JUDs). At this point the concept of developing a dashboard fed by a new database had been considered. Part of my interviews with managers consisted of showing them a dashboard prototype in order to get some initial feedback and work together on adding desired features. This second round of interviews also helped me discover which indicators were crucial for employees to provide a more effective follow-up service with and for the director to strategize, analyse and show the data that will back up their demands towards the Mexican government. One meaningful example is that through the interviews with JUDs I heard about an alarming pattern; LUNA employees have noticed that many abusers are members of the Mexican police or armed forces. Such findings helped me pinpoint specific entries that were required in the new database (such as asking if the abuser is a member of the police, has access to weapons, etc). These statistics are necessary for the LUNA director to show how indispensable it is to create policies that will fight against such criminal patterns.

7.1.1 LUNA

LUNA focuses on the care and prevention of violence and the promotion of the physical, economic and political autonomy of women. These safe spaces seek to promote autonomy and the correct execution of the rights of their users through their services.

There are 27 LUNA centres around Mexico City (about two per district). They are located in public spaces and are open and available from Monday to Friday from 9 to 17 for all women and girls with no distinction. Each LUNA offers the following services free of charge: a) psychological counsel (individual and group sessions), b) legal advice and legal case follow-up, c) domiciliary visits, d) emergency action plan (including shelter service for the victim and her children, economic support, abuser prosecution) e) case follow-up. As an NPO, LUNA employees face challenges familiar to these kinds of organisations [28, 32] such as being understaffed, overwhelmed with workload and poorly equipped (including technical equipment). In addition, they have to face challenges of staying to a degree emotionally detached to their clients [13, 3].

The basic structure of each LUNA includes: a) one Head of Unit (*Jefa de Unidad Departamental* JUD) in charge of managing LUNA employees and activities, give case follow-up, send weekly reports to the LUNA director based on their internal database (described below in this section); b) at least one therapist who offers psychological counselling (on site or by telephone); c) at least one lawyer who provides legal advice (on site or by telephone); and d) social workers that are in charge of general services (such as conducting the initial interview described below, performing undercover domiciliary visits to victims who are no more reachable by phone, etc.) and administration. There is a general director who manages all the LUNA centres, assisted by a sub director.

The director's main tasks are to gather the weekly reports from all LUNAs and to create reports for the higher ranks (e.g. Secretary) from the Secretariat for Women's Affairs. These reports consist of quantitative data concerning the monthly services offered by each of the 27 LUNAs such as number of first-time visitors, number of follow up visitors, number of psychologic and legal assistance via telephone, number of calls to report domestic violence, number of calls to

report femicide risk, etc. They also include some more specific data like if the victim is unemployed or has an informal job, the relationship to the aggressor, victim's and aggressor's age range, number of children, etc. Moreover, they include a few interesting graphs, which are made by the director by hand, that show the number of cases that changed from femicide to critical risk level, to name an example. These reports are shown and discussed in bi-monthly meetings. The director and sub-director, together with the managers, are also in charge of discussing the cases with the highest risks in order to ensure the victims' safety and the best possible outcome.

Additionally, LUNA staff also includes a head of IT along with a team of two programmers. They are in charge of keeping the technological infrastructure updated and running, giving maintenance to technological equipment and offering technological solutions. Most employees are women with the exception of security guards, who in their majority are male, as well as some administrative staff.

7.1.2 LUNA Interdependence Work

LUNA is subject to a high interdisciplinary work with other government agencies such as Public Security, 911, and other members of the Network like hospitals and clinics. The environment in such governmental agencies is highly masculine.
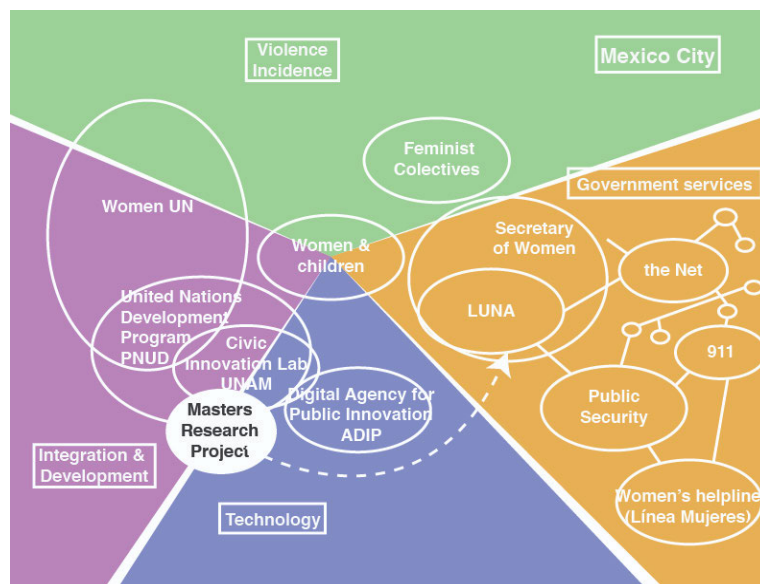
Figure 14. LUNA environment and stakeholders.

It is important to note that the LUNA Director, (female), responds to the Secretary for Women's Affairs (female), who in turn responds to the President of Mexico (male). Most of the LUNA employees and director, as well as the Secretary for Women's Affairs are women. Nevertheless, LUNA operates within a deeply patriarchal society [18]. Mexican men control the social, economic and political aspects and are privileged over women. Within married couples, it is common for the man to make decisions regarding the woman's life, going as far as health decisions [16]. The outstanding LUNA performance is subject to interdependency work with government bodies that have a highly masculine power structure. According to the LUNA director, such federal agencies lack the motivation and the preparation to handle delicate cases appropriately, losing the victims on the last steps of their legal procedures.

LUNA is subject to a high interdisciplinary work with other government agencies. The main challenge regarding this interdependence work has to do with the fact that, although their workers are in their majority female, the procedures regarding legal action must be handled by government agencies such as Public Security, whose environment is highly masculine. According to the LUNA general director, these men, while very capable to perform competently in their professional field, have not received proper training to give adequate service to battered women. As soon as victims are redirected from the LUNA to another dependency, they enter a completely different environment that, after their traumatic experiences, are to say the least, violent and disencouraging. It is backed up by research that men can gain insights of their role within male supremacy cycles through reflection [4], so perhaps some workshops to practise awareness amongst the government employees would be, as the LUNA director says, a very sensible idea.

"Out of every case since January (2021), all women are still alive. We have been able to support them, we know about their situation. Some ask us to not call them anymore. I would hope there was a more integral service, not only from LUNA. A good service is prevention. To prevent that cases get to femicide risk. The cases get complicated at the time of suing for example in the prosecutor's office. They call them (LUNA) saying she 'got away'. They (LUNA) contact her and she does answer the phone but says they (fiscalía) don't trust there, etc. Maybe the direction of such governmental agencies is the problem. They do train their agents but don't instruct them

on how to do it practically. They say comments like: 'she was attacked but she was drunk', so what? They have to detect these comments to start to see it differently. A practical workshop would help do this."--Female LUNA director, interview.

7.1.3   LUNA Protocol

The first step for a woman to receive support from a LUNA is to answer an initial interview. The initial user interview is conducted in person in the LUNA centres, being its main objective to fill out a new user form that will help calculate the victim's risk in order to plan a strategy for her case. This interview is carried out by a social worker who fills out the initial interview form by hand. The form includes the victim's background information as well as that of her support circle, and that of the abuser. It also contains a detailed description of the case with which the interviewer can determine the victim's risk level (medium, high, critical, or homicide risk).

Once the initial interview form has been filled out, the employee is expected to use that information to fill out an almost identical form: the online CRU form. The CRU or *Cédula de Registro Única*, which translates to unique registration card, is the main element of the "Network" (*la Red*). This Network is conformed by key actors such as hospitals, LUNAs, police stations, amongst others, who are involved in the processes regarding domestic abuse. The CRU's goal is to offer the victims' information and updated case history to all members of the Network.

After having filled out the CRU, employees fill out information on a third occasion. This time they do it in a physical or digital database that is uniquely used by the employees of the LUNA she or he works at. This is the tool employees use on a daily basis to provide user service. The database with which each LUNA works is different, which is a hindrance for the homogenous reporting for the general management. This process entails tedious steps, both for the victim and the worker who fills the forms out. Through my alliances with the mentioned stakeholders, I was able to conduct a research project in order to understand these and other protocols to improve the service given by the centres through technology. Considering the lack of equipment, UNDP's Acceleration Lab donated tablets so every LUNA can make use of the technology designed for and by them.
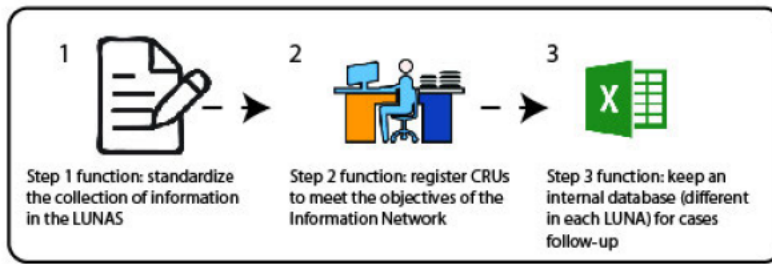
Figure 15. Diagram: LUNAs 3 steps for information capture.

7.1.4   LUNA Organisational Processes

Amongst the findings obtained with the shadowing exercise it stands out that there is information captured by LUNAS employees on three occasions: 1. Initial interview, 2. Filling the CRU, 3. Internal database. During the interviews with the JUDs, I was suggested to design a database that would allow them to fill in the victims' information only on one occasion. The first survey made it clear that employees do have a hard time with filling out the CRU and did not want yet another format to fill in information in. I received a lot of comments asking not to add an extra administrative step to their already jammed schedule.

"The CRU is complicated. If this dashboard were to replace it and the user database, I would appreciate it very much. If it's one more report it would imply more time for administrative tasks."--First survey response.

Unfortunately, I was instructed by the Secretariat for Women and the Digital Agency for Public Innovation (ADIP) to not mess with the CRU or the Network.

My visits were crucial to realise that each LUNA had their own internal database, since the CRU does not afford giving follow up service and lacks the necessary features for their everyday activities. Being able to observe this highlighted an area of opportunity for the homogenization of LUNA work tools through the proposed technology.

When a woman visits or calls a LUNA, the first thing to do is to determine the risk level through the initial interview. If the risk is not determined to be critical, the woman receives personalised attention within the next few days, including therapy sessions and legal advice. When a case is

considered to be critical or under femicidal risk, it is analysed and discussed immediately by the LUNA manager, LUNA director and sub-director. They make a strategic plan for every case. The manager is in charge to make sure they call each victim at least once a week, depending on the victim's availability to receive calls, to see how the case is evolving. If she is not located they leave a message, with a pseudonym agreed upon previously such as the woman from the shop, asking them to get in touch. LUNA also asks for an emergency contact of someone of trust in case she does not report herself. In case the emergency contact has no information on the victim, they organise an undercover visit in which one of their social workers comes to the address pretending to sell beauty products, to name an example. This normally works fine but during the pandemic things got complicated. It was no longer as simple to send someone over.

"As part of the follow-up if they do not answer (victims) we call the emergency contact. If they don't tell them anything, we do home visits to locate them. Here is where it got complicated. Who should we send? In which transport? It was risky. Normally they get there with an Avon pamflet saying they're selling make-up, for example. During the pandemic it got complicated but we still managed, we located most of them."-- Female sub-director, interview.

Before my intervention, only quantitative data was being collected at LUNA (how many first time visitors in a month, how many psychological therapies in a month, etc).

"There's a call register for within the weekly report but it's merely quantitative. We don't know more. I don't know how they register it in every LUNA, whether it is a notebook, Excel sheet, etc.) The managers report the weekly services offered, on site and by telephone. From this register I get how man first time visits each LUNA received (which are always on site), how many follow up visitors on site they received, how many legal assistance calls, psychological calls, calls received reporting violence (here it's not clear then if they received assistance or an appointment), calls received reporting femicide risk, etc. Every LUNA registers it differently. We should maybe homogenise how they register that information." –Female LUNA director, interview.

However, many of the LUNA employees were sceptical when I mentioned a dashboard for registering users. They weren't excited about yet another format to fill out. It was therefore crucial to consider their comments in order for this tool to decrease the time it takes to register and give follow up to a woman, not increase it.

LUNA is a part of Mexico City only so coordinating work with other states was complicated.

"Some of the women under femicide risk left to different states. Por different reasons. We weren't told about them. We would have to make sure the aggressor wouldn't locate them. Organising different states was complicated. We give follow-up, telephone assistance."--Female LUNA director, interview.

The corona pandemic made evident how understaffed and overwhelmed with workload the LUNAs are. The number of visitors of the 16 LUNAs that remained open decreased from about 1,500 first time visitors to 250 a month. This gave social workers the opportunity to give proper follow-up service to the open cases they had been working on. The decrease in first-time visitors gave them the opportunity to prioritise urgent cases and they were finally able to see increasing progress within those. According to the Director, LUNA services can only be appropriately offered on-site, which made it difficult for them to operate during the Covid-19 pandemic.

"The protocol was designed to be followed on-site. We had to make the transition to be able to offer support via telephone. Now it's a hybrid. What we need to guarantee is that we have femicide risk victims well located and to make them trust our services so that they check in via telephone whenever they can and need help."--Female LUNA director, interview.

It is harder for victims to focus when receiving help via telephone due to the emotional stress that they are going through.

"Sometimes it helps (offering help on the phone) and sometimes it complicates things because they cannot focus in such an emotional situation. The staff helps to orient her and calm her down in order for the communication to be effective. They try to make sure that the victim understands

every part of the protocol that is being explained to her but via telephone it's definitely more complicated for them."--Female LUNA director, interview.

Through the employee interviews I found out that psychologists and lawyers both keep a private record of their consultations (manually) and they then inform their JUD about the most relevant aspects of each user's process. The procedure for this information exchange was mostly in a face-to-face format with the JUD having to write such updates in their database.

The lawyers and psychologists also benefited from the hybrid working situation, saving some time by having a fair amount of sessions via telephone whenever the victims agreed to. The LUNA director believes this work to combat domestic violence shouldn't be done by LUNAs alone but way before the cases rise to homicide risk, through prevention. Once the cases turn dangerous, no matter what outstanding service the LUNAs offer, the victims have to carry on in another type of governmental dependency (e.g. Attorney General), where the treatment towards these abused women is different. LUNA employees have "lost" users due to their extremely negative experiences in taking legal action against their perpetrators. I was told an anecdote of a victim who was attacked with a backpack full of power tools weighing over 20 kilos- a deadly weapon. When she took the courage to file a lawsuit, the man reading the report undermined the gravity of the "backpack case" and she left yet again, abused. This backpack crime misconception could have been either a problem of categorization or the product of "not thinking" about women's safety [15,31]. In order to prevent this from happening, LUNA counsellors accompany victims to such heavily masculine power structured places, which in the opinion of the LUNA director, should undergo a series of theoretical and practical workshops in order to be able to aid the half of the population who urgently, and in many cases as a matter of life or death, need their help: women [28].

Based on interviews, I was able to learn that the CRU is not very useful in day-to-day LUNA activities and that there is a wide range of opportunities to improve it. There is a substantial list of usability problems regarding the CRU, most of them resulting in CRU duplicity (victims have two different CRU numbers and files due to a variety of reasons).

"The Network (CRU system) doesn't work well, it has such basic design problems. I wish I had more hands and brains, I only have two developers in my team. If I had more help we could be able to improve the Network."--Female IT manager, interview.

The CRU Network actually offers a tool to create statistics, only with some limitations.

"This CRU version is very limited. You can get some statistics from the LUNA that you are working in but only with an executive account (only for managers). They do not use this tool."

An aspect that highly affects employees' motivation to collaborate together has to do with the type of contract they have. In all LUNAs there are two types of contracts with very different work conditions that directly affect employees.

"Some come with one type of contract and some with another. The ones who come with more sensibility and compromise are under payroll type 8 and they earn less than the other type of employees, who don't work as well. You can see more compromise with the payroll type 8 employees. They have longer hours, they earn 6,000 mxn per month. They sometimes stay until 3 am. The unionised workers earn almost 12,000 mxn a month and work one or two hours less. A good incentive would be to match their working conditions."--Female LUNA manager 1, interview.

7.1.5   Employee Personal Barriers

One of the initial findings from the interviews was that the technological literacy of LUNA workers is very basic and they require guidance.

"We received many emails, during the quarantine, with the most basic questions and problems. Many didn't even know what a browser was, they had problems logging in, picking and setting a password, etc." –Female IT manager, interview.

There are not only personal barriers on the employees side but on the victims side as well.

"At the beginning of the pandemic, I thought that they (employees) had no telephone experience, they were going to have people working from home, with their own telephones. And that is risky but that is how they have solved it so far. It came up to me to generate a whatsapp number to be in contact. They told me that it was complicated, not because of generating the tool but because of its accessibility. They have older adults (as LUNA users), who don't handle phones well, they answer calls and that's it. It would have been easier maybe through sms. With a menu to choose the answer, are you at home, are you alone, can I call you right now? It would have helped them but at the time they didn't have it. I like the idea of a virtual assistant. Sometimes I call a LUNA and they don't answer. If only two colleagues are there, they either give service or answer the phone. With a virtual assistant that could answer faster it could be quickly determined with 2, 3 questions if it is an emergency, link the call with the manager, whether or not she's in (the LUNA)."

Victims were offered monetary aid through funding from UNDP but due to the technological skills needed to get the money, some were not able to go through the procedure.

"The bank proposed an app to do everything online without the need to have a card. They (victims) had a lot of problems, from downloading the app to not having enough data or money to get data, to those who were clueless or had no smartphone. Some even write to us saying they were able to get the digital money but they don't know how to actually get the physical money. Plus some LUNAs are located in more rural areas where they don't have the same access to technology."--Female LUNA director, interview.

7.1.6 Technological Barriers

The technical difficulties encountered as a consequence of the LUNAs' obsolete technological equipment, which will be described in this section, worsens the LUNA situation. This hinders the appropriate case follow-up and data gathering. Nevertheless, the instructions from the higher ranks are to use the system, and so the system is used. In the words of author David Graeber, "the idea that bureaucracy has anything to do with rationality, let alone efficiency, might seem odd" [21]. During my interviews, I was told of the former system, which used to work flawlessly. But with a new administration came funds for projects. Out with the old, in with the new, instead

of working with what had already been developed and established. In this panorama, I was instructed to not mess with the CRU. The head of IT mentioned she wishes there was more she could do to improve the CRU and its network. Unfortunately, with the extremely restricted budget she is given, their obsolete equipment and only two developers on her team, there is not much hope.

Most of the interviewed employees feel overwhelmed with their workload since the LUNAs are heavily under budgeted and understaffed. Interviewing the LUNA's head of IT made it clear that many of their centres are under equipped as well. They lack the most basic equipment such as a working computer with internet connection which makes it difficult to homogenise the services in all centres. This situation has resulted in the employees having to use their personal mobile devices to work which is not only inconvenient for them but it endangers their safety and compromises the users' data.

"They (LUNAs) have different computers, some are newer, some are archaic. Buying software and hardware is quite complicated, especially with the new administration and their austerity measures. We used to buy new equipment every year, with federal resources, to try to keep the centres updated." –Female IT manager, interview.

LUNAs have a big obsolete infrastructure problem that is directly related to an extremely low budget.

"Last year we were able to buy new hard disks to update all of our computers but it took our provider over three months to find such old disks. We used to have more funds but now we don't have enough even for new cables. I used to replace parts in order to extend equipment life cycles but now I can't do that since we don't have enough to even get new memory cards."--Female IT manager, interview.

Resuming the topic under equipped and under budgeted, I personally did not perceive a lack of equipment nor any extremely precarious situation. In the centres I visited, each employee had their own desk with a computer connected to a proper internet connection. During one of my

manager interviews, I was asked which other LUNAs I visited. When I mentioned the locations, she made a comment regarding how they wanted to make a good impression and if I had gone to different locations, that would have been a different story. This leads me to the conclusion that in an attempt to keep appearances, I was invited to come to some of the nicest LUNAs out of the 27. Appearances are important in Mexico, and at the expense of me helping them, they did not want me to see the problems they were facing. This Mexican cultural aspect of minimising their issues led me to believe that they could have done something similar during the surveys. Since I was doing a voluntary job, they were all nice and did not want to be rude to me by criticising my work. After suspecting this, I made sure to constantly tell participants that being super honest and critical would help me to achieve the best result possible for the women's benefit.

"We have eight computers. We are one of the best LUNAs. Some only have one."--Female LUNA manager 1 interview.

The problem of having different equipment in every LUNA, complicates the homogenization in services and/or their quality. They would require a video camera but not every LUNA has one due to budget constraints.

"..for some user services we would require a camera but not every LUNA counts with one."--Female IT manager, interview.

Furthermore, having to use archaic equipment results in connectivity problems.

"Since the computers are old, their processors can't support the internet service, making it at times impossible to work with the CRU network."--Female IT manager, interview.

Connectivity problems result in more work that could be otherwise spared. The bad connection forces employees to fill out a printed CRU format that still needs to be typed later on. This could lead to a regular problem of the CRU not being uploaded immediately. The formats start to pile up and if the victim visits another agency within the Network where it would be required to enter her CRU number to see her case, the CRU would not be there. This then leads to a chaotic action of new CRU numbers being registered, resulting in a CRU duplicity.

"If the internet doesn't work, employees fill out a printed CRU format."-- Female LUNA Director, interview.

Whenever employees cannot access the CRU and have to fill it into the printed format, things get complicated.

"The printed format does not match the digital one 100% because they haven't been updated. They have some differences.The registration is hence sometimes not done properly. There is room for grammar mistakes that doesn't allow employees to find the information they need. Employees complain about this. If you do not generate a good register you can create a false alarm."--Female LUNA director, interview.

Most LUNAs operate with an internal database for their day-to-day activities. Those databases are different in every LUNA and were created as a tool for them to give follow up to their cases. An example of a database they use in one LUNA consists of a digital excel database with key information and physical files with case details.

"Our internal database consists of only name, birthdate, our LUNA centre district's name, victim's suburb of residence, date of first visit. Whenever we need to give follow up to a case, we look up for this information to see where the physical file is located that we have to look for manually in order to see more details."--Female LUNA manager 2, interview.

As mentioned before, their own network infrastructure is another problem. In some LUNAs they have around 15 computers connected to one router which is not enough. Their internet includes 20G and has to support running their website with an extremely old server.

"Also, the internet is too basic to support all the processes. We would receive complaints of the CRU network not working. Many times it was something really basic like they had a YouTube tab open which was taking all the internet. I wanted to switch to Ethernet in order to not have all computers connected to one router but the amount of money required (around 2 million pesos

which is equivalent to approximately 90,000 euro) was not granted."--Female IT manager, interview.

UNDP Acceleration Lab has helped LUNA with organising workshops and training sessions (i.e. Excel) to increase the employee's digital skills. Most times UNDP has very high goals that can't be supported by LUNA infrastructure.

"Sometimes UNDP wants to organise a 2,500 participants course or event and I have to stop them since my infrastructure can't support that. There is support and growth opportunities but without a proper infrastructure it is impossible."--Female IT manager, interview.

LUNA wishes to have better conditions for their workers in order for them to be able to perform.

"That every employee had a computer with proper internet, exclusively for their work. A device where after they finish the phone or on site assistance they could register everything about each case's process: she received psychological attention, she has an appointment for legal advice, we still need to finish such legal procedure, we concluded with certain legal procedure, etc. With all the information in a system or database with reports."--Female LUNA sub-director interview.

7.1.7 Employee Stress Levels

A negative aspect that was present in almost all of the employee's interviews and surveys is the emotional distress factor. When asked about how high they consider their own and their teammates' stress levels to be on a likert scale from 1 to 5, being 5 the highest stress level, 10% answered 5, 52% answered 4, 29% answered 3 and 5 % answered 2 and 1 respectively.

"The stress levels we undergo in the LUNAs are without a doubt high. To have and to feel the responsibility of saving the life and integrity of these women worries me heavily."--First survey response.

Like many other social workers, LUNA employees are under a great deal of stress and emotional exhaustion due to the nature and conditions of their work (understaffed, lacking equipment,

underbudgeted). Previous work has looked at data visualisation to help government employees be more effective but not how to help them manage the emotional labour they are exposed to [32]. Is there a way for these interfaces to help LUNA employees to balance their own mental health and boundaries? [13]

Moreover, due to the Covid-19 pandemic, some employees were working from home, creating conflicts and feelings of unfairness between them.

"More than stress, it is important to inform you that some colleagues are angry and dissatisfied with the fact that some of them are working from home. They feel it is unfair and this is generating conflicts amongst them."--First survey response.

7.2   First Evaluation: Surveys

In order to collect feedback from LUNA employees, managers and general director, I designed and sent out surveys with basic views and functionality descriptions of the new dashboard prototype. I received 21 responses from study participants. When asked about their first impression of the dashboard, I received 13 positive comments and 6 negative ones, which I used to make improvements. Some of the positive comments were:

"It looks friendly and interactive, although I would need to get to know it in more detail."--First survey response.

"It concentrates all the user information we handle in the LUNA, we can control the information better and find it easily."--First survey response.

"It is a very summarised dashboard that allows us to have information at hand quickly."--First survey response.

"It looks very good since it allows us to see easily and in a graphical way, each user's status."--First survey response.

"Visually, it's very pleasant and easy to interpret. I just have the question whether it will contain all the specific user information and the distinction between on-site and telephone service, since most of the follow-up service is done via phone."--First survey response.

Some of these answers allowed me to consider features I had not thought about and to make sure that employees would have all the information they require. The negative feedback was also very useful to make sure to include crucial information:

"It looks good although I cannot see in detail what it contains."--First survey response.

"It only gives you general information and no important details of why she (the user) came to visit. It indicates the offered services but no details on why she asked for those."--First survey response.

"I consider a lot of relevant data is missing."--First survey response.

"It is super complicated."--First survey response.

Some comments, like the last two, were not so specific in what they thought was missing or complicated. The following question complemented these answers. I asked if there were any features they would like to see added in the dashboard. These were some of the answers:

"Date of last update".--First survey response.

"I don't know if there is a space to add follow-up information. If not we should consider that space."--First survey response.

"I would find it very useful to add risk levels."--First survey response.

"Indicate whenever the users' risk level changes or when they ask us to stop calling them."--First survey response.

"If she went to the appointments she got channelled to and what happened in them."--First survey response.

"Statistics for example of age range, areas where we have more users, or areas where risks are higher."--First survey response.

These comments were considered for the iterative process. All of these features were included in the dashboard. They will be described in the dashboard section.

Additionally, this first survey also asked about the official LUNA excel sheet they were given to keep all the users' information and case summary for giving follow-up. The goal was to better understand the challenges they face by using the excel sheet in order to tackle those challenges and redesign it properly. When asked whether they made changes to the excel database such as adding or removing columns, 33% said they did. This results in a lack of homogenisation within the different LUNA centres information. The goal here is to redesign the database in the most appropriate way in order for the director to receive the same information from all LUNAs. Also, when asked whether they think their excel sheet allows the evaluation of LUNA work, 57% said yes and the rest no, which offers a good design opportunity. Moreover, when asked how hard it is to give follow-up service using this current tool, on a likert scale from 1 to 5 (being 5 the most complicated), 25% answered 4, 50 % answered 3, 20% answered 2 and 5% answered 1, meaning over 75% have a neutral or negative feeling about their excel sheet. Furthermore, when asked about how satisfied they are with the follow-up service they offer, on a likert scale from 1 to 5 (being 5 the most satisfied), 14% answered 5, 33% answered 4, 43% answered 3, and 5% answered 2 and 1 respectively. To understand the reason behind their answers, I asked why they felt this way. Most answers reflect the challenge of being understaffed which they struggle with.

"I think that due to the heavy workload and being understaffed it is very hard to give follow-up service to that many women. So even though we try to focus on the ones with murder risk, that limits our human resources for giving follow-up to those with high or medium risk."-- First survey answer.

7.3   Pilot Study

During the four sessions of the Pilot Study, I received some of the following comments and feedback:

"The most useful feature for me is the dashboard's summary. In it I can read the notes that allow for a proper interdisciplinary interaction."--Female LUNA manager 1.

"What I have been using the most so far is the new database where I can quickly check and update everything." --Female LUNA manager 2.

"I like how the dates in which the next steps are automatically updated: when was the last follow up and when is the next one. The update on the risk level is also great."--Female LUNA manager 3.

"It is most useful for me to be able to know there was a new incident (that the lawyer wrote about) just by glancing at the dashboard. Next time I speak to this user I'll be better prepared and up to date."--Female LUNA manager 1.

"The dashboard allows us to make a quick diagnosis of each case. Sometimes there is an intervention from each area (legal, psychological, etc.) and you cannot always speak to the others immediately, especially when we're on guard duty. It helps to give a much faster follow up for risk cases for which we have a greater urgency. I have more time now since we can see the information by area"--Female LUNA manager 2.

"The areas in this tool make it possible to see what intervention each area had and what they will work on (also by area) next."--Female LUNA manager 3.

"It helps to create statistics and have them at hand. Sometimes we can generate prevention actions if we detect patterns in the type of violence in each district. Having age ranges helps develop strategies by district as well. Our network of women against violence does not have this type of information as a whole."--Female LUNA director.

7.3.1 Final Evaluation: Surveys

By analysing the final evaluation surveys, I gathered the findings described in this subsection. Users were asked if they thought the dashboard and database required any changes, to which 100% of the respondents answered no. I asked which tasks were the users of the technology performing. The top two answers with 100% of the votes were: a) giving follow up to active LUNA cases and b) checking tendencies in the number of LUNA users. Moreover, 50% of the respondents said they had been using the tools to visualise: a) a directory of LUNA users and their cases and b) the work conducted by colleagues. Finally, 25% of the respondents answered they had been using the tools to consult: a) statistics and b) interdisciplinary collaboration data.

When asked about the generated data that can be now visualised in the dashboard, managers and employees agreed that it will be useful for each of the LUNAs, the Secretariat for Women's Affairs and more generally, for the government officials of Mexico City. A total of 75% of the respondents said that the tools allow for an evaluation of LUNA work- a measuring tool they did not have before I started this project.

In the first survey, I asked participants to calculate the time it took them for different follow-up activities by using their former method and tools. For registering a new user, 14% of survey participants said it took them less than one hour per week, 62% between one and three hours, 19% between three and five hours and 5% over five hours a week. In the final survey, I asked them to once again estimate the time it would take them to do the same activity with the new technological tools. 25% of the participants answered less than one hour per week, 50% said between one and three hours a week and 25% answered over five hours. Even though the time decrease from 14% to 25% to whom it takes one hour per week and from 62% to 50% whom it takes from one to three hours to register a new user is an accomplishment amongst the main goals of the project, there is also an increase from 5% to 25% that answered they now need over five hours a week to complete this task. This change may come across as a negative result for the project, nevertheless, the following survey results show that the time investment on this first task of registering a new user is fruitful in the steps that follow along the follow-up process.

For giving follow-up service via telephone with the old system, 11% said it took them less than an hour per week, 37% answered between one and three hours per week, 26% between three and five hours and 26% over five hours a week. With the new tools, 75% of participants said it now takes them between one and three hours a week to offer telephone follow-up and 25% between three and five hours a week. To register follow-up information in their database, it used to take 50% of participants between one and three hours per week, 30% between three and five hours and 20% over five hours a week. They estimate that it now takes 75% percent of them between one and three hours per week and 25% of them between three and five hours per week to complete this task.

Analysing the data individually with the purpose of making a specific case decision took 25% of the first survey respondents less than an hour per week, 40% from one to three hours, 20% between three and five hours and 15% over five hours. The new tools allowed 25% of respondents of the second survey to conduct this task in less than an hour per week, 25% in one to three hours per week, 25% from three to five hours per week and 25% in more than five hours per week. When performing this task in teams with the old system, it took 20% of them less than an hour per week, 50% one to three hours and 30% three to five hours per week. With the new tools, this task took 25% of participants less than an hour, 25% from one to three hours and 50% from three to five hours a week.

When it came to discussing cases with the victims, employees answered in the first survey that it took 15% of them less than an hour per week, 40% of them from one to three hours per week, 25% of them from three to five hours per week and 20% of them more than five hours per week. With the new tools, it took 50% of respondents less than one hour a week to perform this task, 25% of them from one to three hours a week and 25% of them from three to five hours a week.

The results from the next question allows the comparison on the usability of the old and new system. I asked respondents to rate, on a scale from one to five (with one being the easiest and five being the hardest), how easy they felt it was to give follow-up service to their users. With the old system, 5% answered 1 (very easy), 20% answered 2 (easy), 50% answered 3 (neutral)

and 25% answered 4 (hard). With the new tools, 50% of the respondents answered 1 (very easy) and 50% answered 2 (easy).

I also asked how satisfied they felt with the results of the new tools on a scale from one to five (with five being the highest level of satisfaction). 75% of the respondents answered 5 (very satisfied) and 25% of them answered 4 (satisfied). I asked to explain their answer and received some of the following comments:

"Because it is clear, precise and simple." -- Final survey response.

"The tools seem simple, objective and practical, including the fields that were added and that it considers the services offered." -- Final survey response.

"Because every time its use was more simple and practical." -- Final survey response.

"I feel satisfied because it is a database that allows me to have control of the offered attention but there are many fields that in the end I feel are necessary, but it will take quite some time [to fill them out]." -- Final survey response.

I received a couple additional comments at the end of the survey that convey gratitude for involving the different types of employees and managers in the design process. For example:

"Thank you for considering our opinions and contributing to a more precise and interdisciplinary follow-up service." -- Final survey response.

"Thank you for the time, clarity in the explanations and disposition. I am sure this is significant progress in the work we perform in LUNA for the benefit of women." -- Final survey response.

8   Discussion

According to the United Nations, around 30 percent of women have been victims of domestic abuse globally [54], a problem arising oftentimes from 'unbalanced power relations within society' [43]. The suffering includes physical, mental, sexual and/or reproductive health consequences and the way out of that unbalanced situation dwells within the systemic complexity of a so-called wicked problem. A woman's way out relies mostly on her *agency*; her ability to take life decisions, including the emotional, health and economic aspects.

When talking about the global problem of domestic violence [43] the first thing to understand within a social group is what a healthy relationship looks like. Some people may not even recognize they are in an abusive, controlling relationship because that type of relationship may be "normal" for them. When doing such social work it is crucial to be specific and objective with certain questions. Women that come to a LUNA seeking for help answer no to the interviewer when she asks if she has ever been abused by their significant other. When asked more specifically by the social workers- has he ever called you names? Denied you money? Prohibited you to go somewhere?- the answer is different. They'll answer: "sometimes, but that's normal" or "just a few times, but it was my fault". It is common not only that the victims blame themselves for their abuser's behaviour but also that the abuser does not realise they're engaging in incorrect practices due to a number of reasons (i.e. exposure to abusive cycles during childhood, cultural promotion of male violence) [3].

HCI's support on improving working environments [24, 45, 46] focused on social causes and the rapid growth in development and inclusion of feminism in design are imperative to induce the change of practices surrounding women around the world. I used a participatory approach throughout all the phases of this research project in order to deliver interactive interfaces that will make a difference in the experience of LUNA employees, managers, director and users. The proposed database and dashboards are tools that will empower the agents offering support to battered women so that they themselves can be also empowered.

Moreover, I considered the feminist interaction design qualities of pluralism, participation and advocacy [1, 2, 45], having always the user gender in mind. I also drew inspiration from Bardzell's "methodological considerations, including a more transparent and reflexive relationship between researchers and research subjects, pluralist strategies to access and represent different ways of knowing, and a special emphasis on accounting for female voices"; considerations which are reflected in the resulting technological tools' features. This research work fights against the feminist challenge of disembodied rationalism by focusing on the user gender and considering the user's perspectives on interaction design and user experience design; something that according to Bardzell, traditional scientists have failed to consider thus far.

The developed technology aims to reduce the gap in women's participation in technology (Camp, 1997). It tackles the problem of technology being seen as a masculine culture and being shaped by masculine interests and power in an already masculine power shaped structure [45] in which the LUNAs find themselves. This structure is required to be urgently transformed so that governmental agencies can properly collaborate with dependencies like LUNA, whose social workers stand next to the victimised women in the battlefield while men in high ranks determine the outcome of the battle. Most likely, and even undeliberately, this decision will be biassed, with feminine voices unheard and underrepresented [12, 27]. Using a feminist lens to analytically critique established systems allows the detection of opportunities for improvement with the aid of new HCI practices based on gender equity and social justice.

As the director mentioned, the work being done by LUNA is in fact making a difference. Some victims are so satisfied with their efforts that they act as ambassadors, recommending LUNA services to other women. But the work doesn't stop there. What is needed is to increase governmental support in order to prevent domestic violence, especially that with femicide risk. Moreover, the interdependency work is to be improved and for that to happen, bureaucratic procedures should be transformed. "Bureaucracy is the technology of control" [25] and as long as control continues to be prioritised over freedom, organisations won't keep up to their citizens' needs of our age due to incompetence and rigidness.

Ultimately, the collection of proper, unbiased data to level the gender disparity in societies [45] and its utilisation to create policy [27, 55] is crucial to tackle domestic violence duly at scale. Before my intervention LUNA was collecting only quantitative data and now they have the opportunity to bring more to the table, increasing the potential to inform decision and policy making. The data collected with this database will aid LUNA directors and managers to continue in their personalised discussions and planning allowing for 'more tailored and customised policies' (Einav and Levin 2014). Designers and researchers have thus a responsibility to understand how classification systems affect User Experience. The example of the victim in the prosecutor's office that was attacked with a backpack full of tools is a good example of this. Had there been an official catalogue of weapons within the formal format to file a sue, the woman could have been armed with the tools to report her attack without having to basically convince the government agents about the gravity of her case. Everything that appears as universal or standard is the result of negotiations and organisational processes. But who determines the final outcome in preparing such a classification, and with what end? Research shows that data is infrastructure (Sarah Williams, MIT). With the new technology, LUNA is now able to gather data that will transform the way they tackle domestic violence. Now the question is whether the government dependencies that collaborate with LUNA will come forth with the motivation needed to undergo this transformation. Just as Williams describes in her work, sometimes government dependencies have the data they require to prompt a change but lack the motivation to do so, especially when dealing with women's rights in a highly masculine power structure [12, 55].

The data now compiled by the LUNA dashboard serves different actors differently depending on their specific and particular goals. From the more specific to the broader, data collected in the database helps LUNA social workers in their day-to-day activities such as follow-up service. LUNA managers can then take the general data from their LUNA to analyse their impact, give employees specific instructions, make strategic decisions on cases and LUNA management. The director can then take this data to make administrative decisions and report impact and statistics to her supervisors from the Secretariat for Women's Affairs, who in turn can make use of the data to identify patterns to create policies for combating gender violence and advocating for LUNAs' needs. This is the ideal scenario in which, nevertheless, the data goes from being highly

qualitative to merely quantitative. Violent cases turn into numbers, switching from a highly empathic to a merely administrative or bureaucratic work.

The information needs of these four mentioned actors are quite different, going from being a specific, urgent and sensitive life-or-death matter to a percentage on a chart. Dealing with the symptoms of a historically neglected population and only slowly starting to focus on preventive measures. It is important to mention that the charts that are being presented by the LUNA Director to her supervisors of the Secretariat for Women's Affairs are all made by her by hand with the data gathered from the individual LUNA weekly reports. This is an arduous task that can now be automated, resulting in more time for the Director to focus on other important tasks that require human intelligence.

This combined with how well a computing system works within this certain culture and society, can benefit the feminist ideals in Mexico by teaching women that patriarchy and its practices are a construct [45]. It is within these constructs where research and design opportunities are. Many abused women in Mexico are not even aware they are being abused. They feel like they are being treated "normally". This tool, with specific questions related to verbal, physical, psychological, economic, reproductive, sexual and patrimonial abuse will be a key and empowering tool for abused women to be able to be objectively heard in such traumatic experiences that are often embarrassing and scary to talk about. The fields required on the database will serve as a guide to objectively document, validate and assess victim's cases.

Through the user interviews, I realised there are many aspects that counsellors should consider and use caution when working on. Assertiveness is key in order to not put the user in more danger. The same caution must be practised when designing technology for such delicate topics. When brainstorming for the dashboard features, I imagined there could be a tool to remind employees to contact users after a certain amount of time to follow-up on their case. An experienced JUD told me that is not a good idea since every case is different and this is where human intelligence and consciousness has to be put to practice. AI is still not advanced enough to assess when it is pertinent to call or text a woman under risk. Perhaps such a tool could be helpful for a JUD or an experienced employee but could cause a new or inexperienced employee

to create an undesired or risky situation.

In our interview, the LUNA director mentioned their services cannot be offered properly online. Nevertheless, examples of HCI to support domestic violence victims show that technology can in fact aid in this process. There are technological tools like the ones mentioned in the related work section that are helping victims and aggressors to go through their healing process for example through storytelling, which is how people learn and exercise agency [15]. LUNA allows victims to share their story and be heard. HCI and CSCW tools also allow victims to be heard by a larger audience, resulting in a greater reach and impact. For urgent femicide risk cases, the care and human intelligence of an expert is required but technology can support victims and social workers at different stages before, during and after abuse, throughout the entire healing process. Just like these and other digital tools, LUNA employees and managers will be able to perform their activities under the modern nomadicity format. Whether due to a pandemic or simply to more flexible work conditions, LUNA workers, with the support from their new tools, now have the option of working from any location while staying up to date with the victims' cases as long as they have access to the database which is safely stored in the LUNA digital drive. This could even lead to an increase in job productivity and satisfaction according to [11].

9   Limitations & Future Work

This chapter will shed light on some of the Limitations I encountered during this research study as well as on some Future Work opportunities I came across thanks to my collaboration with LUNA and its relevant stakeholders.

9.1   Interdependency Work

The participating LUNAs and general director implemented the new tools- database and dashboards- to their operations. Integrating the new database and dashboard to the 27 LUNAs is a transformation that the director and head of IT are willing to undergo if the technological adoption phase in the five participating LUNAs shows to be successful. A concrete risk regarding the tools implementation is the fact that the success of the project depends entirely on one specific stakeholder (female) who is the head of ADIP. As mentioned in one of the former sections, this agency is in charge of implementing technology into government dependencies in Mexico City. After evaluating the developed technological tools and their effects on employee performance and user experience, it will be in ADIP hands to decide whether the tools get to be formally implemented in LUNA or not. To counter this risk, the ADIP director and colleagues were interviewed in the Pre-Study phase in order to understand their expectations on the technology. Moreover, there is also the risk that the LUNA technical infrastructure won't support the system (i.e. excel sheets) due to its already mentioned challenges (i.e. archaic equipment, low bandwidth).

9.2   Future Work

Feminist HCI tools like this could be further developed to have an even greater impact. With this project, I impacted the LUNA centres from Mexico City, but if translated to other cities or dependencies, this kind of research and tools could make a significant impact. Feminist researchers Hanmer and Saunder conducted interviews to develop forms of self-help and mutual support among women [2]. Just as those interviews, filling up something similar to the LUNA database on their own or with the help of another woman, could be a very useful tool to both reveal and prevent endangering situations. This would be a great first step to change Mexico's and other countries' numbers and cultural practices related to gender abuse. As mentioned

before, a large, yet unknown, number of abused women are not even aware they are being abused, suffering silently and normalising these situations at home for future generations to relive them. There are a myriad of design and research opportunities that derive from existing and arising Feminist HCI literature and researchers and designers should take advantage of this gain in momentum in order to help its progress boom and reshape social gender knowledge around the globe.

9.2.1 Features

One of the early prototypes of the technological tool included an interactive map where employees would be able to identify patterns (i.e. risk level linked to drug abuse) in specific areas of Mexico City. The Government of Chicago owns a similar application with an interactive map that allows users to navigate through the city and locate specific types of buildings in order to understand how Chicago is zoned (https://secondcityzoning.org/). Such projects can be a good inspiration for initiatives to make a change, especially since this project was developed voluntarily for the city's Data Science Division. This type of tool would allow LUNA direction to demand certain changes or implementations in policies that are desperately needed in the Mexican capital. By including a map like this, the dashboard would be a more complete tool. Furthermore, if it allowed employees to add information directly on the tablet instead of having to add it on the Excel database, it would allow them to work with the tablet only instead of having to use two devices/interfaces. Both of these features are technologically more ambitious and due to time constraints it was not possible to develop these affordances further.

Even after they are safe, women who have suffered domestic abuse can present related issues including guilt, posttraumatic stress disorder, anxiety, depression, amongst others. Or they also repeat abusive patterns. These are all opportunities for future interventions and research. There are useful emotion regulating strategies such as journaling, being able to read stories from others, goal-setting, self-reflexion, etc. which, through the feminist HCI lens, could propose a more effective, on scale change.

9.2.1 Further Projects

Another proposal within LUNA technological agenda was a virtual assistant that would lighten

the workload of LUNA workers. Its function would be to offer fast, constant and automated guidance, as well as answer frequently asked questions, thus tackling the problems of remote attention and the large amount of time spent by staff answering potential and current users. The outstanding advantages of this proposal are, in addition to lightening the workload of the staff, offering constant attention outside the LUNA opening times, and the opportunity to continue the development of the tool (scheduling appointments, case monitoring, emergency linking, evaluation). I hope this chatbot can be developed for LUNA in the near future.

As a new project, along with my HCI colleague Belén Giménez, I developed a LUNA chatbot for witnesses to learn more about domestic violence. This chatbot's aim is to accompany and guide people in the process of identifying cases of gender-based violence and learning how to intervene. In contrast to the first chatbot idea, this chatbot does not handle data from victims, making the interaction less delicate. This educational chatbot would serve as a tool for tackling domestic and genre violence within Mexican society as the project includes Bardzell's quality of feminist HCI of pluralism by making a broad audience participant (not only women) with the goal of aiding abused underrepresented audiences [16]. This chatbot has been developed and implemented and is awaiting approval from ADIP and other stakeholders in order for it to be available to the Mexican public.

In the words of Hassenzahl et al. (2016), UX is a dynamic concept. In the workplace, it has been proven that UX satisfaction may rise or fall over time, with a trend that does not follow a linear trajectory [26]. This type of technology (i.e. dashboard) should be examined for longer periods of time in order to better understand HCI work dynamics.

9.3   Covid-19 Pandemic Influence

This research project started during the Covid-19 pandemic, which changed the way LUNA centres worked. During that time, employees were taking turns to work on-site and remotely from home with almost half of their employees working remotely. The business hours were cut down and only one centre per district remained open.

10   Conclusion

Research shows that the way to fight domestic violence is through the very actions that LUNA is undertaking through their free services. It is exactly through legal and psychological advice, economic and social empowerment, and participatory education, that the instances of domestic violence among intimate partners can be reduced [51]. The last step in the equation to battle domestic violence is the improvement of law enforcement. This is something that is out of LUNA's hands but what is in their hands now, with the aid of their new database and dashboard, is the opportunity to compel policy makers to consider the data collected in order to improve law enforcement regarding this type of violence.

Effective data visualisation has been used to help understand patterns since the second half of the 18th century. And these patterns are specifically valuable when trying to explain results to decision-makers [48]. The use of the database will give structure to LUNA's data, from the very specifics to the general information. The combined use of database and dashboard will be an effective strategy to fulfil the objectives of lightening the workload of LUNAS staff and speeding up the registration of users. But most importantly, it will increase the director's efficiency by allowing her to automate tasks that she used to do by hand. Moreover, such tasks will allow her to analyse cases and identify patterns along with her team, which at the same time, will allow them to plan successful strategies and demand the budget and assistance that is heavily and urgently required.

Through this study with the LUNA centres in Mexico City which consisted of interviews, shadowing exercises, a workshop, a pilot study and surveys, I was able to understand the LUNA environment, interactions, challenges, and areas of opportunity. The developed technology intends to improve the LUNA's user and employee experience by lightening the workload of LUNA staff by speeding up and enhancing the follow-up service protocol. The dashboard will allow proving they are understaffed by quantifying the services offered. This will be a powerful tool for the general manager to ask for more therapists, lawyers, or whomever is required.

With the results of this research study and using Human Centred Design to identify opportunities for artificial intelligence within LUNA, I proposed a functional prototype. The proposal was a dashboard that would allow LUNA staff to view important information to support user service

tasks and follow-up to cases, as well as detect opportunity areas for making future operational decisions. Two of the biggest problems that this proposal attacks would be to help standardise protocols and lighten the workload by streamlining procedures. Before my intervention, LUNA had just a record of face-to-face care and calls that provided only quantitative data. This dashboard would facilitate the collection of both quantitative and qualitative data and also the opportunity to share them automatically with LUNA leaders. Among the most relevant advantages of this technological tool are the collection of useful data for continuous improvements, the homogenization of data for the weekly and monthly reports of all the LUNAs, a better control and intuitive registration for statistics, and an improvement in the work experience of LUNA staff.

The dashboard or control panel covers the established objectives of lightening the LUNAs' staff workload and speeding up the follow-up data registration. However, it is important that the design of the dashboard does not start from scratch, but rather helps to optimise the efforts already being made by the Women's Secretariat to collect and present information on the operation and status of LUNA service. To meet this requirement, LUNA management shared with me capture, database and report formats, which I analysed in order to take them into account when designing the dashboard interfaces [37]. This practice is aligned with the concept of doing more with less regarding governmental platforms. It is crucial to not design technology disguised as a useful tool that instead of aiding, only feeds bureaucratic procedures [21].

In the final survey, after having used the digital tools for a period of one month, users considered that the dashboard and database did not require any changes. All of the pilot study participants used the digital tools to give follow up to active LUNA cases- the main objective planned for these digital tools. A total of 75% of respondents agreed that the digital tools would allow for LUNA service evaluations. As mentioned in one of the former sections, this measuring mechanism will give LUNAs the encouragement to reach specific goals, affecting employee performance positively though clear objectives [36].

It was immensely valuable to design these interfaces with a participatory approach. The LUNA director, subdirector, managers and employees were key collaborators for this project's success.

They are the experts and I merely listened and understood what they needed from the tools that were developed. This way of working helped ensure that the HCI tools are useful and not hindersome. That is why I worked with what they had already, which was an excel sheet, and I merely enhanced it in order to make sure the tool would be properly adopted without them having to develop any new skills but empower them around the ones they feel confident with already. Going back to my Research Question, through this participatory approach I was able to adapt the HCI technology to the abilities and competences as well as to LUNA technological infrastructure and the result was a tool co-designed and accepted by their end-users.

The effort put in this project by the women and men working for LUNA is immeasurable. For its success, they made sure to provide me with every format, database, log; everything they work with-either empty or with made up information (as a guide)- for data protection purposes. They opened their doors to me and offered their valuable time for me to conduct interviews, they answered surveys and gave valuable feedback to make sure that the result was positive. This tool will aid the managers, sub-director and general director, who are all women, to stand out in their work positions and to become better at what they do, something that will be inspiring in such a patriarchal society. Also, it is relevant to point out that this governmental dependency is being a pioneer in this country in welcoming data visualisation into their operations which is a big and courageous step that will bring about favourable results for them and their users, and will also push other governmental agencies to join them. It is crucial to continue to discuss on Feminist Thinking and Feminism in HCI for its proper development and establishment in the Design and STS (Science and Technology studies) spectrum.

By talking with the main LUNA actors like the director, I was able to conclude that LUNAs do a great job: they give proper follow-up, decrease victims risk levels weekly, the users have the trust to call, visit, recommend their services, they even have what they call ambassadors (women who voluntarily recommend their services). What they need now is to improve interdependency work. Women do not trust the governmental bodies that should assist them in completing the process that begins at the LUNAs. LUNA employees would get in touch with government officials in order to follow up on a case only to find out that the process reached a dead-end. According to the director, a considerable percentage of cases didn't reach a successful completion due to discrimination. To name an example, the government officials would

comment on how a woman who was abused had been under the influence of alcohol, making it seem like she was the problem. Their operations are based on a structural violence within which a centre like LUNA cannot prosper. We as designers and researchers have a responsibility and an opportunity to tackle these social challenges from the root through HCI. My contribution advances the state of the art in LATAM regarding HCI to support battered women with the hopes of sowing the seed of change toward women's wellbeing.

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Appendix

a) Pre-Study Interview guideline online

Interview LUNAS care protocol- Version 1 (IT focus)

Intro (5 min)

Thank you for taking the time to attend this research session. I'm Lili from Siegen University. Today I will be the facilitator of this interview. In this phase, it would be ideal to understand, from beginning to end, what the LUNAs care protocol is like, especially that of remote care, that is, when there is no physical contact with the woman, in order to increase its effectiveness. This will help us to validate the discoveries of the previous phase and discover current challenges in caring for women and girls at risk of violence, and the opportunities for feminist artificial intelligence to support their resolution. It is not an evaluation, thank you for this space.

Information collected during the interview process will never be directly linked to your name or other identifying information. All information you provide will remain confidential. For analysis purposes it would be very useful to record the audio of this session. We will not share this recording with anyone outside of the research team. Do you agree that we start recording?

Our session will last approximately one hour and will consist of some open questions that can help us understand more about the areas of opportunity in the current service provided by LUNAs and how we can improve the experience of both users and service providers. service. There are no correct or incorrect answers. You are the expert, who knows the processes, and I am here to learn from your experience. You may decline to answer any question and you may withdraw from this call at any time if you wish.

Do you have any questions so far?

1. What are the objectives of the technology in the remote care of LUNAs?
   a) **What does success look like?**
   b) **What is the expected result?**

2. What are the tasks that need to be successfully completed using technology systems to meet those goals?

3. What are the 3 things for which the technology works very well in the LUNA remote care protocol?

4. What are the 3 biggest challenges you see in the technologies used during the LUNA remote care protocol?

5. What materials or technological tools do LUNA employees use during the telephone service protocol?

6. Do you have an improvement, application or technological solution in mind that you would like to see developed? Any answer is good. At this stage it is very valuable to get ideas that may sound very futuristic or even far-fetched.

7. What system or technology upgrades are on the horizon and when do you plan to implement them?

8. You mentioned there is a dashboard.
   a) **How does it work?**

b)   **What data does it collect?**

c)   **Do all LUNAs use it? Why yes/ why not?**

9. How do users rate the service?

10. If you could describe an average user, what would she be like?

a)   **What type of technology do they use (what type of cell phone, their own cell phone, internet, social networks, etc.)?**

11. How does the protocol for the care of a woman at critical risk proceed?

12. How does the protocol proceed to offer Support/Follow-up services?

a)   **Economic/dependent**

b)   **Shelter**

c)   **Psychological assistance**

d)   **Health**

e)   **Legal assistance**

13. How did you proceed with these services while in quarantine (remotely)?

14. How could follow-up services be improved?

Closing

Would you like to add any ideas? Do you have any questions?

Interview LUNAS care protocol- Version 2

Intro (same as version 1 interview)

1. What are the objectives of the user experience in the remote care of LUNA?

a)   **What does success look like?**

b)   **What is the expected result?**

2. What are the tasks that need to be completed successfully to meet those goals?

3. Could you describe a typical day in a LUNA? (especially during contingency)

a)   **What do different people do?**

4. During the contingency, having to attend to women by phone and not in person, what were the 3 biggest challenges?

5. What would you like to improve about the telephone and remote service offered?

a)   **What would be the ideal operation of this attention? If you could imagine, for example, in 20 years the LUNAs, how would you describe the care provided?**

6. What are the 3 things that work very well in the LUNAs telephone or remote service protocol?

7. What materials or tools do LUNA employees use during the telephone or remote service protocol?

8. Do you have any technological solution in mind that you think would help increase the effectiveness of remote care for LUNAs? Any answer is good. At this stage it is very valuable to get ideas that may sound very futuristic or even far-fetched.

9. **You mentioned that there is a dashboard. Do all LUNAs use it? Why yes/ why not?**

10. **How does the protocol for the care of a woman at critical risk proceed?**

11. **How does the protocol proceed to offer Support/Follow-up services?**

    f) **Economic/dependent**

    g) **Shelter**

    h) **Psychological assistance**

    i) **Health**

    j) **Legal assistance**

12. **How did you proceed with these services while in quarantine (remotely)?**

13. **How could follow-up services be improved?**

14. **How do users rate the service?**

15. **If you could describe an average user, what would she be like?**

    a) **What type of technology do they use (what type of cell phone, their own cell phone, internet, social networks, etc.)?**

Closing

Would you like to add any ideas? Do you have any questions?

b) Pre-Study Shadowing guideline

Introduction

Thank you for having me carry out this research session. I am Lili from Siegen University and today I will be observing the face-to-face and telephone service protocols as well as the interactions with users in one day on this LUNA to identify areas of opportunity. As you know, we are developing technology to increase the effectiveness and improve the experience of users and employees of the LUNAs. This is not an evaluation, simply observing and having an interview with the JUD will help us discover current challenges in caring for women and girls at risk of violence, and the opportunities for feminist artificial intelligence to support their resolution. Please carry out your activities as you normally do and if you think it is pertinent or important to comment on something, do not hesitate to do so. I am here to learn from your experience.

1. **What is the process to capture the information of a visitor/call to LUNAS.**

    a) **Visitor:**

    b) **Call:**

2. **At what times is there capture?**

    a) **At what points is information requested?**

3. **Is a protocol followed to capture the information?**

4. **Where does the information that is captured go and how is it used?**

    a) **Is it used differently by employees who are psychologists than by employees who are lawyers?**

5. **How do employees use the information in Excel?**

6. What kind of information from Excel do employees use for their work?

7. Describe the journey map of one or more women users who visit the LUNA.

8. How are urgent issues handled? (For example, femicide risk.)

9. How do they follow up?

Ideas and notes.

c) Pre-Study Interview guideline on site

Introduction

To begin I would like to conduct a short interview with...[JUD].

Information collected during the interview process will never be directly linked to your name or other identifying information. All information you provide will remain confidential. For analysis purposes it would be very useful to record the audio of this session. We will not share this recording with anyone outside of the research team. Do you agree that we start recording?

Our session will last approximately 45 minutes and will consist of some open questions that can help us understand more about information capture protocols. There are no correct or incorrect answers. You are the expert, who knows the processes, and we are here to learn from your experience.

1. What is the process to capture the information of a visitor/call to LUNAs?

2. What information is important for you to capture?

3. How do you use the information you capture?

4. How do you imagine you could use the information you capture for prevention or monitoring, for example?

5. Describe how you use the Excel database in general.

6. What are the biggest challenges in capturing data?

7. What works well in terms of data capture?

8. How do you use Excel to obtain knowledge that is useful for your work?

9. What information in the Excel database is especially useful for your work?

10. What do you do with the Excel sheet after the information is captured?

11. What information do you see after the capture?

12. How do you follow up on cases?

   a) How do you use Excel to keep track?

   b) How do you use Excel to identify which cases are open and which are already closed?

13. What incentives are important for LUNA workers?

   a) What do you think motivates them? (Be the best LUNA? Help a large number of women?)

14. How are employees evaluated?

   a) How are they evaluated by other people (for example by their boss, their colleagues)?

   b) How do they evaluate themselves and/or each other?

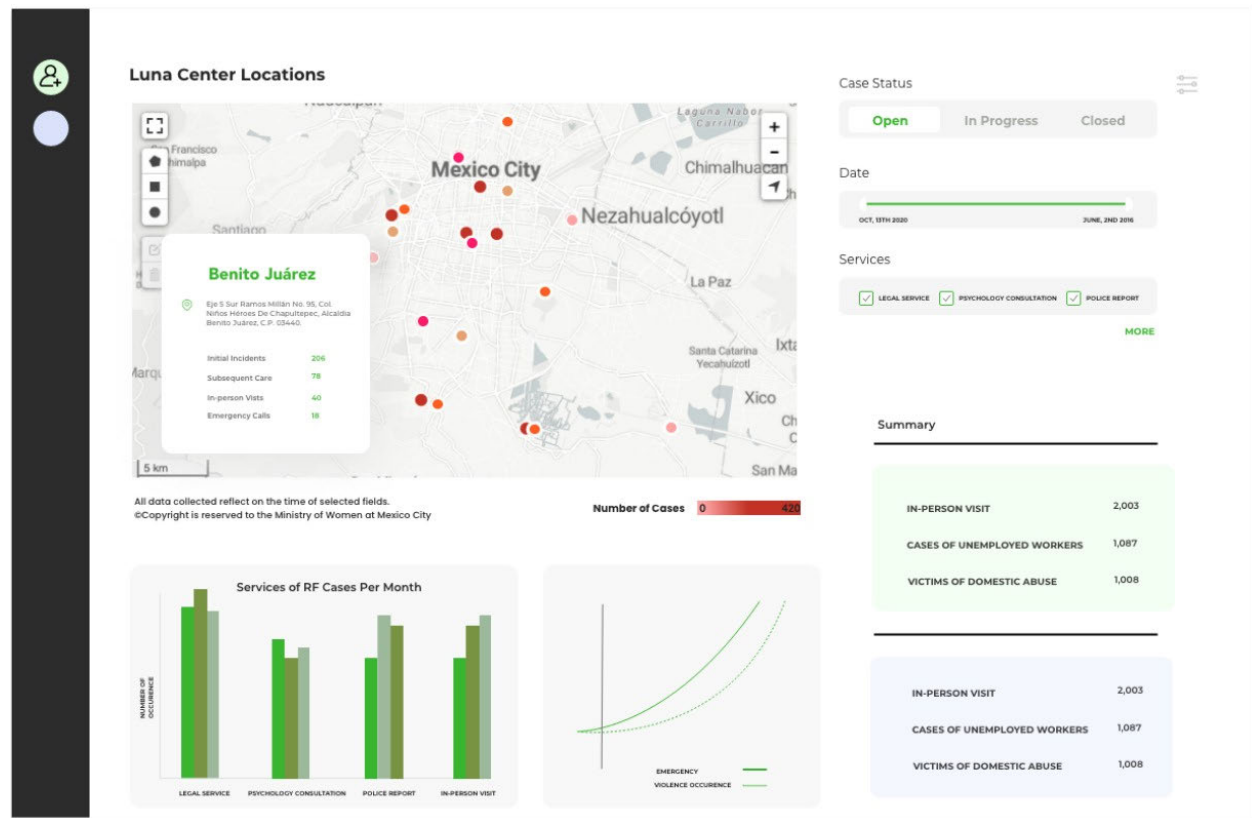*The dashboard prototype is presented to the manager.

Figure 16. First Dashboard Prototype.

13. What is your first impression/reaction when you see the dashboard?

14. What do you like about the dashboard?

15. What do you dislike about the dashboard?

16. What other things would you like the dashboard to have?

17. What information would be important to you for the dashboard to summarise?

a) What qualitative data (for example, descriptions taken in the capture) would be helpful to have in the dashboard?

c) First Evaluation Survey (online)

Hello! This is a survey for people who work in the LUNAs of Mexico City Women's Secretariat. Your answers will help us to incorporate improvements in the dashboard prototype that we are designing for the LUNAs. We greatly appreciate your time and feedback. For any questions, do not hesitate to contact Lili Savage at liliana.spinto@student.uni-siegen.de

The following questions refer to the EXCEL file that the LUNAs use to follow up with the users.

1. Have you made changes to the Excel file that was provided from headquarters to keep track of users?

2. What uses do you give to the tracking Excel file? Select the options that apply... or tell us another.

3. How many times a week do you consult the Excel file with which you follow up on LUNA users?

4. For whom is the user information generated by LUNAs useful?

5. Is the information from the user follow-up file used to evaluate the performance of LUNAs?

6. Approximately how many hours a week do you dedicate to the following user follow-up activities?

7. In the past week, how many users did you track on file?

8. Approximately how many users do you have on file right now to keep track of?

9. In the past week, approximately how many users visited LUNA?

10. On a scale of 1 to 5 (with 5 being the highest), how difficult do you think it is to follow up with users on your LUNA?

11. On a scale of 1 to 5 (with 5 being the highest), how satisfied are you with how you follow up with users on your LUNA?

12. Briefly explain why you chose those scores for the way you track users on your LUNA.

13. On a scale of 1 to 5 (with 5 being the highest), how would you rate your stress levels and those of your team at LUNA?

14. On a scale of 1 to 5 (with 5 being the highest), how satisfied are you with how you handle your stress levels and those of your team at LUNA?

15. On a scale of 1 to 5 (with 5 being the highest), how difficult is it to manage stress levels for you and your team at LUNA?

16. Do you have any additional comments about the stress levels you experience working on your LUNA?

*Dashboard prototype is presented.

17. What is your first impression of the dashboard and its different views?

18. Is there any functionality or feature that you would like to see in the dashboard? What would you ask us to add?

We appreciate any additional comments you want to share with us.

d) Second Evaluation Survey (online)

Hello! This is a survey for the LUNAS that participated in the pilot of the Monitoring Tool and Dashboard of the "Seguras en Casa" (safe at home) project. Your answers will help us finalise the pilot study and make improvements to the tools we are designing for the LUNAs. We greatly appreciate your time and feedback. For any questions, do not hesitate to contact Lili Savage at liliana.spinto@student.uni-siegen.de

The following questions refer to the tracking file that was designed to track the users of your LUNA.

1. Do you have any changes you'd like to propose to the tracking file that was designed to track users' cases?

2. If you said yes to the previous question, tell us a little more here.

3. Select those uses that you can give to the new monitoring tool and the Dashboard.

4. How many times a week on average did you consult the monitoring tool of your LUNA?

5. In your opinion, how useful is the monitoring information generated by your LUNA?

6. In your opinion, is the information from the monitoring tool used to evaluate the performance of your LUNA?

7. During a normal week and with this new tool, how many hours a week do you estimate it takes in the following user monitoring activities?

8. How many users did you follow up using the new tool?

9. Approximately how many users do you have registered with your LUNA monitoring tool?

10. In the past week, approximately how many users visited your LUNA?

11. On a scale of 1 to 5 (with 5 being the highest), how difficult do you think it is to follow up with users using the new LUNA tool?

12. On a scale from 1 to 5 (with 5 being the highest), how satisfied are you with the result of the new user tracking tool at your LUNA?

13. Briefly explain why you chose those scores for the way you track users at your LUNA.

14. On a scale of 1 to 5 (with 5 being the highest), how would you rate your stress levels and those of your team at LUNA?

15. On a scale of 1 to 5 (with 5 being the highest), how satisfied are you with how you handle your stress levels and those of your team at LUNA?

16. On a scale of 1 to 5 (with 5 being the highest), how difficult is it to manage stress levels for you and your LUNA team?

17. Do you have any additional comments about the stress levels you experience working on your LUNA?
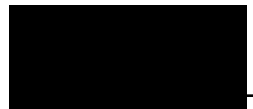**We appreciate any additional comments you want to share with us.**

Confirmation

Hereby I confirm that I have composed the present thesis independently. I only have used the sources and means specified in this thesis. Especially from the Internet, I only have used the denoted references. I have taken note of the section in the examination regulations concerning attempts to cheat.

I confirm that the electronic version of the thesis which I deliver is identical to the printed version with respect to the content. I agree that an electronic version of the thesis will be stored for purposes of inspection of plagiarism.

Date

Signature