Failures Supporting the Evolutionary Design in the Wild of Interactive Systems for Public Spaces

Vinicius Ferreira(✉), Junia Anacleto, and Andre Bueno

Federal University of São Carlos, São Carlos, Brazil
{vinicius.ferreira,junia,andre.obueno}@dc.ufscar.br

Abstract. In this paper, we describe the lessons learned from an experience of deploying an interactive public installation adopting a methodology that intertwines aspects of in-the-wild study and evolutionary design. This methodology shrinks the cycle of design of a prototype and allows researchers and practitioners continuously design improvements while they learn from evaluating the prototype in the wild. Thereby, multiple settings can be explored, minimizing the need to conduct new experiments that demand time and resources. Considering the metaphor of a wishing well, we designed a public interactive installation, allowing people to make wishes using their personal or a shared device to throw a virtual coin into a real water fountain augmented with a wall-sized screen displaying a "pool of wishes." We deployed this interactive installation in a passageway of building for eight days, collecting data from observations, questionnaires, interviews, photos and video recordings. Based on the failures in our first cycle of design with the prototype, we present our findings and directions to apply our methodology. We claim the need of a pilot study in situ and having a team committed in collecting and analyzing data, discussing the insights and changes. In addition, the system design must support predictable, orderly and managed evolution. Finally, we contribute to the ubicomp field, demonstrating the implications for evaluating evolutionary prototype in the wild.

Keywords: Prototyping methods · In-the-wild · Evolutionary design · Ubicomp

1 Introduction

Interactive technologies are increasingly spreading through the urban environment, moving Human Computer Interaction (HCI) into a new research paradigm. Researchers are shifting from their labs into the real world, developing and deploying pervasive technologies for people [15]. This in-the-wild movement emphasizes performing in situ user studies with new technologies to uncover design probes in real-life context settings [16]. Moreover, this approach differs from previous ethnographic approaches applied to interaction design that propose to observe existing practices to elicit system requirements and general implications for the design [15].

In-the-wild approach focuses on learning from users experimenting and adopting a prototype in situ. From this approach, several insights can emerge that demand modifications on the prototype and require new experiments, which consumes resources and

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time for planning and execution. To mitigate that, we have included aspects of evolutionary design into the in-the-wild approach. Thus, this new methodology augments the in-the-wild approach by encompassing aspects of evolutionary design, allowing to designer to learn from evaluating the prototype and improving it in situ.

The rise of the support of ubiquitous and pervasive technologies to the Online Social Networks is modifying the way we interact with others. People have more opportunities to socialize in the virtual world and to be context aware. This expansion of our social world supported by technologies allows people to have their social needs attended, even though it is clearly not enough to attend our human needs for contact [12]. With such understanding, we want to explore the process of iterating in-the-wild with a public interactive installation that aims at support and promote the sharing of personal content in public. This public sharing would be the chance for people to know their own community, in a process of socialization.

In this paper, we present our lessons learned from a case study with a situated public interactive installation, indicating how evolutionary design of interactive systems for public spaces can accommodate and support in-the-wild studies.

2 Related Work

The demand for novel technologies that can improve people's lives is leading to the growing interest in in-the-wild studies. The in-the-wild approach shifts the design thinking model of designing a solution, exploring new possibilities that can change and even disrupt human behavior. This fact differs from previous ethnography methods that focus on producing a solution according to the established practices [16].

Using the in-the-wild approach to evaluate novel technologies is valuable to capture people's reactions when first experiencing these solutions. This evaluation process encompasses observing and recording people's behavior while interacting with a prototype. From the outcomes of in-the-wild studies, researchers can better understand how people use and appropriate solutions of technology on their own terms and for their own situated purposes [16]. According to Rogers et al. [15], lab studies may fail in capturing the complexities of the situations in which ubiquitous applications will pass when launched in the real world. Another difference in this kind of study is the absence of a facilitator explaining the purposes and functionalities of the application to the participants. This fact can make users behave more naturally, increasing the ecological validity of the outcomes and findings. On the other hand, ethical, legislation and privacy concerns are crucial in this approach to not expose the participant to risks [13].

During a deployment in the wild, several insights can emerge as researchers learn from observing the participants. However, to test these insights in the wild, the prototype must be robust and flexible enough to enable modifications on the design as the research evaluation is carrying. Providing this flexibility for interactive systems is one of the main goals of the evolutionary design, which focuses on continuous improvement of a solution [18].

For Dittrich et al. [6], with technologies evolving at a rapid pace, new applications should provide forms of maintenance, tailoring, adaptation and further development.

They propose a model, called "design-during-use", in which a system is updated to a new version according to explicit requests from end-users or changes in the system. This practice is related to the participatory design, in which all stakeholders are involved in the design process.

Botero and Hyssalo [3] used the co-design to extend the evolutionary design as they learn and engage users to collaborate on evolving the prototype. Once their users were elderly people with no expertise in design and few skills in technology, they outline their lessons learned from a study case and provide a set of guideline to help designers to engage co-designers.

Carter and Mankoff [4] present their findings on how to evaluate ubiquitous applications from a case study with three applications, using non-interactive and interactive prototypes. From the non-interactive prototypes, they valued as useful for rapid iteration and for getting early, but limited, feedback on the situated use. On the other hand, interactive prototypes provide more helpful and invaluable feedback about the use and for the co-evolution of the application. However, interactive prototypes are difficult and time consuming to deploy.

Crabtree et al. [5] outline key challenges in applying in-the-wild studies. In this kind of approach, using video recording can be difficult to identify and extract of useful information as well as to synchronize different sources of video and log system. They claim the need for a tool to support the analysis of the footage. In contrast, Hazlewood et al. [10] describe the evaluation issues in using observation approach, which can be limited, affected by the lack control of context, and hard to avoid contamination of the researchers. Besides that, opinions and behaviors reported in the interviews cannot match with the data captured using the sensors or system logs.

Summarizing, the in-the-wild approach involves performing studies by deploying novel technologies in real-world conditions to observe and understand how people use and appropriate them [16]. On the other hand, evolutionary design approach provides a model for incrementally creating and modifying an application, over the system lifetime [18]. This evolution is characterized by adaptability of the system, enabling to adapt rapidly to changes in the environment, including user needs and wants, and other externalities.

Based on the previous lessons learned from evolutionary design and in-the-wild studies, in this paper, we explore a model that allows to evaluate different settings and scenarios as we learn from observing users interacting with the system. This prototyping approach differs from others [3, 4, 5, 7, 10, 13, 15] by providing a model for planning, deploying, evaluating, gathering requirements, and modifying the prototype to enhance the design in situ.

3 Iterating a Prototype in-the-Wild

Deploying prototypes in the real-world conditions such as public spaces can be very challenging for researchers [7]. Many aspects not envisioned in the design process can emerge during the experiment. To address that, we present a prototyping approach that

intertwines aspects of in-the-wild study and evolutionary design, enabling the designer to modify the software characteristics to evaluate them in real-world settings.

Considering that interactive technologies are becoming part of urban and everyday experience and that the urban space is dynamic and complex, systems for these conditions should support predictable, orderly and managed evolution. This evolution and changes on the design depends on certain design qualities. For the code, the system should avoid duplications of code; keep the code simple, clear, cohesive and decoupled; isolate third-party code [18]. Scenarios can be used to foresee possible changes on the prototype and make them easily deployable. However, system should also allow the designer to implement unforeseen changes in those scenarios. Furthermore, changes in the prototype are not limited to the code and include changes in the components of the prototype and in the context in which the prototype is deployed.

Considering an evolutive public interactive installation, the prototype should be robust, flexible and highly parameterized, allowing to make and test changes in the prototype efficiently and incrementally. Test-Driven Design and automated tests can be used to ensure quality and stability in the system. The prototype must provide useful information, once the lack of feedback is recognized as the main issue to evolve interactive systems [17]. Changes in the prototype should ensure reliability, availability, and safety of the system, providing an efficient evolution without impacting the system's service to its users. To support these requirements, the code can use a modular architecture using reusable components and services-oriented system. In addition, the prototype must be user piloted to certify that there are no functionality issues before the real deployment.

4 Case Study

Aiming at exploring our methodology, intertwining aspects of the evolutionary design and in-the-wild approach, we created an interactive installation called WishBoard. WishBoard is a digital art project that promotes a collaborative expression of the wishes of its participants, aiming at promoting a sense of community. With their personal mobile devices, such as smartphones, people can interact with the technological installation contributing to the collective construction of the artwork. The installation aims to provoke a reflection about the future, celebrating local culture and promoting contemplation. People can share their wishes and dreams, anonymously, using their mobile devices and accessing to the installation website and filling out a sentence.

For this project, we have been using different metaphors to embody it, as shown in Fig. 1. Taking our previous experiences with other WishBoard installations [9], we used a new metaphor aiming at transforming a socially abandoned space into a more social and interactive place. This space is the old Student Union Building at the University of British Columbia.

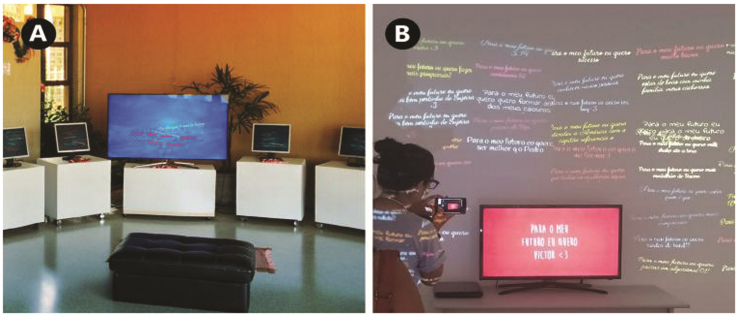

Fig. 1. WishBoard installations exploring multiple screens and projections.

4.1 The Old Student Union Building at the Campus

Since a new Student Union Building (SUB) was introduced in the campus of the University of British Columbia (UBC), a process of replacing the old building was established among the students. The old Student Union Building, referred here as "the old SUB", was built in 1968 and for more than 50 years has been considered the heart of student life at the UBC's Vancouver campus. For a long time, students used the place to study, eat, shop and socialize. The space functioned as the third place for the students, offering restaurants, bars, stores, meeting rooms, a movie theater, and leisure area. However, with the growth of the campus student population over the time, the space has become ineffective. Thus, people began gradually to avoid the old SUB and to gather in other spaces in a decentralized manner, causing a community fragmentation and affecting the social experience of the campus [1].

Third places comprise a generic description for a variety of public places (e.g. bars, cafes, barbershops and beauty salons), where people voluntarily and regularly attend for casual encounters and social interaction, enjoying each other's company. These places are crucial to the maintenance of community life, promoting intimate personal ties among individuals beyond the realms of home (first place) and workplace (second place). In addition, having a harmonious balance between the domestic, productive, and sociable realms of everyday life is necessary to maintain a good quality of life [14].

After a process of seven years, the new SUB, formally named as the AMS Student Nest, was established from the scratch, focusing on the needs and desires of the students on campus. Aiming at ensuring a student-centered hub of activity, the place creates a welcoming environment for all students, introducing new sustainability practices and goals. With the release of the new SUB at UBC, the old SUB has become increasingly a deposit, since the remaining restaurants struggle to keep their patrons. In addition, the space lost attributes of an inviting place, such as, cleaning, attractiveness and accommodation. This lack of maintaining can lead to an urban disorder, vandalism and antisocial behavior, according to the broken windows theory [19]. As people start to avoid staying there, the space becomes more abandoned. However, people still use the main hallway of old SUB to transit between the bus stop and the new SUB. Figure 2 shows the difference between the old and new SUB.

Fig. 2. (a) Old SUB versus (b) AMS Student Nest building. Photo credit: Ema Peter/Vancouver Sun. 2007. Retrieved from: http://www.vancouversun.com/story.html?id=12729426

In partnership with the student society of UBC (Alma Mater Society) and aiming at making people pay attention to the old SUB, we propose to create an interactive installation using the concept of the WishBoard. By promoting the sharing of wishes in public spaces, WishBoard purposes to make people aware about the existence of a greater community around the space. Thus, the installation could bring social life to the abandoned space, which has been once considered the third place on the campus.

4.2 Designing the Public Installation

We started our design collecting some requirements, such as, spaces available and which spaces are still in use. After that, we performed brainstorming sessions to refine the requirements and elicit metaphors for sharing wishes. Our goal was to create a technological installation, rethinking how people make wishes and considering cultural issues. To refine the ideas, we performed some brainstorming sessions with the support of the sketching technic to assist the visual thinking.

Having collected ideas of metaphors, we chose the idea of a wishing well in which people throw coins into a water fountain. This metaphor represents our thoughts on how technology can metaphorically be the "new fountain" on public spaces, attracting people and augmenting public spaces.

Fountains were people aggregators for centuries. Originally, they were purely functional, providing water for drinking, bathing and washing to the residents of cities, towns and villages. Therefore, fountains were used for decoration and to celebrate their builders, glorifying their power over nature. Water is vital for sustaining human life, for ancients having drinking water was a gift from the heavens. Since indoor plumbing became popular by the end of 19th century, urban fountains have become purely ornamental. Nowadays, they are used to decorate parks and squares, promoting contemplation and charming place. Fountains are also used for recreation and for entertainment [11]. The tradition of throwing coins into fountains came from an ancient practice of presenting gifts to gods aiming to appease angry gods or offering payment for a request. In modern times, people still practice this tradition, usually making a wish as we can observe at Trevi Fountain in Fig. 3. Eventually,

the tradition has evolved and other ideas were introduced, such as, throwing two coins into the fountain will make easier to find the soul mate. This tradition is widely spread that thousands of coins are thrown daily in the Trevi Fountain, which are swept out and donated to the local charities [2].

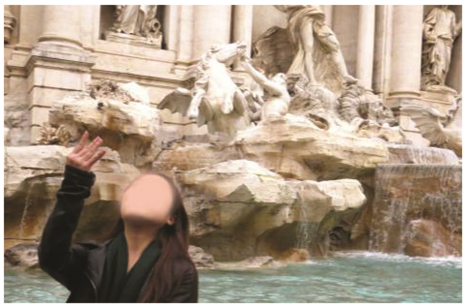

Fig. 3. Person making a wish by throwing a coin into the Trevi Fountain.

In order to promote a temporary appropriation of a space in a process of replacement, an approach is to promote self-expression. This kind of expression is a powerful sign of freedom, in which, individuals project their thoughts, feelings, opinions, and identity into the world [12]. Using urban interactive installations to foster self-expression can help to strengthen the sense of community and interconnection among people in a community. People may feel connected to the community once they share similar goals, preferences, beliefs or values.

Using the principles of interactive aesthetics, we designed an instance of the WishBoard project. According to Fels [8], people build relationships with external objects to their own self depending on how deeply embodied the person is into an object or an object is into the person. He suggests four relationships: response, control, contemplation, and belonging. These types of relationships occur during the interactive experience and may overlap, increasing the intimacy relation between a person and an object. The interaction began in an exploratory way, aiming at understanding the installation. After that, the user feels able to interact with the installation and then people can begin a reflection on the installation. At the end, people can actually participate of the installation contributing with their message and becoming part of the installation. Furthermore, messages and the quantity of messages can induce contemplation, making people spend more time on the installation. Together, all four interactive aesthetic components were included in the design of WishBoard.

WishBoard prototype reinterprets the metaphor of making wishes in a wishing well. As shown in Fig. 4, the installation is composed of a water fountain and a wall-sized projection screen behind. The water fountain represents a "wish catcher" – in reference to the "dream catcher" from Native American culture – that receives and selects the wishes, filling the "pool of wishes" represented by the large screen. People can watch the shared wishes projected coming from the water fountain to the large screen, floating on a virtual "pool of wishes" as if they were leaves. To encourage people to share their wish, every time a new wish is thrown into the fountain, the system presents the wish in a magical and captivating way by making it appear as if it was streaming out with the water stream of the real fountain

and making a splash sound, giving feedback to the newcomer that their wish was received. After that, the wish joins the collective wishes floating as a leaf in the projected water motif. With this collaborative expression, the installation provides the sense of belonging to the community and place attachment, as if a part of themselves was "rooted" in that place.

Fig. 4. WishBoard installation at the old SUB at the UBC.

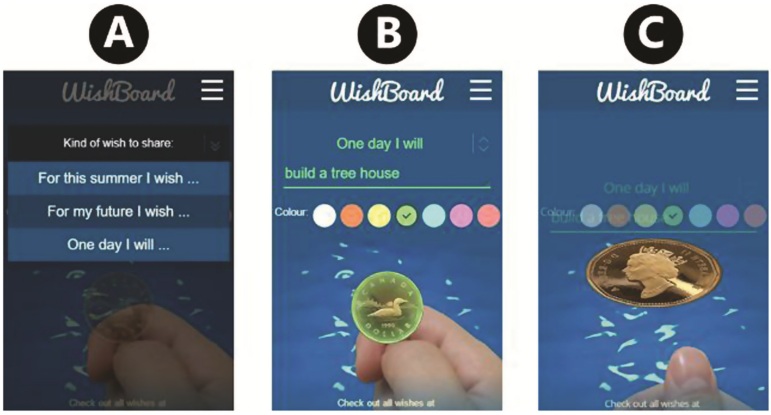

Fig. 5. Sharing a wish with WishBoard using a mobile device

To share a wish on WishBoard, users use should access the installation website and complete one of the template wish statements, e.g., "One day I will ___", as shown in Fig. 5. They can also choose the font color of their wish. After filling out the wish, users can virtually throw the coin into the fountain by swiping the coin towards the top of the device. When the installation registers the wish arriving, a splash sound is played and the wish streams out of the water fountain. By using this approach, this project explores the interaction with contextualized situated public displays using personal and shared mobile phones, to build

promote the development of intimacy and embodiment between people and people, and people and the dynamic art-system. Thus, WishBoard (Fig. 6) offers a space for self-reflection and contemplation, creating a rich aesthetic interactive experience on the behavioral, visceral, and reflective levels.

Fig. 6. People making wishes on WishBoard using (a) their own mobile devices and (b) a public ready-to-use device.

4.3 Study Design

Using a simpler version of the WishBoard prototype, we planned our experiment to collect data, in eight days, from interviews, questionnaires, photos, video recordings, and system logs. Researchers were present in strategic spaces, taking field notes without disturbing the normal characteristics of the space. We applied questionnaires and interviews to understand how people perceived the installation and collect feedbacks for improvements. To deal with ethical issues, users were presented to the consent form after sharing a wish inviting to collaborate with the study. In addition, we had approval from the UBC Research Ethics Board to run this study. We de-identified all data that can identify participants or that might embarrass them and we did not collect personal contact data (e.g. name and e-mail).

4.4 Results

In this section, we describe how we applied our methodology with the WishBoard, describing the design decisions, defining the metrics and the evaluation methods. Following these steps, our goal was to test the successes and failures in our design decisions for the first version of the WishBoard and, consequently, elicit requirements for the next iterations.

To share a wish on WishBoard, the users need to access the installation website through a mobile device (e.g. smartphones) and fill out a sentence, as shown in Fig. 5. Once the interaction with public displays using personal mobile devices is not common around the campus, we wanted to collect people's feedback about this form of interaction without prejudicing the aesthetics of the installation. Consequently, to invite people to interact with the installation we decided to display "Please, make your wish at shareyourwishes.ca." near to

the WishBoard logo in the upper left corner of the projection screen. We designed the url in order to be inviting and ease to recall. Once the installation should be self-explanatory and provide discoverability, we avoid to use additional supportive materials, such as banners, posters and folders. With this design, we expected that people would understand how to interact with the installation by sharing and visualizing their wishes on the installation. We defined as a success metric having at least 20% of people who stopped at the installation sharing a wish. However, after 4 h of experiment, it was evident that people did not understand they could interact with the installation using their smartphones. We found evidence of that, observing most of people that deeply explored the installation left it without sharing a wish. Although there was a large amount of people crossing the installation, we counted only seven people posting wishes. In the interviews, people said that they saw something different at the passageway, but most of them thought that was a presentation or a static video, and some of them asked if it was necessary to pay to use the installation. Based on those findings, we concluded that the installation should provide more interactivity clues.

Aiming at investigating how to address the lack of interactivity clues, we interviewed more three people who stopped by but did not share wishes, asking them the following questions: "What do you think this installation is about?", "Do you find out how to put your wish in there?", "Do you see any clue on the installation on how to do that?", "Do you know that you can use your phone to access that website on the installation?." In the answers, most of people mentioned that the installation was quite interesting due to the water fountain and sound. The funny wishes on the screen called their attention. Regarding to the url on the screen, two people said that they noticed a website url, however, they thought that they should use a computer to access that. Thus, we decided that the installation need to provide signifiers for interaction with smartphones. To address that, we believe that using a visual representation (icon) can support the inviting message in the interface.

In order to improve the attractiveness of the installation, we combined a big screen and a water fountain. We used sounds, animations, projection-based augmented reality, and other metaphors associated to the theme "wish." This would create a more sensorial and cozy environment for exploration, which could make people spend more time in the installation, unwinding, contemplating, and socializing with others. We established as success metrics having at least 10% of passersby stopping at the installation and sharing a wish and 20% of those people staying there for more than 60 s. Based on our previous measurements, the average time to make a wish on WishBoard is approximately 35 s. Although it is difficult to accurately measure how long each person remained in the installation, after 14 h of experiment, it was clear that most people who stopped were staying less than 20 s. In despite of people were being attracted by the installation turning their heads at the installation when they were crossing the installation, few people deeply explored the installation. We could count more than 300 people crossing the installation, but only 24 people engaged in a deeper exploration of the installation sharing a wish and 19 of these stayed in there for more than a minute. We counted more 7 people exploring the installation for more than a minute, however, they just read the wishes and 2 people took a picture of the installation. In the interviews, we asked to 6 participants what would make them stay more in the installation. In the answers, they pointed out that the installation was a great addition to the space to the building, however, it should provide more comfort to make people stay there for a long period.

To increase the inviting appeal of the installation, we decided to use a physical object – a small water fountain – to compose the installation. We believe that the relationship between the physical and the virtual object would complement the playfulness of the installation and could be an invitation to explore and then interact. We stated as a success metric, 20% of people commenting aloud, looking at or pointing at the water fountain. After 14 h of experiment, we noticed that the water fountain was more attractive than the screen behind. People were attracted to the fountain and water sound, and we counted 10 people touching the water in the fountain and we heard people saying: "Is that real water?", "Oh, my gosh! It's water", and "Can I touch it?." Although including water fountain was successful, some people were not engaging to explore the screen behind. Furthermore, as the people approach to the water fountain, reading what is on the screen becomes difficult due to the projection resolution. For the next iteration, we should explore better the water fountain area to make people want to fully explore the installation.

In order to display the shared wishes, we used a projection screen and explored projection-based augmented reality. By presenting randomly the shared wishes, we expected to make people stay around the installation reading the shared wishes, motivating people to discuss about the wishes, promoting socialization and making people return to the space. Due to the infrastructure limitations, we had to use front projection, consequently, in the first 4 h, we noticed more than 20 people avoiding crossing between the projector and the projected screen. Furthermore, we noticed people saying to others to avoid crossing in front the projector, people making a late stop when they noticed the presence of the projector and then crossing in front quickly or avoiding crossing in front the projector, and it was evident to hear people apologizing. In the interviews, people pointed out that they were avoiding crossing in front the projector to not disturb someone's presentation. Interestingly, we noticed 3 people being attracted by the brightness coming from the projector and starting to play with shadows, without interacting with the installation. We believe that the brightness, clarity and resolution of the projection were not enough to the context where the installation was set. In addition, until the end of the study, we did not notice same people returning to the installation on the same day or on different days. However, this fact can demonstrate how difficult is to identify people in the crowd through observation. For the next iteration, we need to explore means to make people more comfortable crossing in front of the projector, such as covering or hiding the hardware, once using front or rear projection was not viable. Based on those findings, we conclude that running a short pilot in that space before the real test could be enough to refine and improve some installation characteristics and other context related features such as the lighting.

Regarding to the advertising strategy, we planned to use videos and animations, in order to invite people to come to the old SUB and make a wish. However, we waited to evaluate if the installation was self-sufficient in attracting people. As we noticed that the number of people were decreasing in consequence of the beginning of the summer vacations, we started to announce the installation in the digital signage around the campus using videos. We thought that would attract more people to use the installation. However, we failed in our strategies to advertise the installation due to the attractiveness of the advertisements and late advertising. We noticed that people were not aware in advance of the installation. In the interviews and questionnaires, people discovered the installation only when they were

walking through the installation. Only a person said that decided come to the installation because a friend has commented on it.

Aiming at extending the engagement with/within the installation, we had a profile on twitter where people could comment and share the wishes shared on the installation. This online presence would allow people to interact with other participants. However, we had no follower on our profile. We failed because we only advertised the twitter account on our website. For next experiments, we must use a better strategy to improve the visibility of our profile and. For example, previously announcing online our profile at the main twitter accounts and mailing list of the campus.

In order to test a new scenario, we introduced a public shared device – a tablet – in the installation, allowing people to have a ready-to-use device. After doing that, we noticed an expressive increase in the number of users from 37 to 160. Nevertheless, we observed one person leaving the tablet without sending the typed wish. This fact occurred in virtue of a disengagement of user, giving up sharing the wish and that could affect the next user with a non-fresh state of the system. To address this problem, we introduced a timer that refreshes the system if there is no user interacting with the interface for longer than 45 s. In the system logs, we counted that 70% of the wishes were shared through the public device.

Overall, successes and failures are part of the process of experimentation and learning. Learning as much as possible from failures is important to improve designs and make better design decisions. In the questionnaires applied to people that shared wishes at the installation, 91% of people felt that the process of interacting with WishBoard was straightforward. However, only 18% said that they could share a wish accessing through their own phones. On the other hand, 95% said that they could use the public shared device to share a wish. In addition, they said that WishBoard brought fun to the space and one of them commented that sharing wishes on WishBoard was "quick and fun!." In the interviews, people said they rather use the tablet with the application ready to use due to being faster and more convenient. From that evidence of weak commitment to interact with that kind of "not ready to use" interface, we suggest that public installations need to grab audience attention directly to present its purpose and mechanisms of interaction.

5 Implications for Evolutionary Prototypes in the Wild

With our case study, we learned that evaluating prototypes in the wild is difficult, especially in relation to ensure the accuracy of the data. Assessing the metrics in a public space by manually counting requires focus and agility. Researchers should have some expertise on in-the-wild studies to elicit situations that are worth to count or take notes. Although it is necessary, it is hard to predict which data will be useful to gain a deeper insight. Furthermore, the more data is collected, the more the researchers will spend time, resources and skills to analyze them. However, when systems for monitoring human behavior and physiological responses become more refined and reliable, capturing and classifying data will be more automatized providing richer analysis and new interpretation opportunities.

In in-the-wild studies, several unexpected bugs and needs can arise due to lack control of context. For studies carried out in public spaces, some bugs can emerge early in the beginning of the study. Therefore, we highly encourage researchers to run a pilot in the

space before the experiment. In order to make easier to modify the prototype and test different settings, we strongly suggest to use modularization and parameterization, and to create a control panel, allowing to make adjustments and tuning of the system.

To make evaluating and iterating feasible, a team-based research approach is required. The researchers must discuss the insights emerge from the successes or failures on their design decisions. They also should be open to test the different solutions, and have the commitment in evaluating and continuously improving the design in the face of time pressure. However, researchers need to minimize as much as possible their impact to avoid compromising the ecological validity of the outcomes and findings.

6 Conclusion

In-the-wild studies provide invaluable feedback on the use of interactive prototypes, enabling to improve the design. However, performing several in-the-wild studies consumes time and resources. In order to shrink the cycle of design of a prototype, we included aspects of evolutionary design into the in-the-wild approach. To make that possible, we used a team-based research approach and a prototype ready to evolve. Considering that successes and failures are important to understand how to build better solutions, learning as much as possible from field-based studies is essential. In addition, learning from failures is important to refine and improve methods and techniques.

Based on our analysis from 199 people making 273 wishes, we describe a set of lessons learned. In public installations, provide clues of interactivity and the necessary affordances for people to effectively understand how to interact with the installation. Keep in mind that people are in public spaces with a goal and an expectation. Then, do not expect too much concentration during the process of exploring the installation. Breaking the barriers in the interaction, such as using a public ready to use input device can be more efficient than asking people to use their own devices. For greater thirdplaceness experience, provide a cozy and comfortable space for people to hang out around. Make a plan to advertise the installation to create a buzz and invite people to use the installation. Physical affordances can attract people attention, encouraging exploration of the installation. Providing anonymity is key to leverage public expression, enabling also introvert people to have the opportunity to express. The personal circumstances of passersby highly influence the interaction potential. Using certain kind of approaches such as direct inductive approach can be very intimidating, making people uncomfortable in using the installation. Overall, designing for playfulness have a key role in attracting people.

With our prototype, we bring significant contributions to the understanding on how to conduct an experiment with an evolutionary situated prototype. Future work will involve refining this approach and designing tools to support ethnographers and researchers to study ubiquitous computing.

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