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A shared space for families in a children's hospital

RESEARCH PROTOCOL

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SUMMARY

This article presents a research and design project undertaken to develop a shared space for families and healthcare professionals in a children's hospital. For space development, the design team conceived the Minimum Viable Prototype Lab, a participatory design workshop. The use of minimum resources was the backbone of the workshop, as participants would focus on functional or atmospheric requirements to design an Acoustic Cabin and a Proximity Room. The use of cardboard sets helped the users focus on functional requirements. High-quality renderings and floor plans were used to generate discussion about space atmospheres. We share the resulting prototypes and the benefits for getting different points of view. We also discuss the role of images, drawings, and renderings to inform the perception and possibilities of space.

Key Words

Participatory design; Children's hospital; Caregivers; Prototype; Space design

INTRODUCTION

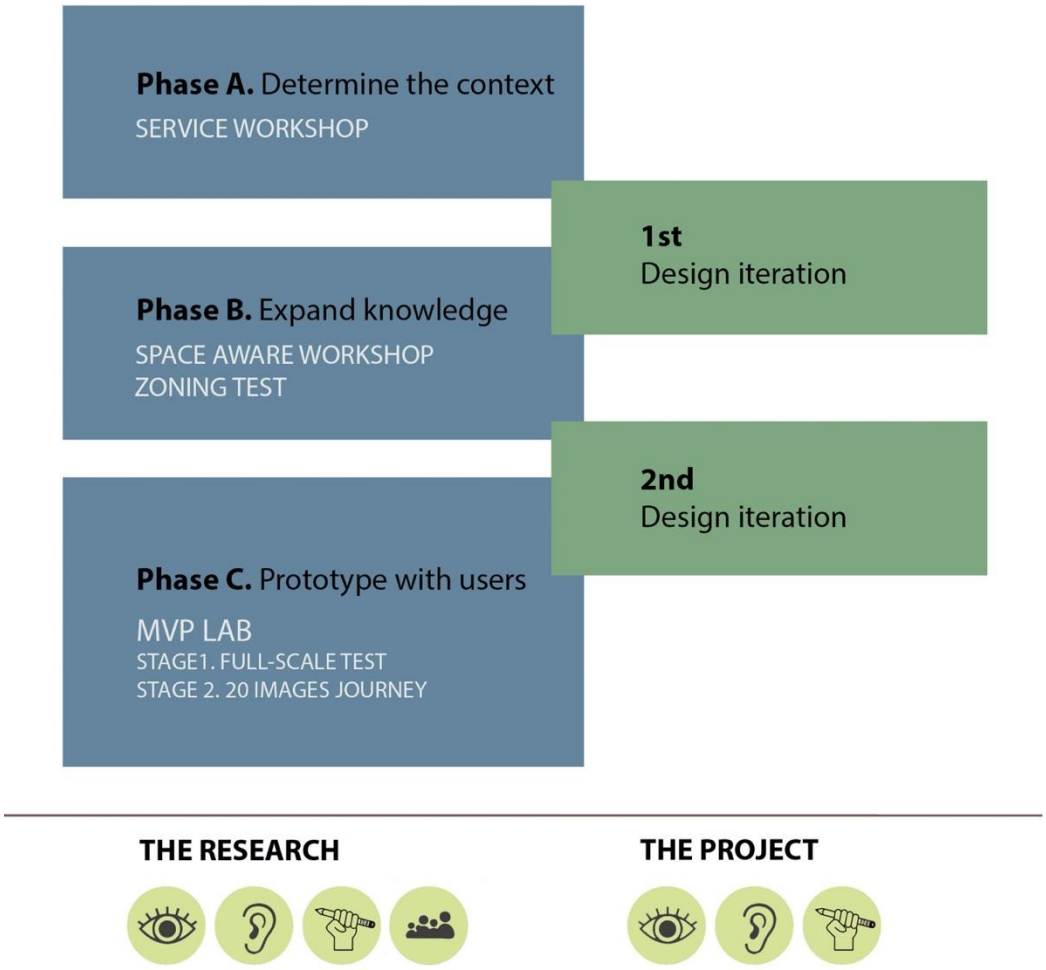
Hospitals generally lack private spaces for patients and caregivers. This lack of private space can be particularly problematic for families or caregivers who bring young children to the hospital. The Innovation, Infrastructure, and Patient Experience (IIPE) Departments at a small children's hospital in Barcelona sought to address this issue. In July 2016, the IIPE Departments put out a public call for proposals to conduct a research project aimed at designing a dedicated, private space for family members and/or other caregivers accompanying hospitalised children.

For this project, a multidisciplinary design team led by designers and researchers implemented a mixed research strategy based on a human-centred design process (HCD). The project placed patients and other users (ie, relatives and staff) at the centre of the research.[1] The patients and users collaborated with the multidisciplinary team to identify and define the project needs and to develop solutions. The research project used ethnographic methodologies, participatory and co-design activities, service design techniques, and architectural design processes.[2] The research and design processes overlapped (Figure 1).

The research project had three distinct research phases:

1. Phase A aimed to determine the study context;
2. Phase B aimed to expand knowledge; and
3. Phase C focused on design proposals and rethinking spaces.

Figure 1: Research, design, and implementation process*



**We highlight Phase C, which includes the Minimum Viable Prototype Lab (MVP Lab).*

These three research phases corresponded with two design iterations in accordance with the British Design Council's Double Diamond Design Process.[3] Correspondence between the research phases and the design iterations aimed to ensure that decisions made by designers were discussed and developed with patients and users. In the first design iteration, the design team transformed the main insights of Phase A into a design program. Participants lead the second design iteration; the scope and results presented in this paper relate to this part of the project.

In this article, we outline the research and design activities carried out during Phase C. The multidisciplinary team used a version of the minimum viable product (MVP) test to establish a critical dialogue with users and patients by holding a workshop to facilitate users' participation. MVP is a concept from the Lean Start-up methodology.[4,5] We discuss MVP to inform the possibilities of space and the role of drawings, images, and resulting prototypes.

BACKGROUND

In Phase A, the multidisciplinary team conducted ethnographic research that included unstructured interviews with hospital staff, patients, and relatives; staff shadowing; and observation of the family space. Over six weeks, the team also conducted in-depth interviews with 11 healthcare professionals (Table 1).

Table 1: List of interviewees

DN	Social worker manager
RB	Social worker
AB	Social worker
MC	Social worker
EL	Social worker
AB	Associations head
TP	Volunteers manager
EP	Spiritual and religious care
MP	Patient experience manager
NS	Child life manager
AB	Engineering manager

The healthcare professionals' feedback was a catalyst for the project because it allowed the team to examine four main problems:

1. The difficulty of locating and accessing services for families—namely, Customer Services, Volunteer Services, Social Work, Spiritual Counselling, etc.;
2. Long journeys between spaces assigned for services;
3. The need for services to share projects and merge processes; and
4. A need for private spaces.

The goal of Phase B was to expand, with the help of relatives and staff, the team's knowledge about the problems encountered in Phase A. Two common requests emerged from the data collected in relation to the need for privacy: 1) the need for a confidential talk area within an open space; and 2) the need for a place to share painful information.

The design team developed two design proposals in response to the two common requests: an Acoustic Cabin and a Proximity Room.

Acoustic Cabin—This design proposal aims to meet social workers' needs. Social workers make many calls to schools, associations, and relatives that disrupt the acoustic continuity of open spaces. The cabin concept is already established in open offices where staff can do isolated work in an open space. However, in the hospital the design team proposed the Acoustic Cabin as a booth added to a table, to enable people to make phone calls, use their computer, and review reports or other paperwork.

Proximity Room—This design proposal aims to meet the needs of family/caregivers and staff to have a place to deliver "first news". The first news moment was described as a sensitive moment where families receive the first medical report about their child. The place to give this information was also designed as a nearby space where family members could stay in difficult times while their

children are hospitalised. It also met social workers' request for a space for spiritual or religious counselling.

The design team developed both design proposals and prepared them for testing (see Figure 1, Phase C). Phase C included a final workshop created in the form of a laboratory. We called it the MVP Lab.

METHOD

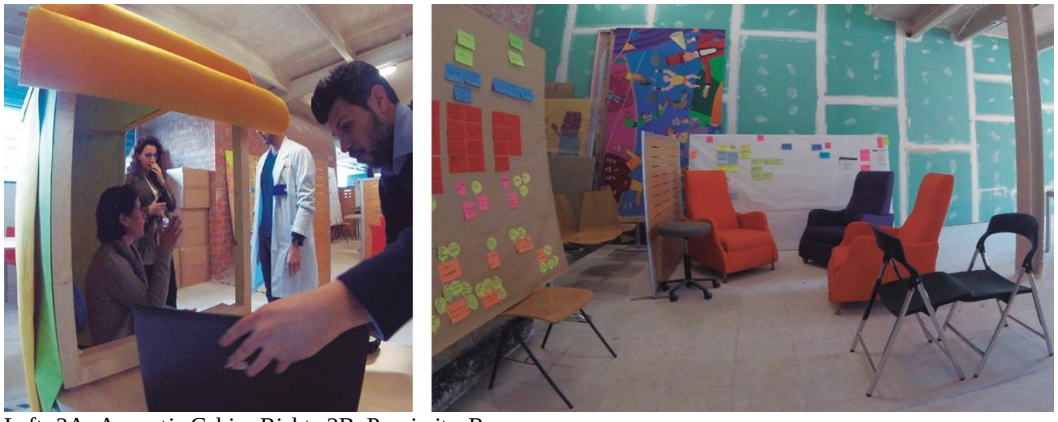
We created the MVP Lab to achieve two design purposes:

1. Share and consider with family members/caregivers, staff, and stakeholders the decisions taken by the design team in the second design iteration; and
2. Forge relationships between space research and production.

For the first goal, the team developed full-scale models of the Acoustic Cabin and Proximity Room. The design and research team then tested them in two stages with 25 users: staff (16), relatives (6), and stakeholders (3). The first stage was a full-scale simulation, while the second was a patient's journey using images. The objective of both stages was to get participants involved in research, space design, and production, to reach the second goal—namely, forge relationships between space research and production.

In stage one of the lab we created functional prototypes (Figure 2). As mentioned in the Background section, we used a version of the MVP to create full-scale scenarios with minimal elements to enable users to discuss, experience, and elaborate on the design of both privacy spaces. We developed both spaces using minimal resources (time, money), but with enough elements to communicate properly the characteristics of the represented scenario. We presented each scenario with a brief storytelling of a family's need. Then participants walked through the scenarios and moved the cardboard furniture and commented on new arrangements. The team asked "What if" questions to explore solutions.

Figure 2: Scenario developed in MVP Lab, Stage 1



Left: 2A: Acoustic Cabin; Right: 2B: Proximity Room

** The individuals that appear in the images granted the authors permission to use their images in the manuscript.*

In stage two of the lab, we used images as prototypes. The images simulated a journey through the work environment (Figures 3 and 4).

Figure 3: Images used in MVP, Stage 2

The images were developed from the results obtained from working with prototypes in the first part of the MVP Lab.

Figure 4: Images used in the MVP Lab, Stage 2

Images used to discuss positions for the use of the Acoustic Cabin.

The tour consisted of 20 images (renderings and floor plans), and we told participants that the sequence approximated the desired atmosphere of the space implementation. Our aim was not only to make information on the atmosphere available to participants, but also to present zoning and technical details to them so stakeholders could remember the space constraints from stage 1 of the MVP Lab. We asked participants to take notes about furniture surfaces, lighting details, etc., to be taken into consideration in the project implementation and the furniture fabrication. We had conversations about lighting, surfaces, and atmospheres with participants to facilitate the observation of the images and to get them to share their opinions; and finally, to take notes about the changes they would like to see for the places represented.

RESULTS

Acoustic Cabin

The acoustic cabin was intended to allow staff to have a private conversation in the middle of a space shared with many other healthcare professionals and patients' families/caregivers (Figure 2A). Specifically, it was being tested to understand how staff could move to talk on the phone in an area

where the patient cannot see or hear the conversation. We created the images to be representative of the movement. The Director of Infrastructures (AB) was the most reluctant participant to implement this prototype as it was a rather innovative one. Rendered images and technical drawings of an acoustic table cabin were used to test cabin positions. At the end of the process, AB commented on his understanding of the differences between seeing the renderings (Figure 4) and the finished device (Figure 5). His feeling was that the finished product was "more real" than the rendered cabin prototype.

Figure 5: The implemented Acoustic Cabin

Proximity Room

A Proximity Room was defined as a place where professionals and families share sensitive information. In the first stage of the MVP Lab (Figure 2B) we described a typical scenario: for example, the space should respond to the possibility of a family entering the consultation room with a baby carriage and/or a wheelchair. This scenario aimed to identify the boundaries of space and prompt "What if" questions. Participants engaged with the scenario, moving through the space and reconfiguring the zones, like the place to sit, where the staff should be, where to receive the family, etc. Each participant arranged the pieces according to their own criteria and their previous knowledge of the use of a consultation room. This facilitated the discussion on zoning and variations: Should there be a clear place for staff and for family members? Should there be a round table and allow any user to decide where to sit? Professionals from Customer Service, Social Work, Volunteer Service, and relatives were involved in the same process of decision-making, and it allowed them to feel part of the same team.[6]

A social worker (MC) used a closeness configuration—that is, she placed the chairs and table in a corner of the room. She said, "These spaces are commonly used to give a first medical report, or for spiritual care". She pointed out the need for an atmosphere of trust in such instances. During the first stage of the MVP Lab she found the atmosphere to be unfriendly because of the coloured papers and cardboards defining the space. Although MC knew it was a mock-up, the sensations she perceived did not align with her idea of "proximity". In this stage of the MVP Lab we had not considered comfort or user-friendliness to be part of the functional test, so we explained to her the functional purpose of the MVP test and offered for her to participate in the renderings and images in stage 2 of the MVP Lab.

In the second stage images were used as prototypes. The images simulated a patient journey

through the new families space (Figure 3). The tour consisted of 20 images, and the participants were told that the sequence approximated the desired atmosphere. The goal was not only to make information on the atmosphere available to participants, but also to present zoning and technical details to them so stakeholders and family members/caregivers could remember the space constraints from stage 1. The images provided a good starting point for discussion and improvement. Zoning was helpful to identify how to use the space. Technical details were helpful to remember the constraints of space. Regarding zoning, all participants found the distribution appropriate and easy to identify and use. It helped them to recognise how to use the space. They identified the areas for workers, for relatives, the common places, and the passing areas. Regarding technical details, health professionals and social workers understood the rendered representations much better than the technical drawings, as they included details of the atmosphere that were relevant for professionals. Thus, technical drawings were valuable for designers to keep in mind technical details, but rendered representations allowed health professionals and social workers to envision themselves using that place. However, renderings contained what one participant (JN) called "fictitious endings" that encouraged high expectations. JN explained that the image was so bright and shiny, so it looked like a fictional space rather than a real space in which to work.

DISCUSSION

We found the use of the prototypes beneficial to bring together different perspectives. We consider the role of prototypes the main contribution of this research and key to understanding iteration as a process of defining proposals. Douglas *et al.'s* 2018 study positions the prototype as the basis of all experimentation;[7] in later work,[8] the authors also apply prototypes from a methodological perspective, as a way of incorporating user participation in design processes.

According to Reay *et al.*, the benefit of using prototypes as facilitators is the variety of microcultures that are involved during participatory processes.[9] Each participant uses the prototype following their own processes, values, and believing. During our MVP Lab participants assessed the prototypes and projected their points of view about the space representing the characteristics of the group or microculture[10] to which they belong. As microcultures are not dominant, they often do not get expressed. The diversity among participants proved beneficial for these small groups; the differences between their backgrounds offered diversity of user experiences in the arrangement of space and facilitated a critical discussion on zoning and its variations.

Moment of use makes prototypes a useful tool: when the spaces and concepts being developed are still unfinished, they can be shaped by the participating agents.[4] We believe the MPV Lab was developed at the appropriate stage of the design process.

Since the use of a MVP is business-specific, no information exists on its successful use in a participatory development process. Participatory design tends to favour the achievement of objectives through the process itself.[9] This research project generated a global culture of family support within the service workshops, which promoted active listening and the exchange of knowledge.[6]

The use of minimal resources in each stage was the backbone of project communication and proved to be the case for experience. For working on space awareness, the full-scale scenario with a minimum amount of furniture helped participants focus on functional requirements. For the test we did not focus on trust or user-friendliness as a functional requirement, so we didn't prepare the

mock-up with elements of comfort such as cushions or posters on the walls. The use of minimum resources led us, albeit inadvertently, to shape the scenario in an unfriendly way, as one participant pointed out.

In the second stage, the use of technical drawings and renderings helped participants move from individual imaginings to envision shared atmospheres. As two participants pointed out, however, renderings and image prototypes can divert perception towards something virtual or unrealistic.

Finally, moving from individual to shared atmospheres without losing sight of functional requirements proved to be essential for iterations. And "not losing sight" was the key to aligning the different points of view at each stage. We found it beneficial to include diversity in the points of view to prevent investors and financial partners from weighing in solely regarding investment decisions, and to prevent patients being considered only as a source for detecting space problems, not solutions. Every single point of view proved valuable at each point of the project.

This research project offers key takeaways for others that might consider undertaking a similar project:

1. Prototypes are a useful way to bring together different perspectives.
2. Integrating patients, family/caregivers, and staff throughout the design process can lead to more effective design of spaces and bring to the forefront issues and ideas that the design and research team members may not consider alone.
3. Minimal resources proved to be effective for project communication and experience. It can help identify unintended aspects of scenarios that can be rectified in later phases of the design process.
4. Integrating and aligning all points of view at each stage was beneficial and helped ensure diversity. Microcultures can also help designers truly embrace diversity.
5. User-friendliness can be considered as a functional requirement in minimal resources environments.

For continuity of this project, we intend to conduct further research on the level of realism of images as prototypes. It should be noted, however, that heterogeneous groups contain different levels of literacy in reading images, interpreting technical drawings, mock-ups, and space representations.

CONCLUSION

Often the design team focuses on identifying the tools and strategies needed for data collection, interpretation, and the production of solution. However, the design team's explorations must include participants to build knowledge within the design team. Including users in the practice of design requires planning the visualisation of processes and results to facilitate conversation. The design team needs to make design information visible and accessible, including full-scale prototyping like the one developed for the MPV Lab. Our research also shows how participants focus on functional or atmospheric requirements depending on the level of realism of prototypes. Research projects that focus on designing functional spaces must afford participants the opportunity to be in, experience, experiment with, make observations about, and modify the

prototypes. Doing so will ensure a better functional design that users will take advantage of.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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ETHICS COMMITTEE APPROVAL

This research was carried out in accordance with the regulations of the Healthcare Ethics Committee (Accredited by the Generalitat de Catalunya). It acts following the principles set out in the Identity Card of the Hospital Order of Sant Joan de Déu, Barcelona.