A Physical Information Kiosk for Classical Music Concerts

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ABSTRACT
Classical music concerts are part of our cultural heritage, however young adults seem less interested in classical music and thus attendance to such events has been declining. We describe the design process and initial evaluation of a physical information kiosk to inform and motivate young adults to attend classical music concerts. As a starting point for our research, we analyzed the current situation at a local concert hall by involving people in a series of user studies, which included questionnaires, field observations, and interviews. Based on our findings, we designed an artifact that detects the presence of people and invites them to interact with it by playing extracts of upcoming classical music concerts. By means of an interface consisting of physical buttons, LEDs, and a limited resolution dot-matrix display, people obtain information on upcoming concerts and express their intention to attend. A small thermal printer is used to allow people to take the obtained information with them and potentially invite someone else to attend the concert with them. The results of an initial evaluation show that participants embraced the old school aesthetics of the artifact, felt that the physical buttons invited people to interact, that the provided information was relevant and interesting, and liked the possibility to be able to print out an invitation.

Categories and Subject Descriptors
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Keywords
interaction design; co-design; prototyping

1. INTRODUCTION
What role does classical music play in our modern culture and how does it affect classical music concert attendance?

Classical music concerts are part of our cultural heritage and are still widely present in our modern culture. Regardless of their presence, according to research, their attendance has stagnated despite the general growth of our population [4]. As a reason for this, it is argued that fewer young adults between the ages of 20 and 39 are attending classical music concerts, resulting in an ageing audience. Young adults are strongly underrepresented when compared to the percentage they make up of the whole population. *Would that mean that classical concerts that have been part of our society for so many years are about to disappear in the next decades?*

With the goal in mind to develop an artifact that raises the interest of young adults in classical music concerts we started researching the current situation of the population in Sønderborg, Denmark, and the involvement with the local concert hall at Alsion. For our research we narrowed our target group to the age of 19 to 29 for two reasons. Firstly, it is easier to research a group in which most individuals are likely to be in similar life situations. Secondly our reason to focus on the younger half of the age range mentioned above was that by influencing young adults who will get older, we can reach both groups over time. Furthermore, we were interested in the interaction between the students of the University of Southern Denmark with the concert hall, which is located in the university building.

In this paper, we present the co-design and initial evaluation of a physical information kiosk for classical music concerts (Figure 1). The artifact first detects and then invites people to interact with it by playing extracts of upcoming classical music concerts. By means of an interface consisting of physical buttons, LEDs, and a limited resolution dot-matrix display, people obtain information on upcoming concerts and express their intention to attend. A small thermal printer is used to allow people to take the obtained information with them and potentially invite someone else to attend the concert with them. The prototype was initially evaluated with attendees of a Tech-Expo event at the Alsion building.

The rest of the paper is structured as followed. First, we describe the results of our user research, which included questionnaires, field observations, and interviews. Second, we describe the design process of the artefact, consisting of co-design workshops, conceptual design, and prototyping. Finally, we present the results of an initial evaluation, followed by future improvements and conclusions.

Figure 1. Physical information kiosk printing out relevant classical music concert information upon request.

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2. USER RESEARCH

To gain a better understanding of the classical music concert context and our target group, we conducted a series of three studies: questionnaires, observations, and interviews.

2.1 Questionnaires

Based on Oppenheim [12] and in order to explore our problem space, we iteratively created three questionnaires: a pilot, a paper, and an online questionnaire. This strategy allowed us to first gather broad data, identify relevant questions, and then provide a focus for our research.

2.1.1 Pilot Questionnaire

As preparation for our pilot questionnaire we conducted four informal semi-structured interviews, helping us to understand the key points that determine the relationship between our target group, their interest in classical music, and their motivation to attend classical music concerts. Important topics discovered through our interviews included their *views on classical music, family influence*, and *classical music experience*.

With these topics in mind, we developed a pilot questionnaire handed out at a regular classical concert at the Alsion building. The questions first aimed at giving us background information on the person and their general involvement with music, before focusing on their standpoint towards classical music concerts. As this questionnaire played the role of a pilot study, it was essential for us in order to gain a first broad insight in the situation at a classical music concert, without a deeper analysis of the results. The findings suggested that new considerations had to be included in the main study to gather sufficient data.

One of the key findings regarding this topic concerns the formulation of our questions. Since it was handed out during the intermission of the concert we concluded that the format should be simplified and the questions clarified, as many participants did not find the time to answer all questions. Furthermore, we decided to consider the participants' level of involvement with music as, for example, we knew one of the participants to be a professional musician, which may have influenced his views.

2.1.2 Paper Questionnaire

Based on our pilot questionnaire we went on to develop a paper questionnaire aimed at gathering demographic data on people who attend concerts at the Alsion building. At this free music concert, it quickly became evident that there was an obvious lack of attendees from our target group. We were unable to ask everyone at the concert to fill in our questionnaire, so instead we randomly handed out 30 questionnaires, of which 26 were returned to us, and 22 were filled in with sufficient information. For the analysis, we divided them into two age ranges (i.e., under 40, and 40 and above), which resulted in having and equal number of participants for each age group (n=11). Both groups were first analyzed quantitatively before coming to qualitative conclusions including the non-measurable data.

The results showed a strong division between the two groups in several aspects. The variety of music styles they listen to was drastically different. While the younger group showed a more diverse and modern variety of genres, the older user group more strongly focused on classical music. Interestingly, almost half of the younger group (5/11) also mentioned classical music as a genre they listen to, showing us that there is a general interest in classical music from those attending concerts at Alsion. Comparing this information to what each group enjoys about classical music, we can see that the younger group mostly likes the atmosphere generated by the music while the older group has a stronger interest in the music and its background. It also became evident that the younger group generally attends concerts less and considers the ticket prices as too high. Additionally, they stated that usually other people (e.g., friends) suggested attending such concerts. Both of these factors (i.e., frequency and price) were generally neutral regarding the older group.

2.1.3 Online Questionnaire

Inspired by Luce et al. [5] and in an attempt to gain further insights from a larger number of participants from our target group, we created an online version of our questionnaire. We used snowball sampling, whereby participants from within our contacts recruited others from among their acquaintances. A total of 57 participants initially answered the online questionnaire. After filtering to participants between the ages of 19 and 29, without a professional music background, we were left with 40 completed questionnaires. These were then analyzed in a similar way as the previous paper questionnaire at the free music concert.

The results from this population that largely consists of university students shows a clear trend towards low classical music concert attendance of our participants with 66% replying that they rarely go to a concert and additional 23% only attending concerts every 2-3 months. In addition to the low attendance, the results show a majority of participants that would not go to a concert by themselves with 36% strongly agreeing and an additional 22% agreeing on this statement. Considering that our participants would prefer to have company when going to a concert, the results of the question whether someone else suggested going show an interesting distribution. With 42% almost half of our participants only sometimes have somebody else suggesting going to a classical music concert. The rest is mostly distributed with 22% answering that usually another person suggests it and 31% saying that rarely somebody else would suggest it. On the contrary, to people not wanting to go alone, it was interesting to see that the majority of our participants does not seem to go to concerts to socialize with other but rather enjoy the music.

All results can be interpreted better when looking at the individual responses. Overall we were able to see a general interest in classical music as many stated it as a genre they would listen to normally. Furthermore, positive aspects of classical music include the atmosphere it creates, while negative ones include that it often becomes boring or difficult to appreciate over time.

Looking at the social aspect that we could see in our quantitative analysis we can see strong correlations with the individual responses. A very common response, regarding the participant's motivation to attend, includes mentioning their friends in various ways. Generally, they would like to have friends to accompany them with several participants stating that their motivation would be friends approaching them to go. In addition, a reason mentioned a few times for not going to a concert was not getting asked to by their friends.

2.1.4 Conclusion

Young adult students between the ages of 19 and 29 without a professional music background seem to have a general interest in classical music and appreciate the atmosphere it creates. However, the majority rarely attends classical music concerts. It seems as if the concerts are seen as a social event, but rather than socializing with new people, our participants prefer the company of their friends. This seems to be an unresolved issue as there is no clear distribution of who takes the initiative to ask their friends.

2.2 Field Observations

Based on Preece et al. [13], we decided to approach people in their own environment to obtain information about their natural behavior and activities. Spradley et al. suggest that when doing research, one should first examine the nature of the social situation that is to be observed *"by identifying the three primary elements - place, actors and activities"* [15]. Considering these three elements and the way they are linked to each other, different relationships can be observed.

The setting of our field observations was the classical concert *"The other side of Russia"* performed by the Southern Denmark Philharmonic and a Danish saxophone soloist. The concert took place at the Concert Hall at Alsion, Sønderborg. We took the role of participant observers since we attended the concert and also observed the behavior of the participants. While observing, we could identify a strong relationship between the three main elements: place, actors and activities (see Figure 2).

We observed that people who attend classical concerts are involved in different situations. The event of a classical concert can be divided into three main parts that are described by different activities at different places. Before the concert, people gather in groups by the entrance outside the main hall and engage in conversation with people they know. Afterwards the audience finds their seats and enjoys the music silently. Between the two parts of a concert, there is an intermission that allows the audience to again be involved in social interactions. People gather in front of the hall and in the cafeteria of the university building and might get something to drink. To summarize, the different groups of actors involved participate in similar activities, which may be experienced by the actors in different ways, but nevertheless provide a common base for social interactions.

2.2.1 Conclusion

We conclude that the classical music concert is a social event and brings people together. Our observations reminded us that people attend classical concerts because of the way they are in order to have a specific experience of cultural event. In addition we could recognize that most of the activities involve groups of people and encourage group interaction. Very few people would attend a concert on their own and they would stick out of the rest. Being in the field helped us notice the absence of a group of young adults, despite a few individuals within that age group who are already interested and enjoy attending classical concerts. It was interesting to learn from their motivation to attend concerts. Also, some of them were later asked to further participate in our research.

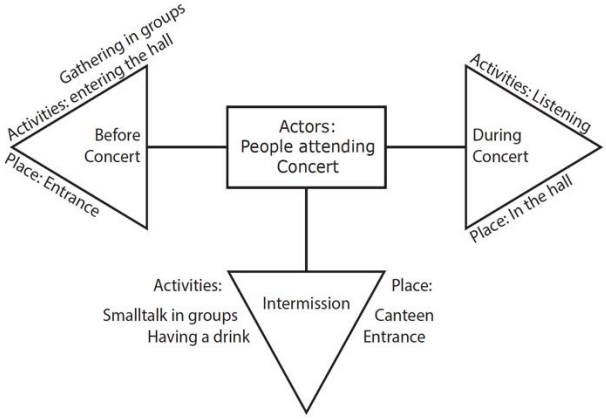

Figure 2. Cluster of social situations, inspired from participant observations.

2.3 Interviews

The third stage of our user research consisted of eight interviews to get more in depth information on young adults' thoughts, ideas and opinions about classical music concerts and how they engage with them. In addition, we interviewed the manager of the Southern Danish Philharmonic as a main stakeholder and expert in the classical music concert setting who could provide us with a different standpoint on the researched issue.

2.3.1 Interviews With Young Adults

Inspired by Schensul et al. [14], we decided to create semi structured, in-depth interviews in order to further investigate previous findings and to seek for more interesting aspects on the topic. The participants in our study were eight young adults between the ages of 10 and 29, all students at the University of Southern Denmark students. They varied in gender (i.e., 4 female, 4 male) and level of interest in classical music. Each interview was video recorded for further analysis.

Affinity diagramming [10] (or KJ Method [3]) was used to analyze the material. For this, key points and quotes were gathered on sticky notes, which were then grouped into different categories and subtopics on the wall forming common themes. Additionally, involving two researchers, gave us the possibility to consider the data more objectively. The resulting categories and subtopics were later analyzed through tangible illustrations. This step allowed us to place our findings in different physical relations to each other, in order to generate a better contextual understanding.

As a result, we found out about two different ways how people can get from their interest in going to a concert to actually getting a concert experience. Generally, both approaches follow two main steps. As we found out through the interviews, a key motivator to go to a concert is to do so with somebody else. For this we need to generate a community, who would be interested in the concert as well. We divided this step in two sections, as our target group includes two different kinds of users in the context of classical music concerts.

The first group has a strong interest in classical music but is lacking a group of people to go with. Furthermore, this type of user would potentially also be interested in going to concerts more regularly. In order to establish a community, they were somehow able to share their interest, as well as having access to the interest in classical music of their surroundings. Our research showed in this point that the topic of classical music is not a well-conversed topic in our target group, which leads to individuals not knowing about their friend's interest regarding this topic.

The second group only has a general interest in classical music and would like to go to concerts occasionally. They are not looking for a community with the same interests to attend concerts regularly but rather a community consisting of just friends to join them for an individual concert at a time. In this case we identified a strong need for either of the interested users to approach the other and suggest going to the concert. For this approach it is particularly important to know what concerts there are in someone's surrounding and when they are taking place.

Once the community has been established in either way, the second step focuses on finding the right event. While the first group might be more interested in finding a particular kind of classical music, according to their specific interest, for the other group it seems to be more important to find a concert with the right setting. The different kinds of classical music for example, can relate to different instruments, composers, whether it is a

soloist, orchestra or opera and many other factors. On the other hand, the concert setting revolves more around the price, the venue, the audience and the right time and place. Regardless of any concert attribute, both groups need to be informed about their possibilities to go to concerts around them. Once each group has successfully managed to find the right group of people and the right concert to attend, they can gain the classical music concert experience.

2.3.2 Philharmonic Manager Interview

The aim of this interview was to understand the position and policy of the people providing the concert as an event to the audience. We arranged an interview with the manager of Southern Denmark Philharmonic. For the interview, we prepared a semi-structured approach allowing us to cover our initial interest, while leaving room for questions on new and relevant information. The interview was video recorded for further analysis.

The main finding of the interview suggests that a classical music concert provides an experience not only through music, but also through the social interactions with others. Although attendance of young adults may not be very common, they should be able to experience cultural events in order to create their own impression. The involvement of the Symphony orchestra in involving young adults is giving out free tickets through "Concert Student Club" and going on school visits where music is brought to students.

2.3.3 Conclusion

The results of our interviews with young adults not only support our previous findings from the questionnaires, but further provided us with information to understand the underlying problems. As we are working with young adults that have a general interest in classical music and going to classical concerts, it was very important to find out what would limit them from going to concerts. Both interviews showed how the main focus is on generating a good concert experience. There are three main factors influencing the concert experience: *music, event,* and *community*. As our aim is not to change the concert, we cannot influence the first two factors (i.e., *music* or *event*). Therefore, our main focus lies on establishing a suitable community for each individual. Our main research question was: *How can we connect people and provide easy access for the concert experience?*

3. DESIGN

In this section, we describe the results of a co-design workshop, our conceptual design, and the different design considerations for our final prototype.

3.1 Co-Design Workshop

We decided to develop a co-design workshop with the aim to gain new opinions and interpretations of our previous research. As our user group of young adults is very diverse, we decided to involve people with a creative background (i.e., three interaction design students, one interaction design PhD researcher, and three innovation and business students) in combination with a stakeholder in the field of classical music concerts (i.e., one student from the Danish conservatory).

3.1.1 Structure

The structure of the workshop was inspired by a combination of the *dialogue-labs* [6], which describes a research method that is used to create ideas with the help of relevant stakeholders, and the book 'Gamestorming' [2], which discusses different ways to encourage creativity through games. Based on the premise of finding classical music concert followers, we planned a two-hour workshop entitled *"The first follower"*. It started with an introduction to explain our research and present a persona that was generated through our user research. Additionally, we wanted to generate a relaxed atmosphere, before engaging participants in four different exploration activities in pairs. The results were then discussed in groups of four. To further conclude from the results we finished the workshop with a prototyping session.

3.1.2 Four Activities

The exploration activities we used were inspired by different sources and developed for our specific goals. Before the co-design workshop, we tested all four activities with five interaction design students, which led to some changes in the final preparation. The results were the following four co-design activities.

First, we used the PLEX cards [9] to encourage the participants to think creatively, while having a playful experience. Participants used the 'PLEX Scenario' technique, whereby players randomly pick seven out of 22 PLEX cards and put them face up in front of them. Using the 'PLEX Scenario' template, both players cooperatively choose three out of these seven cards to develop a scenario, which is then documented on the template. The goal of this activity was to generate as many scenarios as possible within the 15-minute time frame and document each of them. All scenarios explored the topic of finding the 'first follower' for a concert while considering the role of the given persona.

Second, Mitchell and Buur's [11] pinball model or marble machine method was introduced to the team. The method was developed to predict customer behavior and better understand the context of how to involve different stakeholders in the process. The activity consists of an inclined surface board with magnetic wooden elements, each representing an influencing factor that can be different in size, shape and placement. Marbles run down from the top of the surface, which can be guided and diverted in different directions using the wooden elements until they reach one of two pockets at the bottom, representing two possibilities. In this way, different scenarios can be assumed and tested, encouraging people to think about different possibilities. Participants used this method to consider different factors that might influence the behavior of our target group towards going to more classical concerts.

Third, inspired by Gray et al. [2] we used an adaptation of the Wizard of Oz technique. This method involves two people that act out a human-machine interaction. For this, two participants sit across from each other but are visually separated through a barrier. Both participants have instructions on a given scenario, in which one participant acts as the machine, while the other one is the human user. Through this interaction, different attributes of the machine can be either tested or explored. Based on a persona, we used this activity to explore how people could use a machine to find out about a concert and find the first follower.

Fourth, we used collages or mood boards [7]. In this activity participants used a variety of pictures and other materials, that were provided, to create their own collage representation of "*The concert that ...*". Participants used a memory of a concert and visually represented their thoughts on a template that included space for pictures, ideas and discussion. This activity was inspired by the creation of collages as well as a technique called 'Cover Story' from the 'Gamestorming' book by Gray et al. [2]. The goal of this method was to make the participant think about their own concert experiences as inspiration to imagine what could be possible regarding the concert setting.

3.1.3 Prototyping Session

This prototyping session was based on the findings and thoughts each participant gained during the activities. In order to collect their impressions and thoughts, all participants were asked to first write down five key points that were interesting for them on colored post-it notes. The participants would then gather in two groups and combine their key points. For this we suggested a similar method to the 'Affinity wall', as described in our interview analysis section. This means that they would receive two A3 papers on which they would have to group their points according to headlines, forming different topics. The resulting topics could then be used for the Prototyping session.

As the topic for our prototyping session we decided to define our topic further and ask the participants to prototype 'The perfect invitation' (for a classical concert). We encouraged the participants to ideate without constraints by considering tangible prototypes, such as installations, machines and others are possible, as well as scenario description that could be just be acted out.

After the building session, each group presented their prototype and explain their design choices. This step also left room for further questions and discussions regarding the topic as well as the workshop itself. Additionally, we developed a feedback form to be filled in by the participants, allowing us to better evaluate our methods but also possibly get more findings.

3.1.4 Results

Through the workshop, we gathered data in the form of written materials, video recordings, pictures and notes were analyzed for a better understanding of the results. We went through all the mentioned materials and noted down key points, which were then grouped through discussion within the research team and named with the following headlines:

- The last option
- Concert, the game
- The ticket vendor
- Ludovico experience
- Fellowship
- Networking
- Self-realization

In order to combine the key points from all categories and find out how they relate to each other, we built another affinity wall where all key points were written on different color post-it notes and put up on the wall. In the second step we arranged any notes that we could relate to each other in the center. We ended up with the three main categories of *music, event,* and *community* in the center, similar to the main three factors of our interview analysis. The difference in this case was that we used our findings to find possible connections between all three categories.

3.1.5 Conclusion

To conclude we focused on further understanding how the three categories (i.e., *music, event,* and *community*) can be connected in order to accomplish the main goal of providing the experience of a classical concert. Previously we only focused on how we could influence the human factor to generate a community. But we also need to create a bridge between *community* and *music,* as well as between *community* and *event.* The key is to use the qualities of the music and the event to involve the people, as they have to make the decisions. We can only provide information and thus, possible motivation.

By allowing people to explore the music we can possibly gain their interest. In order to at the same time generate a community we need to add a collaborative factor. The idea is, that if classical music is explored collaboratively, with all participants enjoying the music, it should eliminate any borders towards approaching others. Furthermore, our data suggests that it is equally important to inform about the concert. Taking this a step further and including information on the community and on who is going, with a possible motivator to invite others, it can generate a community not through the music but rather the event.

3.2 Conceptual Design

Looking back into our ideation sessions, we defined the main needs of this interface to inform about concerts at the same time as motivating people get involved with them. Additionally, we focused on a platform that could approach people through classical music exploration, while showing information on other interested people and the possibility to invite other people or establish/join concert community.

Lucero et al.'s [8] work on mobile collocated interactions touches upon the problem of screens overtaking face-to-face interactions. Similarly, we were also interested in technology to enhance social interaction rather than to disconnect humans. In the context of classical music concerts and our research we saw the importance of face-to-face interactions between attendees. When developing our concept we considered an artifact that would support individual as well as collaborative interactions.

We decided to go 'old school' and thought of an information kiosk with the idea of promoting physical interactions, where people would experience information in a physical, not digital, way. We created a solution without the usual touchscreen interactions traditionally associated to information kiosks.

Gallacher et al. [1] also take a no-screen approach with the use of a tangible device used for evaluating social events. They discuss the use of tangible objects and how they can bring curiosity and entice people to engage in public spaces. In order to motivate people to engage with an information kiosk, we embraced the idea of creating a design that would draw young adults to experience concert information about an event, music and attendance while bringing the possibility to interact with others.

Another aspect that we discussed when designing raised the questions of how information about concerts and attendance is supplied to young adults in order to 1) make them decide whether they are interested or not, and 2) remember the choice they have made. Moreover, information is accessible in the digital world, however when it is brought into our physical world it could be better perceived. This led us to consider providing people with something that can be taken away. Additionally, the artifact should actively approach people and allow the possibility for multiple persons to interact with it.

The active approach was important for our concept to make the artifact more attractive to use and, unlike existing website solutions, harder to dismiss. For this purpose, we focused on the exploration of music, mentioned earlier in our research. The idea is that the artifact would sense a person approaching it and start playing music. If the played music resembles a piece from the upcoming concert it can be seen as a preview.

To summarize our considerations, we ended up with the concept of an information kiosk that approaches people through music. The interface of the artifact should be tangible, leaving different possibilities to engage with people. Additionally, each person needs to leave a trace of their interaction on the interface. Considering the data that needs to be conveyed we decided to print it, as this allows people to take it with them.

3.3 Prototype

When the initial concept was developed there were still many considerations that needed to be taken into account in order for us to build a functioning prototype. Questions, such as how the information about concerts and the overview of interests should be provided exactly, were raised. With the aim of building the prototype, we carefully considered many possibilities.

The design of our prototype is divided in two main parts considering their functionalities. The top part's main function is to inform, providing an overview of how many people are interested in the concert and giving information about the event and the music. The bottom part is mainly supporting the whole structure, but also senses the presence of people approaching the artifact. This results in playfully approaching them with classical music from the upcoming concerts. In this section we will include all considerations that we made while designing our prototype.

3.3.1 Screen

As described in the concept section, our team initially considered the possibility of using a screen as the main interface allowing people to interact with the data. We then discussed the pros and cons of this idea and what would be relevant in the specific case we were working on. In order to be more concrete with this idea, we created a paper mock-up, which can be seen in Figure 3, helping us to discuss the possible constraints and opportunity that we may have when using a graphical user interface.

Although there are many possibilities with screen-based interfaces, our artifact would easily become a simple information kiosk, which could leave different impressions on people and strongly influence the interaction as previously discussed. However, some of the information we have to provide can be presented mainly by the use of a screen. Therefore, we concluded that at this point of our process we would implement a small screen displaying the important information like name, time and date of each concert.

3.3.2 LEDs and Buttons

Since we decided to minimize the use of a screen, we had to find a way to present an overview of the people involved with the concert. Simply displaying a number of how many people are involved was not appealing to the team. Since we wanted to convey the message, that actual people are involved, rather than showing a statistic with numbers. In that case, we aimed for a visual representation that would convey the idea we wanted to represent. Having in mind different thoughts from the Idea generation section of our research, we considered the use of LED buttons. Their functionality allows people to press a button and simultaneously to turn a light on. These buttons we imagined being placed, resembling the seats in a concert hall.

Figure 3. Paper mock-up of the top part of our artefact to explore the possibilities and constraints of including a screen.

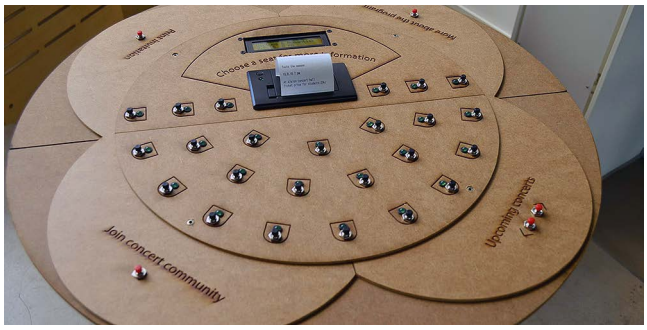

Figure 4. Final information kiosk prototype.

The idea behind this concept was to send a signal of whether or not a seat was 'taken' by either having the LED turned on or turned off. However, due to some budget limitations we decided to use simple buttons with the addition of LEDs next to them. Since our prototype was built as a proof-of-concept, we assumed that this change would not affect our data because it is not in contradiction with any other parts.

3.3.3 Printer

When discussing the impact of the data we provide to people we thought of how people will end their experience with the artifact. We thought of a way that people can go back to the information presented without coming to the artifact again. If the artifact could not just present and acquire data, but also give away something to the person, this would contribute for relating to the event. We decided to implement something that people can take with them, which will be a reminder of the decisions made when interacting with the artifact. For our prototype we implemented a thermal printer, similar to a receipt printer, which we programmed to provide people with the information they require.

3.3.4 Final Prototype

The final prototype[1] (Figure 4) has the overall look of an information kiosk and consists of two major parts: the top part, which informs about the event, community, and the bottom part playing classical music.

For the top part we had the layout of our interface cut into six pieces of MDF. All six pieces were later glued together as three layers, and attached to the bottom structure in order to end up with a table-like information stand. The first top pieces include the 'decision layer', where people can have an overview of people's interest for a specific concert. They offer space for the 24 seat buttons, printer and LCD display. The buttons are placed in way that represent seats at the concert hall. When a button is pressed people receive feedback with a responding LED lighting on. In that way people input their own data. In addition, the printer prints out the general information about the selected concert. The small display is used in order for people to be aware of the concert name, date and hour. The layer underneath includes buttons for the information layer. There are four main sections that were considered important for people to be aware of the additional information about community and concert program. In addition, people can print an invitation that they can give out to friends. People can browse through different concerts information as the music played is being changed and the overview of the interests is also changed. Both of these layers were cut from 3 mm MDF sheets, while the third layer, which acts as a support layer was cut from 5 mm MDF.

[1] Prototype video. https://youtu.be/Hj1Gb3a9sgA

The bottom part consists of four legs that are mounted to a base plate for better stability. Additionally, we enclosed this structure in order to house all of the required electronics, where a distance sensor and speakers have been placed. When approached, the artifact starts playing preview of pieces from the upcoming concert. The closer people advance the louder the music clip is played. We chose to build the overall prototype with a height of 96 cm, which was decided to be ergonomically suitable for a first prototype through an initial evaluation within the design team. The finished structure can be seen in Figure 4.

4. INITIAL EVALUATION

In order to get initial feedback on our prototype we were able to join a small Tech-Expo at Alsion (Figure 5). At the exposition, many people with different backgrounds were present. Especially considering, how our prototype completely differed from the other projects, we were constantly approached with large curiosity.

4.1 Findings

4.1.1 First Reactions

We encouraged people to explore the interface by themselves, as many were asking for an explanation. What we were able to observe was that often people did not read any of the descriptions for the different buttons. This made it difficult for them to understand the concept. Once people saw a description or we guided them towards it, most people immediately started using the artifact testing its different functions.

A further observation we made was that initially many people were afraid to touch the buttons but once we ensured them that it would be ok they wanted to test all of them. In combination with this, we noticed how many people tried to press the buttons with already LEDs lit up next to them, indicating a previous interaction.

As constructive feedback we often received the question why we did not use a screen instead buttons. Despite, people often added that they enjoy the button interaction, but would expect a screen in such an artifact.

4.1.2 Design of Butttons Pattern and Mappings

The design of the buttons' distribution has been inviting for people to interact. When people have been allowed to use the artifact freely, a big part of them imediately started trying out different buttons and their functionality. Later on when they have been interviewed they shared that "*it is very tempting"* to press buttons. "*When you see buttons, you want to press them all, see what happens."* This also showed that the attractiveness of the buttons has left behind the mapping of the buttons, which have been neglected by some people: *"I didn't notice the text."*

Figure 5. Participants interacting with the prototype during the initial evaluation.

On the other hand, there was a group of people that needed guidance in order to use the artifact. These persons observed and read the different labeling before taking an action. Some of them even asked what would be the result if a certain button is pressed, but when assured that they can try it out on their own they used the artifact. This created a distance between people and the artifact since there was a need of a facilitator to be present.

4.1.3 Booking of Tickets and Self-Service

During our evaluation we recognized that most people are interested in the artifact and the information that is presented. However, this led them to the idea that they are able to buy a concert ticket from the artifact. "*It looks like you are actually booking the ticket."* This assumption was explained by one of our participants – "*It is a very Danish artifact, self-service, it will work perfectly in Denmark." "I like the aesthetics, the flower shape, the design is symmetric."*

4.1.4 Invitation

The function of printing an invitation for a friend has been well accepted among participants. *"I really like that you can print invitations."* When trying out the artifact they would print invitations and hand them out to their friends. When talking about the way invitations are printed there is a room for improvements. Since the prototype prints out receipt-like paper with information about concerts some participants shared that *"it is like a receipt from the supermarket."* This resemblance led some people to share that because it is a "receipt" they tend to think about it as trash. This led the team to consider different ways of printing an invitation and creating 'ticket-like' invitations. We also had a few suggestions "*maybe you can have images or QR code,"* and some more broad "*why not to just receive the information on your mobile phone as an SMS?"*

4.1.5 No Screen Interactions

A big group of participants embraced the idea of 'no screen; and with a positive attitude commented that *"it looks old school."* The design of the prototype resembles old game machines for some participants and this made our artifact be attractive for interactions. On the other hand there were opinions that supported screen interactions and suggested placing a screen on the prototype. *"It would be nice if there is a screen, when I take the receipt I would get lazy to read it."*

4.2 Future Improvements

Considering the results from our evaluation we can draw several conclusions on future improvements regarding our prototype. Firstly, and most importantly, the electronics need to run stable for further field testing if we want to reach any conclusions on our interaction concept between people and music. For this we could either reconsider our programming or switch from the three Arduino boards to a more powerful controller such as a Raspberry Pi. This could eliminate the need of an additional computer to control the music. Overall, we consider this change a good possibility for a second iteration on the prototype.

Additionally, to the change of controlling unit, the feedback we received implies that a better visibility of the instructions on the interface would be essential for an improved usability. Nevertheless, it could also be kept the same for the first round of field testing as participants might be less influenced by our presence, changing their initial approach.

In combination with the reconsideration of the instructions it would also be important to further think about what possibilities the implementation of a screen could provide. Also this would strongly rely on more in-depth results through field testing as a

screen might not be an improvement but rather just simple changes to the existing tangible interface.

A third and reoccurring aspect to keep in mind for additional testing as well as further prototypes is the possibility to buy tickets through the prototype. This point was first mentioned during our evaluation. It would be a particularly interesting aspect to consider if upgrading to a more powerful controller for the electronics.

Overall we can already suggest different possible changes in further prototypes. Nevertheless, many of them strongly depend on more conclusive data from field testing the prototype. Field testing in this case is particularly important, as the final product would be an artifact, standing by itself without further explanation or support. Our research leaves one of the key questions open: *"would people approach and interact with the artifact?"* Only then we can compare the results of our usability testing with the usability of it in the field leading to more complete conclusions for further iterations of the prototype.

5. CONCLUSIONS

In this paper, we described the design process and initial evaluation of a physical information kiosk to inform and motivate young adults to attend classical music concerts. Based on a series of user studies, which included questionnaires, field observations, and interviews, we designed a physical information kiosk that detects the presence of people and invites them to interact with it by playing extracts of upcoming classical music concerts. By means of an interface consisting of physical buttons, LEDs, and a limited resolution dot-matrix display, people obtain information on upcoming concerts and express their intention to attend. A small thermal printer is used to allow people to take the obtained information with them and potentially invite someone else to attend the concert with them. The results of an initial evaluation show that participants embraced the old school aesthetics of the artifact, felt that the physical buttons invited people to interact, that the provided information was relevant and interesting, and liked the possibility to be able to print out an invitation. Future work includes, conducting a long-term in-the-wild study of the artifact to assess the long-term impact of such an information kiosk in the context of classical music concerts.

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