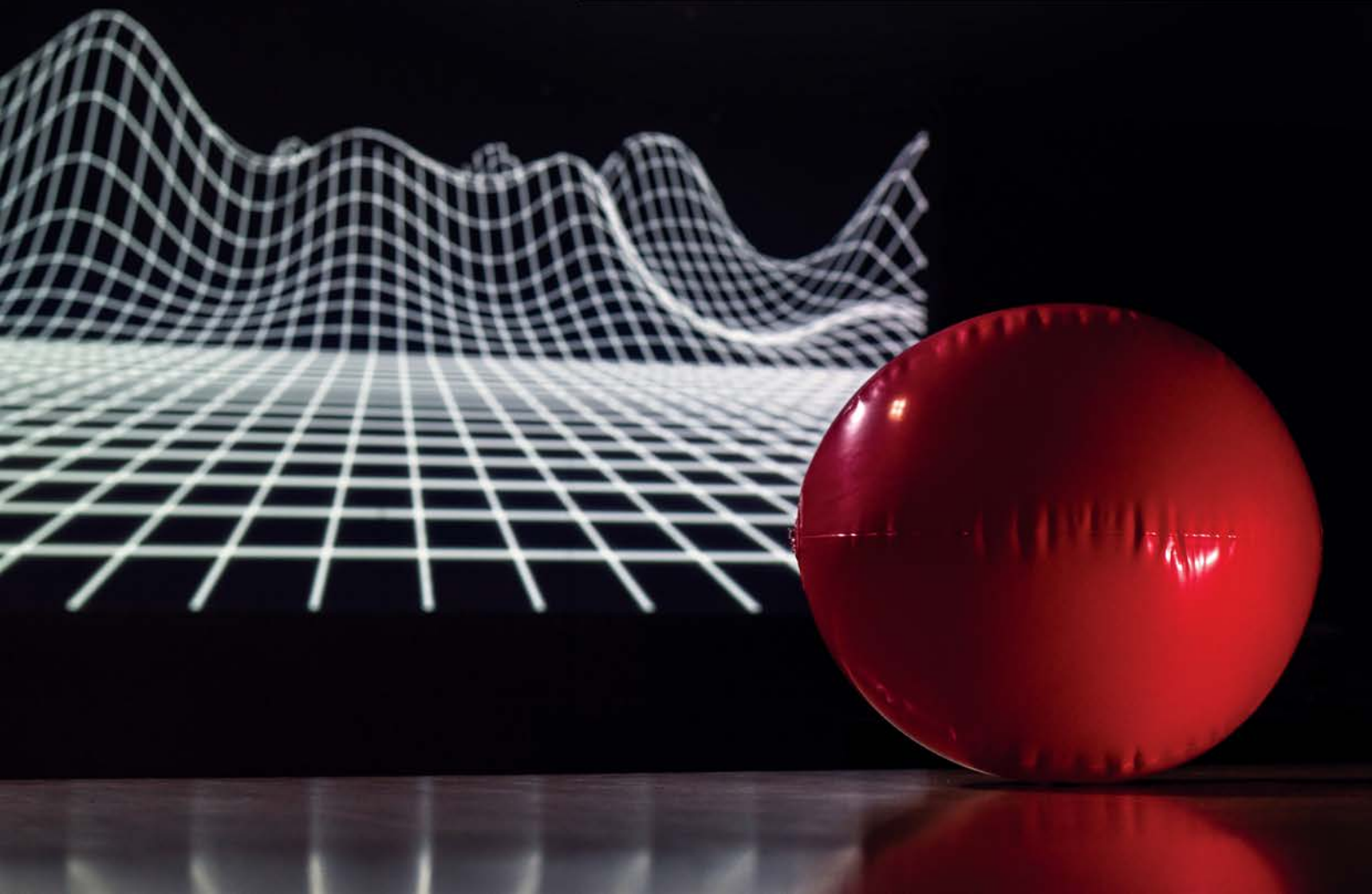
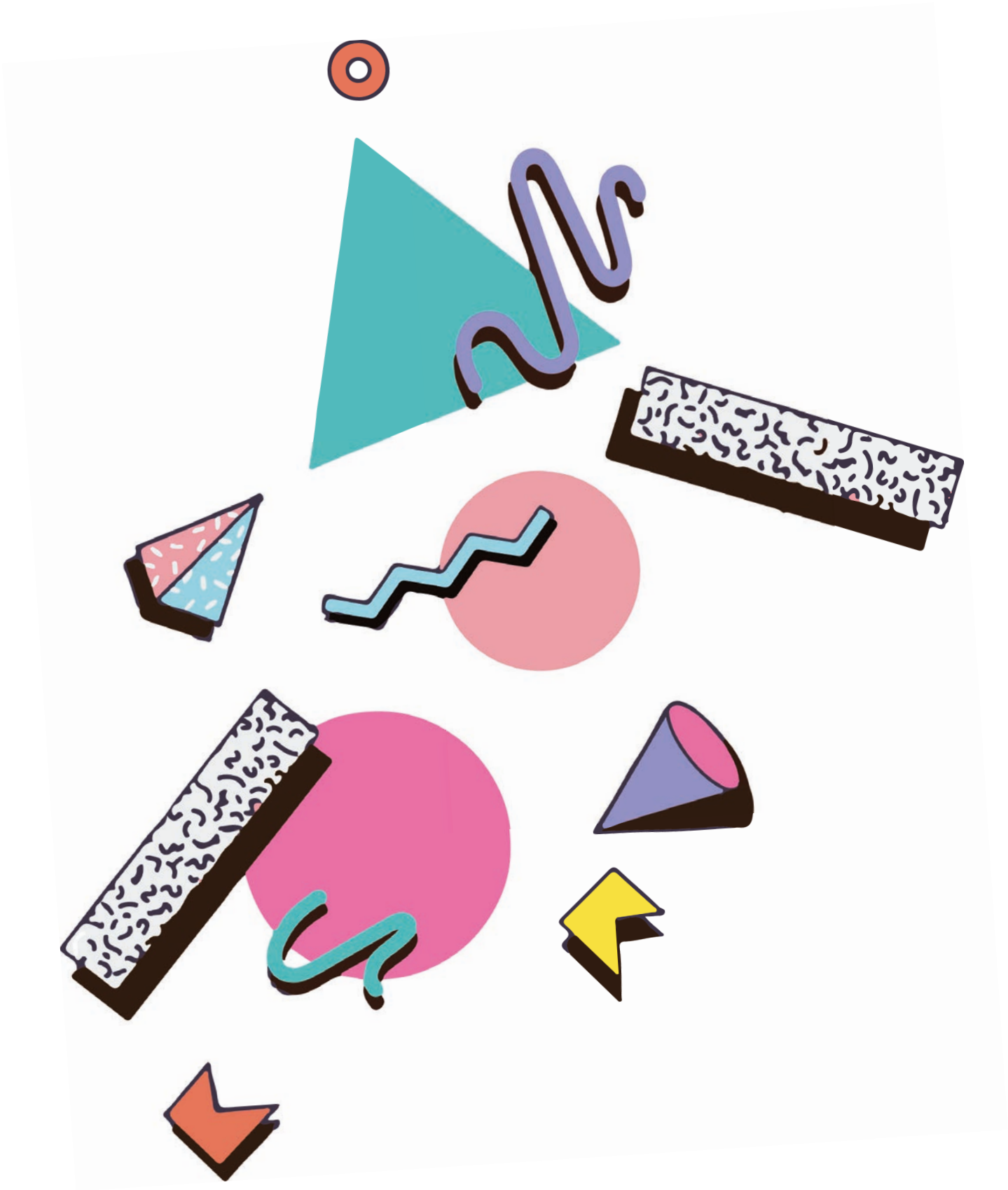
PARTY SPHERE

Eindhoven University of Technology
Bachelor College Major Industrial Design

DPB100 - Project 2 Design, Connecting Realities
B2 2017/2018, Semester A

M.M. van Dongen (s162165)
L.J. de Langen (s161648)
V. Teigeler (s167828)
N. Jansen (s168274)
M.E.E. Oosterholt (s168468)
Coached by dr. Jun Hu





Party Sphere report

Index

Introduction

This project was done for the Connecting Realities squad. This squad was about the relation and connection between the virtual reality and the physical reality. In this squad we were given three challenges by the business client The Effenaar. We chose for the challenge of We All Love. We All Love is an 80s/90s/00s party hosted in multiple towns all across the Netherlands. The challenge was to create a new element for the We All Love program that could enhance the experience of the event by involving the audience in the program. We choose for this challenge, because creating a positive shared group experience through technology interested us.

Our final product is called the Partysphere. This concept consists of two aspects: balls that are thrown into the crowd and the visual effects on the walls. The concept allows the people to adjust their environment during the party using a playful and intuitive tool. The visuals on the walls fit the targeted era and invoke a nostalgic feeling for the audience. This combination will help increase the memorability of the events and at the same time enhance the mood during the event.

Project Goal

At the start of the project we discussed what we wanted want to achieve during this project, both individually and as a group. We shared some common goals to which everyone liked to work to. Our main goal for the project was to create a high fidelity prototype, which showed potential for further development and provided for a rich learning experience.

Since we had the opportunity to work on this project with a business client, we wanted to get the most out of this opportunity. We were motivated to work towards a high fidelity prototype, as the opportunity and the chosen challenge interested and inspired us. To achieve this, we already took the business aspect into account during most of the process. We wanted to make sure to add a new element to the We All Love event, which used new technologies and at the same time uses the equipment that the Effenaar had already installed. This way the effort that the Effenaar would have to make in order to adopt the concept would be minimized and thus increases the potential it has for them.

Building a high fidelity prototype also provides for a rich learning experience. In the competence area technology and realisation it offers a learning experience in getting the hardware and software to work smoothly together. In the expertise area creativity and aesthetics creating the challenge is to create a visually finished prototype and creating an immersive visual experience.

Process

For this project we were offered to collaborate with the Effenaar, a music venue. They offered us three challenges to design for: Chagall, We All Love and Next Level Artist. What we liked about concerts and parties is that it is a social group experience and we felt that the We All Love challenge provided the best opportunity to express this vision.

Our first concept was to use huge projections in the main hall. On these projections Arcade games would be projected that would fit the current music and create a nostalgic feeling. The main feedback on this concept was that we had to do more research on the challenge and then adjust the concept.

To further explore the We All Love challenge we did both field research and literature research. From visiting a We All Love event we concluded that due to the large amount of people attending, doing an actual game would be very difficult and we went back to ideating again.

During the midterm demo day we presented the concept hype mapping. It consisted of visuals that represented how enthusiastically people are dancing, which is detected through sensors. The main feedback were questions on the feasibility of this concept: how hard it would be to detect the movement of the entire audience and what the goal of our project was.

Thus we went back to doing more research in order to formulate a stronger goal. We also came up with a solution for the feasibility issue of our hype mapping concept, to make use of a design area and to track the movement of only a few people. However we did not yet know what we wanted to project on the walls.

The answer to what we wanted to project on the walls were nostalgic visuals that could be adapted by the audience. The visuals will adjust when the Party Spheres detect a shock. In this phase of the project we worked on realising this idea and building prototypes.

Iterations

Introduction of the challenges

At the start of this project, we were given the choice between three different challenges, provided by the Effenaar. They were all required to involve modern technology to help the Effenaar reach its goal of becoming a technical precursor in a tech-averse industry. The first option was the Chagall challenge, a tool to help the artist Chagall communicate the meaning of her music to her audience better. The second one was the We All Love challenge, which was about enhancing the 80's, 90's and 00's themed dance events that the Effenaar periodically hosts. The final challenge was about creating a toolbox for a DJ at the Effenaar, which could be used by the DJ to add interesting special effects to the party whenever they pleased.

We eventually opted for the We All Love challenge. We figured it gave us the greatest opportunity to come up with something unique and thrilling. Moreover, the Effenaar gave us the opportunity to work in their halls and on their stages. This made developing a project for a crowd an interesting opportunity. The experience of a great party with so many different people is a unique one; we wanted to create something memorable for groups, an experience people could share with their friends, which made this challenge ideal in our eyes.

First concept: arcade games

Through brainstorming techniques such as sketching, individually coming up with ideas and discussing our ideas with each other, we decided on our first concept: an arcade dance hall. We wanted to create various interactive arcade games, possibly using projections and kinect, infrared light or cameras. Our approach to the first concept was a rather empirical and subjective one. Our motivation behind this idea was based largely on assumptions, simply, because this early on in the project we hadn't done any research yet.

Presented maquette

We presented a maquette of what these projections could look like in a concert hall shown and the game Jump (see appendix 1 for the code). Depending on the sensor value of the accelerometer of the players phone, Mario would jump over an obstacle. In the actual implementation sensors would detect if the audience jumps or not. The collision with these obstacles would be timed to the lyrics of a certain song, which would make it more fun.
The feedback was, though largely positive, to make the game an addition to the music. The concept should enhance the event, not overpower it. We should focus on how people interact with the music, rather than the game itself, and make a game that revolves around the music of this particular event.

Additionally, our goal wasn't very concrete yet. Ultimately, we wanted to create a feeling of nostalgia and establish a playful atmosphere for the audience through these retro games, but we hadn't quite elaborated how the games would contribute to this experience and what they were supposed to actually enhance. We were advised to study the audience's behavior - their social interaction, the overall group during the party - and focus on a particular element or event. We then could adapt and improve our concept, and make our research and our already existent idea meet in the middle.

Presented game 'Jump'

We All Love event in Utrecht

Field research and ideation

Before starting field research, we did exploratory literature research in advance. [1] [3][4][6] [7] This concerned gamification, nostalgia, group psychology and recreation, specifically of our target audience, people of approximately 30-40 years old. We could specify our goal to be related to crowd interaction. We gained the knowledge that if we were to make a game for crowds, it would be rather easy to make people collaborate. Possibilities are strategic and communicative actions, which we would have to design opportunities for.

Furthermore, we went to a We All Love event in Utrecht in order to conduct interviews and observe the party and to test our expectations. Our goal was to study the audience's behaviour, note the highs and the lows of the show, observe the environment and music, conduct interviews and capture the overall atmosphere to find inspiration or opportunities for improvement. We set up a list of questions in advance (see appendix 2.1 for them).

The main hall was barely decorated. The only notable decoration was a large Pikachu doll, some We All Love posters and a screen with old music video clips on repeat. We decided to focus more on the visual aspect of the party, because we believed that could be improved.

We interviewed multiple people (see appendix 2.2 for the interview answers and 2.3 for our conclusions). Most of them were at the party with their friends or their partner, some with colleagues. Their reason for attending this party was often their love for 80's or 90's music, or simply because they wanted to go out and dance with their friends. A surprisingly small amount of people were at the party to meet new friends or potential love interests.

The criticism was mostly towards the music and the DJ itself. There would be an uneven balance between the music of the three different decennia, one interviewee said that they would have preferred three different "areas" with other music. Some people said the wished to see more live music. They agreed on the suggestion that a large projections of these famous singers would be a nice addition to the atmosphere.

Finally we did an interview with Jos Feijen, the director of the Effenaar, and from him we obtained information concerning the business relation between the Effenaar and We All Love (see appendix 3 for this interview). He also explained why the We All Love event is an ideal setting to test out innovative technologies: it has no artistic vision behind it, which means there's room for interesting additions to these events. And it additionally attracts a large audience, which means there is a large group to test these technologies with. From the interview with the

technician at the Effenaar we learned the technical possibilities there and we based our concept around something we could use there (see appendix 4 for this interview).

We came to the conclusion that an arcade game within the party was not a good idea. Its main focus would lie on playing these games with strangers during the party, but the audience isn't that interested in making new friends. And most importantly; the hall is way to crowded and chaotic to project games on the floor and walls. A fairly large space is needed in order to play these games, which most likely isn't available. Lastly, the audience, especially under the influence of alcohol, wouldn't understand or perhaps not even notice these games.

We then decided to steer the project in a different direction; the social interaction in between strangers became less relevant. The focus would move to creating an interesting atmosphere that added to the nostalgic feeling that people seek at this type of event, and use this to make the entire crowd excited to dance.

Midterm Demo Day concept: hype mapping

After the field research, we refined our concept. Our goal remained the same: creating a memorable evening, but we took distance from the idea of gamification. We wanted to establish an energetic mood and allow visitors to carelessly let go. In our personal experience there is a lower threshold to start dancing if the people around you are dancing enthusiastically. We wanted to stimulate the atmosphere through interactive lighting and projections that create a data visualisation. The system would measure how hyped the public is through cameras. The virtual overlay is then adapted to the intensity of the crowd's movement. This way, a virtual world filled with nostalgic imagery is created within the hall. This world would automatically react to the audience's behavior without them noticing, unconsciously stimulating them to dance and become more excited.

As for feedback, we got a lot of questions concerning the feasibility of our design. We were advised to conduct a user test to confirm our assumption that intense visuals makes the audience more hyped and excited, and to do some research on what exactly triggers nostalgia. We should literally ask ourselves: "If our goal is to create an atmosphere of what life was back then, how would we do that? How do we make these people dance?" We too were told to look into the existing possibilities with projections at events; there were was a lot of interesting inspiration available. Another suggestion we got was to capture just a few people in the audience, in a small area for example and match the visuals to them.

We found that using nostalgic visuals and creating an interactive, colourful and exciting virtual world within a party could create an almost magical atmosphere, but doing so through cameras and mapping the audience's behavior wasn't ideal. The feasibility, especially on this scale is very questionable, not unlike the questionability of whether the visuals excite the audience. We decided to focus more on the strengthening of the nostalgic aspect, and ideated to come to a new and better concept.

Visual exploration

Research and ideating 2.0

During the midterm demo day we received feedback that had to be addressed in this phase. The main goal thus was to establish a clear concept goal and adapt our concept to make it more feasible. We did literature research exploring the topics nostalgia and how to make people enthusiastic at a party, interviewed people on nostalgia and then brainstormed ideas.

Our concept goal is largely based on the paper 'The experience economy approach to festival marketing: vivid memory and attendee loyalty' [5]. It is a paper by Aikaterini Manthiou et al., which goes into creating a competitive advantage in the festival industry. In particular it is about creating a festival experience that gives people the incentive to go back to the festival at another time. The paper gives evidence that the festival experience can be represented in terms of four dimensions: (self-)education, entertainment, aesthetics and escapism. Optimizing these dimensions in a festival can lead to a better memorization of the festival, which in turn leads to increased loyalty. The most influential of these dimensions are entertainment and aesthetics. With this knowledge, our concept goal became to increase the memorability of the We All Love event and to improve the mood.

Furthermore in a interview held with people in their 40s to 60s the conclusion was made that most people feel especially nostalgic for their youth (teen and college years) and that when people start working, time blurs (see appendix 5). The paper 'A review of Nostalgic Marketing' [2] also supports this conclusion. The We All Love event covers three decennia, which attracts a variety of people that feel nostalgic towards different decennia and therefore making an even division between these eras is essential. For our project we chose to focus on 80s/90s visuals, because it is more practical to not cover all the eras and the attendees of these events felt mostly nostalgic towards 80s/90s according to the interviews at the attended We All Love event (see appendix 2.2 and 2.3).

To make something stand out in the crowd, we had the idea to create a design area. This would allow us to make a more in-depth prototype and the people using it a richer experience. Next to that, a design area would greatly simplify the technical requirements. It would allow us to detect information about individual people, instead of the entire crowd. A multiplayer game using full body interaction (which reflects the spirit of such a festival with regard to dancing and activity), would then be feasible.
In the end we disregarded this and opted for a game involving the whole crowd: the Party Sphere.

Final concept: Party Sphere

In this phase we came up with the concept Party Sphere and worked on realising and validating it. The goal was to have a working prototype that we could present during the demo day.

Conceptualization

The Party Sphere consists of 2 aspects: balls with electronics that are thrown into the crowd and visual effects on the walls. These balls have an integrated shock sensor and everytime the ball is passed around, smashed or hits a surface, the visual effects change. The concept allows the people to adjust their environment during the party using a playful and intuitive tool. It makes it more interesting, because they themselves influence the atmosphere during the experience. The visuals fit the targeted era and evoke a nostalgic feeling for the audience. This combination will increase the memorability of the events and at the same time enhance the mood during the event.

The most influential dimensions, laid out in 'The experience economy approach to festival marketing: vivid memory and attendee loyalty' paper [5] and also the ones used in our project, are entertainment through playing with the balls and aesthetics and escapism through interesting nostalgic visuals. Another point the authors makes is the importance of create extraordinary moments, which can create vivid memories. We applied this to our concept by allowing the audience to change the environment in an instant, something normally not seen in events like this.

Business

From the interview with Jos Feijen, director of the Effenaar, we received information on the business relation between Effenaar and We All Love (see appendix 3 for the interview). The relational graph below represents the current situation.

Making this graph gave us more clarity for filling in the business model canvas for our project. The main conclusion from the business model canvas is that the customers of our product are not the users. It also showed that this project has the possibility to grow beyond We All Love, because the visuals can be adapted to different events.

Realization

The realization of party sphere consisted of three aspects: the materials, the hardware and the software.

Material realization:
For the prototype we bought two balls we presumed to be white, but were actually transparent. This meant that the electronics would be very visible. With sanding we tried to reduce the transparency, but this was not effective. On another type of ball it showed that spray painting could be effective. We eventually did not need to do that, because one of the transparent balls was used as a 'repair' ball and the other one ended up being deformed and we bought a red one.

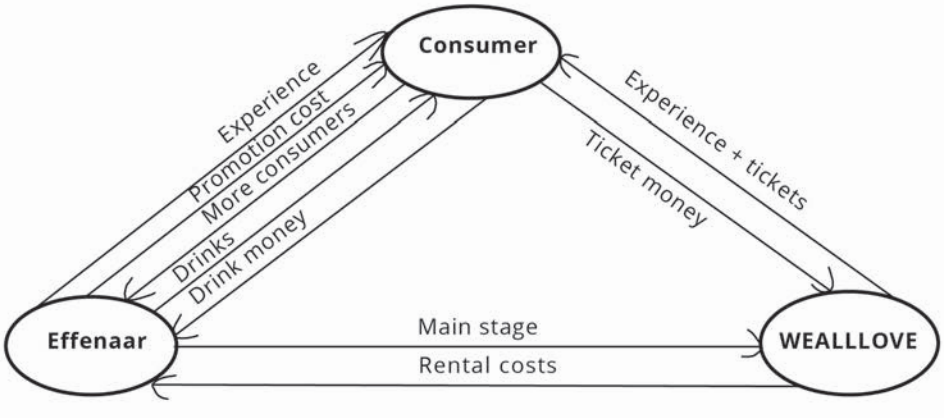
A big problem for us was how to close the balls after putting in the electronics. We experimented with different techniques. A bike reparation set was ineffective, because it is too small to work for bigger cuts. Duct tape was also not effective in taping the hole together and the hole could also not be glued together. The final solution was to use bizon kit and use one of the transparent balls as reparation patches.

Sanding

Spray painted ball

An unforeseen problem was securing the electronics safely inside the ball. We had used duct tape and bubble wrap to secure it inside the ball, but the electronics did not stay in place. The result was that the prototype broke down during the demo day. Hence we made another prototype from foam, because it is a damping material and thus will be able to handle the shock better.

Business context analysis through goods and money flows among WEALLLOVE, Effenaar and the consumer



Key Partners

Effenaar: supplier of the hall for the WE ALL LOVE event and promoter of the event in Eindhoven. The technologies in their main hall are in our reach. For us mainly being able to use their projection technology is important.

WE ALL LOVE: supplier of the ambience of the party and the music. Since our visuals will be based on the music, their input will be crucial.

Key Activities

- Research on the experience of the balls and visuals at the events and improving them.
- Manufactering and reparing the balls.
- Expanding the amount of interested customers.

Key Resources

The key resources are the balls, the visuals and the integrated electronics. The electronics for now will be integrated manually in the balls.

Value Propositions

Value Effenaar: the project can help them becoming an technical innovation hub, which will attract people who want to experience these technologies.

Value WE ALL LOVE: adding a cool party element that enhances the night which will make people want to come back.

Value event visitor: creating a more memorable evening for them through nostalgic and playfull balls.

Customer Relationships

The project is made for the Effenaar to use and will also be tested out there.
It could also potentially be used at other WE ALL LOVE events.

Channels

Our main channel is the director of Effenaar, Jos Feijen and we meet him once in a while to discuss the progress of the project.

Customer Segments

The project is made for the people attending a WE ALL LOVE party. These are people usually over their 30s whom don't go out in the regular spaces anymore.

Cost Structure

Material costs: electronics and the balls.
Renting costs: projection technology.
Loan for manufacturing, researching user experience and marketing.

Revenue Streams

The revenue of this project comes through the customers Effenaar and WE ALL LOVE. They are able to rent the project for their events. This project could possibly be expanded among other interested parties.

Business model canvas

Hardware realization:
First the circuit for the sensor was build and a test code in processing of a square that changes color on impact was made. Then the circuit for the data chip was made and some effort was needed to get it to work. Then the connection to UNITY, for the visuals, had to be made and tested. Once that worked, all the connections were soldered. The data connection, which was implemented as the ESP being a server and the laptop which displayed the visuals the requester to that server, was either slow or did not work properly. After asking for help of teachers, we got the advice to rewrite the code as an event to only send data through if the threshold is high enough instead of sending in all the raw data. To accomplish this, we switched from HTTP communication, which is inherently slow, to UDP communication. This allowed us to broadcast packets faster and only when needed (see appendix 6 for the code and appendix 8 for the circuit).

Visual realization:
We chose to make the visuals somewhat in a 80s and 90s style and chose specifically for a neon style. The Unity Engine allowed for such a style.

Unity has a lot of built-in components which make it easy to prototype visuals. The ones we used were the

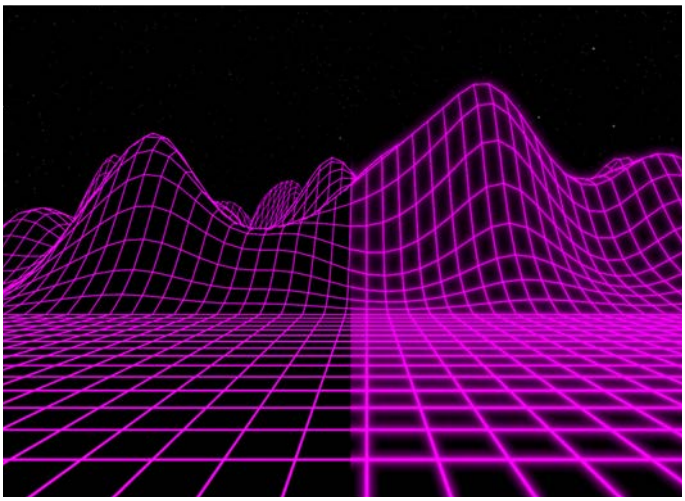
Impression moodboard

Line Renderer, which is used to make the neon lines, the Audio Source, which is used to sync the visuals with the music.
The Line Render component takes an array of Vector3s, which represent the positional space in Unity. This allowed us the make the mountains using the following line of code:

vertices[i] = new Vector3(x, Mathf.PerlinNoise(x * terrainSteepness, terrainSteepness * z), z);

Perlin Noise was made to create a natural looking computer noise. So, this was good for our mountains. The vertices were also used to create a mesh beneath the neon grid, to prevent the night sky from showing through the lines.

To make the Neon style, we added emission to the shader of the Line Renderer. This simulates self-emitting light (such as lamps). On top of this we added a Bloom After effect to spread the light (see appendix 7 for the code).



No Bloom versus Bloom After effect

The communication

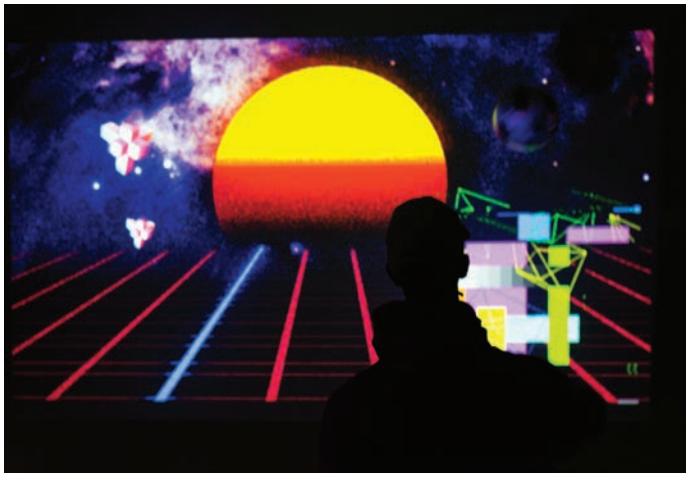
Our original http implementation was problematic. This is due to the fact that it blocked the main thread, which Unity also uses for rendering, resulting in a stuttering visualization. We tried using asynchronous requests, but, as the stuttering explained, the calls do not all return within one frame (and often they timed out). We couldn't send out more than one call at a time, because Unity uses an older subset of the .NET framework which did not support that out of the box.

So, we put it on another thread and set a timeout on the request to a second. This did somewhat work, but was ultimately not good enough due to many time outs. To solve all the problems, we switched to an event driven system. We listened on a side thread to incoming UDP packets, and dispatched an event if we got one. The relevant visuals subscribed to this event, and changed accordingly (see appendix 7 for the code).

Validation

For our user test, we created a presentation with moving GIFs and colourful retro, old-school visuals. We used a dark room, put on 80's music, and projected said presentation on the wall. We gave participants a ball and let them throw it around. Whenever the ball received an impact, a team member manually skipped through the visuals; faking an interaction. We observed that the participants were surprised by the visuals and thought it was some kind of game. They also found them to be funny and retro. Afterwards we made the participants fill in a survey, which we discuss in more detail next.

Visuals were experienced as being definitely 80's & 90's style by over 70% of the participants. The likability of the visuals' interactive response to the ball scored 3 out of 4 by over 85%. All the participants agreed - in varying extent - that this added a playful and energetic element for the audience during an event. We received very mixed responses to the question whether they would tell their friends or family about this interactive virtual landscape. Roughly as many people would share it as would not. We shouldn't leave out of account that they might not feel the need to share experiences at parties in full detail with other people, which might play a role.



User testing

We received various additional comments on our user test. For one, people weren't sure if the visuals only would change if a ball was thrown against a wall, or if impact of any kind would suffice. This might be due to the setup of the user test itself, as it was located in a rather small location with a relatively small area in which people could play with the ball. Someone else suggested that the balls should simultaneously give feedback when the impact is great enough to cause the visuals to change. Changing colours, for example. This kind of feedback would solve our aforementioned problem too; the ball itself this way shows that impact on any surface - not just the wall - generates some sort of effect.

Future steps

The balls have three main requirements. The first one is that it has to be bouncy and float in the air. This could be done by filling them with air or helium and a test could determine which gives the most pleasant experience. Our first prototype did meet this requirement, the second was made from foam and consequently did not meet this requirement.

The second requirement is that the electronics are secure inside the ball: it should not break down once it receives one big shock. A solution could be to create a compartment inside the ball that is made from damping material, which keeps the electronics secured.

The third requirement is that the electronics need to be easily accessible. This is necessary, because then the electronics can be recharged easily fixed in case they break down. Hence two openings are needed: one for filling the ball with gas and one for accessing the electronics. Our first prototype did not meet the second and third requirement because the electronics ended up laying loose in the ball and the ball had to be cut open again to access the electronics.

Furthermore, the nostalgic visuals are a big part of our concept. It is required that the visuals always match the performer and the era of the music that is playing. This way there is no disconnect between what the event goers see and hear. The system could check which performer is playing and search a database of visuals for that specific performer. Alongside this, an app could be used by the DJ to select the specific era with the music they intend to play.

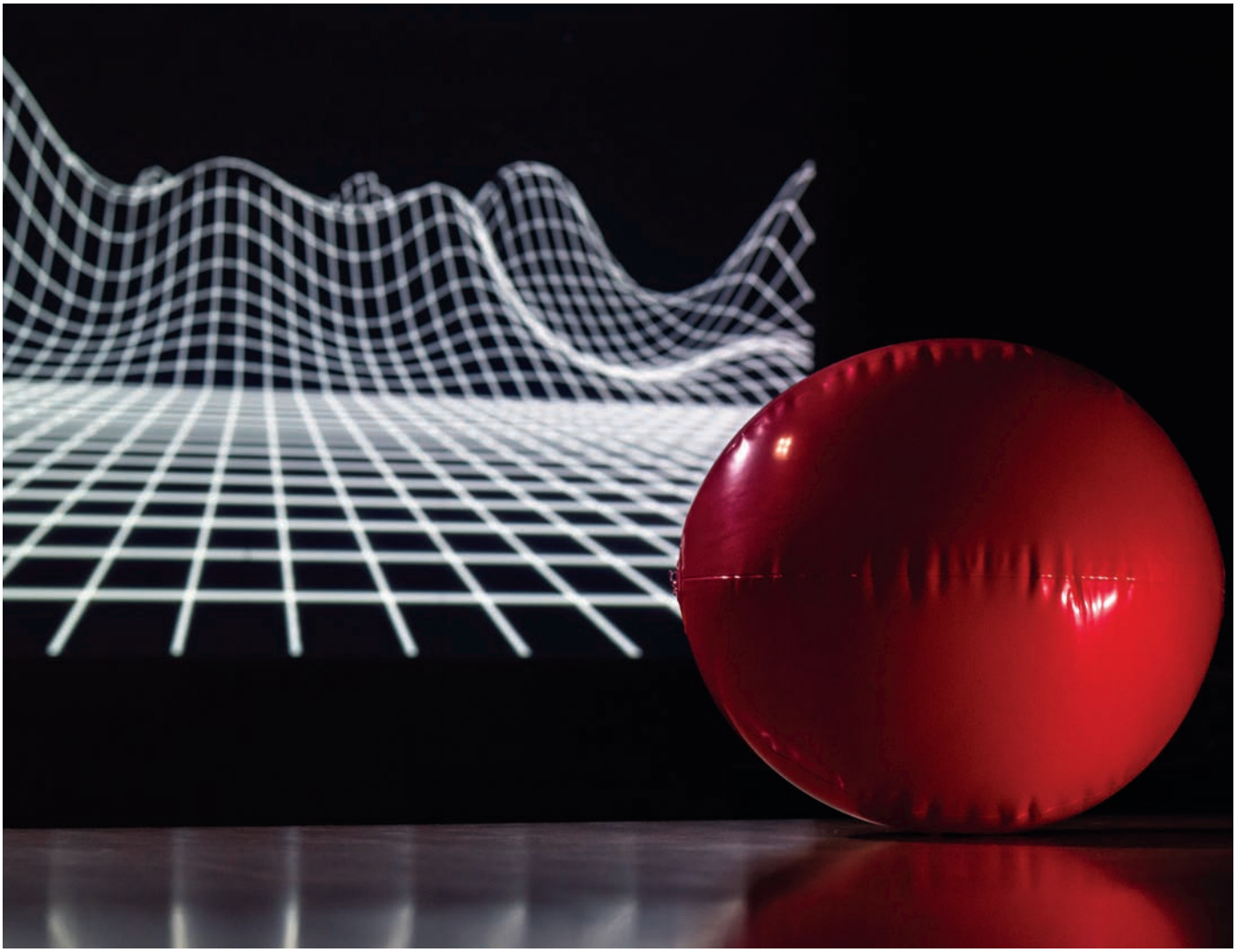
Next, there is the potential problem of the visuals changing too quickly. We could experiment with filling the room with 2 balls with a sensor and the rest without or making sure that each individual ball only changes one aspect of the visuals. There also is the possibility of making the sensors only detect every once in a while if there is a shock. To conclude, we would have to run more tests on the quality of the chip. It remains, for example, untested at what maximum distance from the wireless router the chip stays connected.

Conclusion

Our goal for this project was to make a high fidelity prototype. In the end we made two prototypes of our final concept. They used the same electronics, but were integrated in different balls. It proved to be difficult to seal the balls back up airtight, while keeping the electronics integrated in a sturdy manner. Our first prototype broke down during the demo day, because it was not able to handle the force applied upon it. The electronics were not secured enough inside the ball. However, to show its functionality quickly, we chose to cut open a foam ball, integrate the electronics and use a zipper to close it up again. This prototype is hopefully sturdy enough to be used at an event, but it does not have as interesting floating abilities as a ball filled with air or perhaps even helium. The communication between the data chip and the laptop with the visuals did work well: there was almost no latency and the shock detection rate was high.

We also had the goal that the high fidelity prototype could show the concepts potential to our business client, the Effenaar. We achieved this by having a concept that uses equipment that is already at the Effenaar. Using visuals related to a specific event, it can be deployed broadly in the Effenaar.

Demo Day prototype



References

[1] Andersson, T., D., Armbrecht, J., Lundberg, E. (2012). Estimating Use and Non-use Values of a Music Festival, *Scandinavian Journal of Hospitality and Tourism*, 12(3), 215-231, DOI: 10.1080/15022250.2012.725276

[2] Cui, R. (2015). A Review of Nostalgic Marketing. *Journal of Service Science and Management*, 08(01), 125-131. doi:10.4236/jssm.2015.81015

[3] Kuenen, Stoffel. (2015). Mediating Group Experiences - Designing the In-Between. Presented at TEI - Proceedings of the 9th International Conference on Tangible, Embedded, and Embodied Interaction, California, 2015. doi: 10.1145/2677199.2691605.

[4] Manninen, T. (2003). Interaction Forms and Communicative Actions in Multiplayer Games. The international journal of computer game research . 3(1), Retrieved from http://www.gamestudies.org/0301/manninen/

[5] Manthiou, A., Lee, S., A., Tang, L., R., Chiang, L. (2014). The experience economy approach to festival marketing: vivid memory and attendee loyalty, *Journal of Services Marketing*, Vol. 28 Issue: 1, pp.22-35, doi:10.1108/JSM-06-2012-0105

[6] Pegg, S., Patterson, I. (2010). Rethinking Music Festivals as a Staged Event: Gaining Insights from Understanding Visitor Motivations and the Experiences They Seek, *Journal of Convention & Event Tourism*, 11:2, 85-99. doi:10.1080/15470141003758035

[7] Yolal, M., Woo, E., Cetinel, F., & Uysal, M. (2012). Comparative research of motivations across different festival products. *International Journal of Event and Festival Management*, 3(1), 66-80. doi:10.1108/17582951211210942

Individual reflections can be found in the appendix