

IMPROVING THE VISITOR'S END-OF-FESTIVAL EXPERIENCE

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PREFACE

For as long as I can remember, people have told me that I should do what I like to do; that making a lot of money will not make me happy.

I've always felt the need to create. People would call me an inventor; a title I proudly carried.

Years later, while traveling through Costa Rica, Nicaragua and Panama for half a year I've seen people who had few material things, but seemed more happy and more connected with each other. It was then that I understood that what people had been telling me is true. It was the difference between knowing what they said is true, and believing it.

I applied for two studies: Photography at the HKU (University of the Arts Utrecht) and Industrial Design Engineering (IDE) at the TU Delft. I was accepted for both studies, so I had the luxury to choose; a tough decision.

In the end the possibility to self-teach photography and the idea of learning to actually become an inventor convinced me to choose IDE. I did indeed become a professional photographer, next to (hopefully) graduating from my master Integrated Product Design (IPD). More importantly, I've come to really like IDE, so I do what I love, as was the goal all along!

STRESS

This brings me to the most important rule during my graduation: Have a good time. I've seen people go into a burn-out, become really unhappy from the stress they created themselves and losing themselves in the feeling of having to finish to feel alive again. I will not allow this to happen. Nevertheless, a bit of stress can be beneficial. Not everything is fun and some stuff just has to be done, but it must add to an overall likeable situation.

CROWDSOURCING

Before and during my graduation project I actively used **crowdsourcing**. I know a lot of people that know a lot more people that know a lot of people, etc. Some of these people could in one way or another contribute to my project, but only if they know about the project.

I found that this crowdsourcing was a great addition to my project. Helpful information came from many and sometimes unforeseen people.

THIS DOCUMENT

This document is setup to be read either digitally (16:9, pages side by side, first page is a single page on the right) or in printed format (A4, one page per side, long side duplex, cut edges to meet borders of document). Digital readers can click [hyperlinks](#) throughout the document which will redirect to others parts in this document that explain or elaborate on the subject.

A hyperlink to a source outside this document, such as a web-page is formatted like this: <https://www.mojo.nl/>

Text formatted as **such** is considered important.

"References in text are formatted in APA as such" (KURPERSHOEK, 2018) ← [HYPERLINK TO THE REFERENCE LIST](#)



“Sit back and relax...”



Abstract

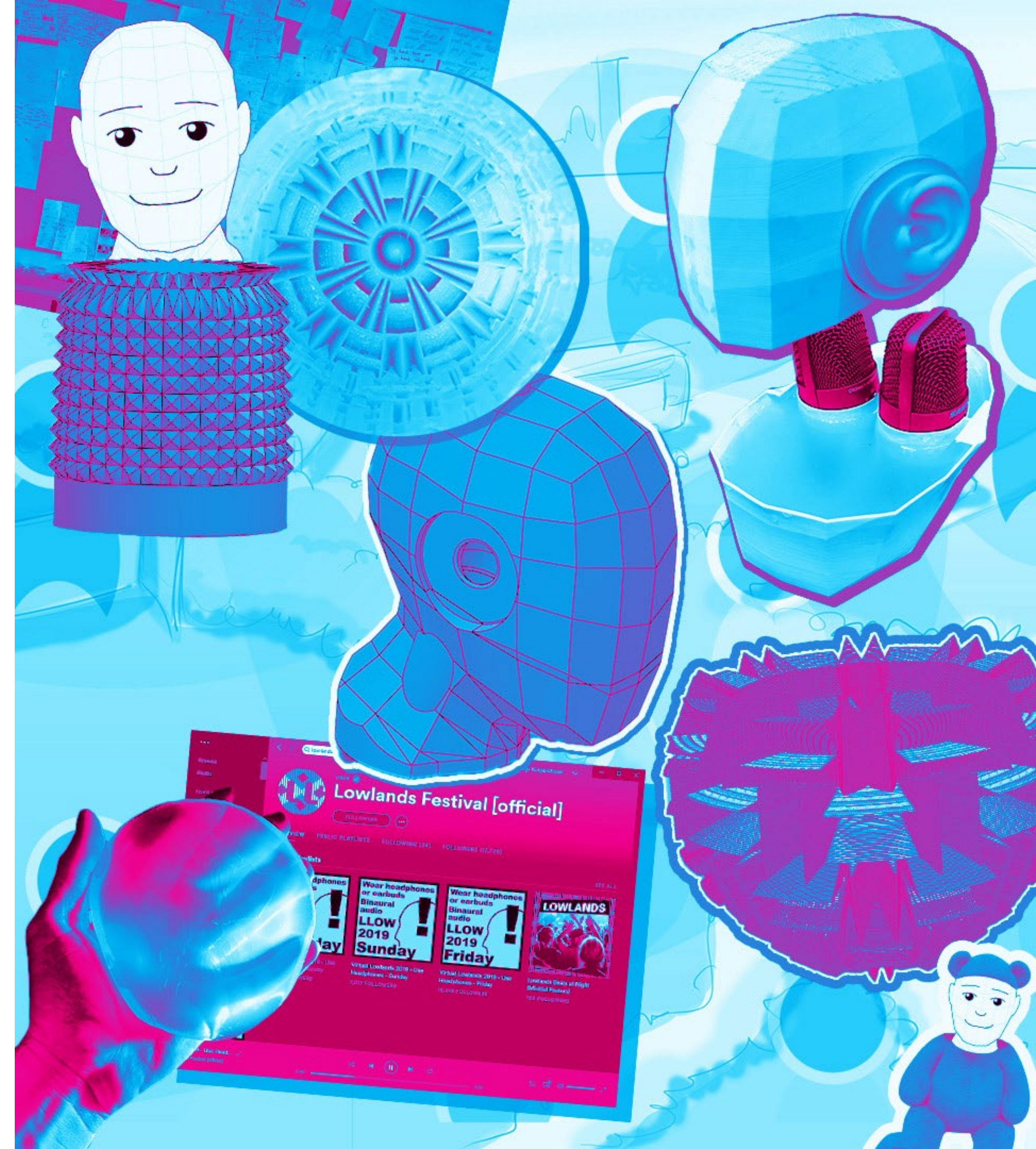
Visitors who return from a festival experience an empty feeling combined with fatigue. In this thesis, this experience is called the void. An established psychological phenomenon called the Peak-End rule describes how events are judged by both their peaks, be they positive or negative, and their ends. The end of festivals is now often perceived by visitors as "necessary evil". It is assumed that the end and its experience are part of the festival and last from the moment of leaving the terrain up to three days after. Therefore, the judgement of the festival depends on this experience.

MOJO Concerts has not designed anything for this period of time, while the number of competing festival organisers is rising, which makes delivering a better festival experience even more important. To improve this end-of-festival experience, a product was designed to 'embrace' the visitor. Embracement is an experience that solves the void. A greater amount of embracement results in a better experience.

In this thesis the product uses the auditory sense to embrace the visitor. A binaural, head-shaped microphone is designed that will record the sound of the festival, and record the visitors' reactions to the request to say something nice. After the festival, the records are collected by the organiser and distributed to the visitors over a popular music streaming medium.

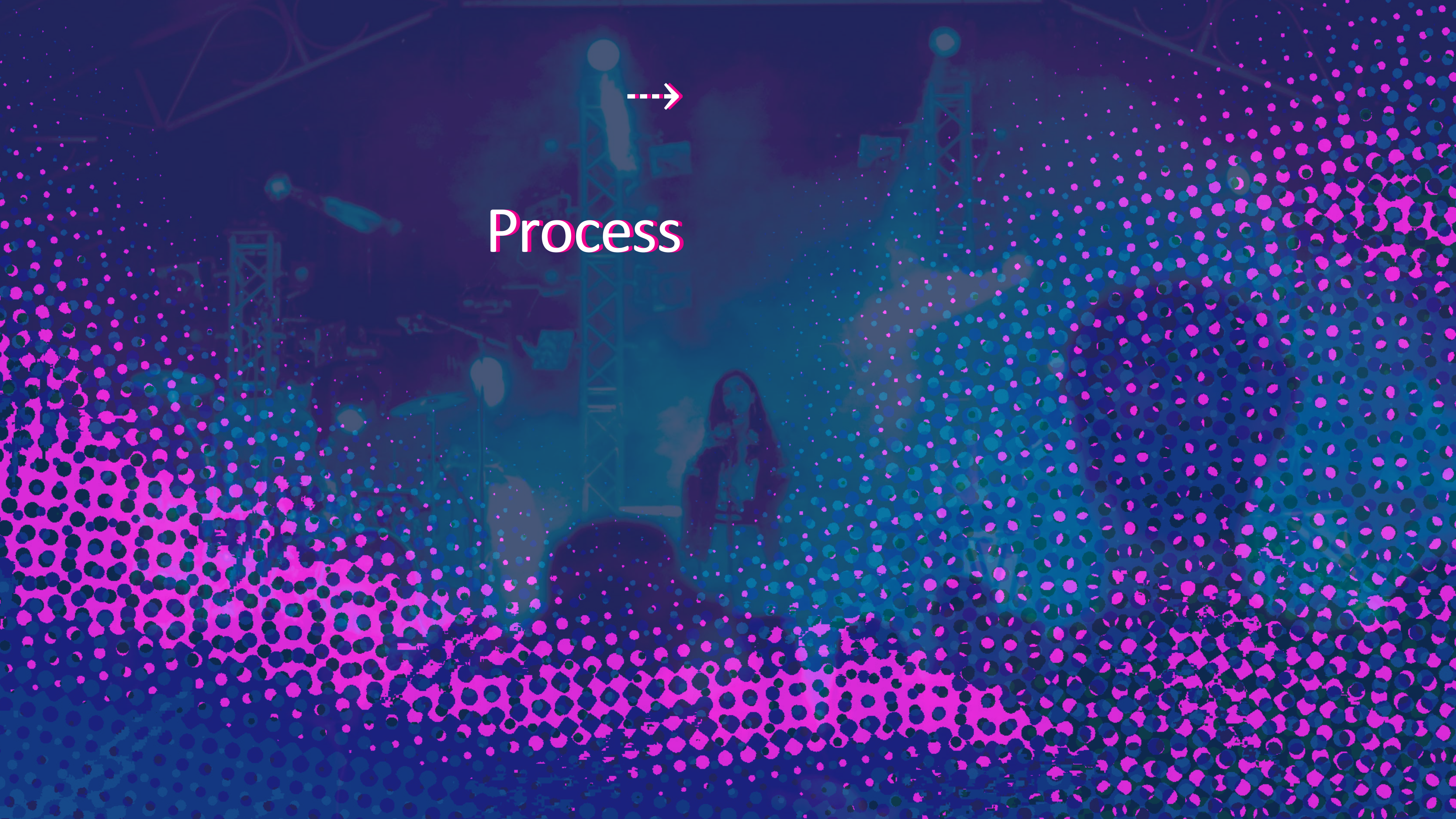
The head-shaped microphone was shaped as such for a more binaural experience. A more binaural experience will result in a more embracing experience. The face that was put on the head was chosen from sixteen faces in a test (n=32). During this test, participants were also asked to describe what they would say to see how the question should be changed for better results.

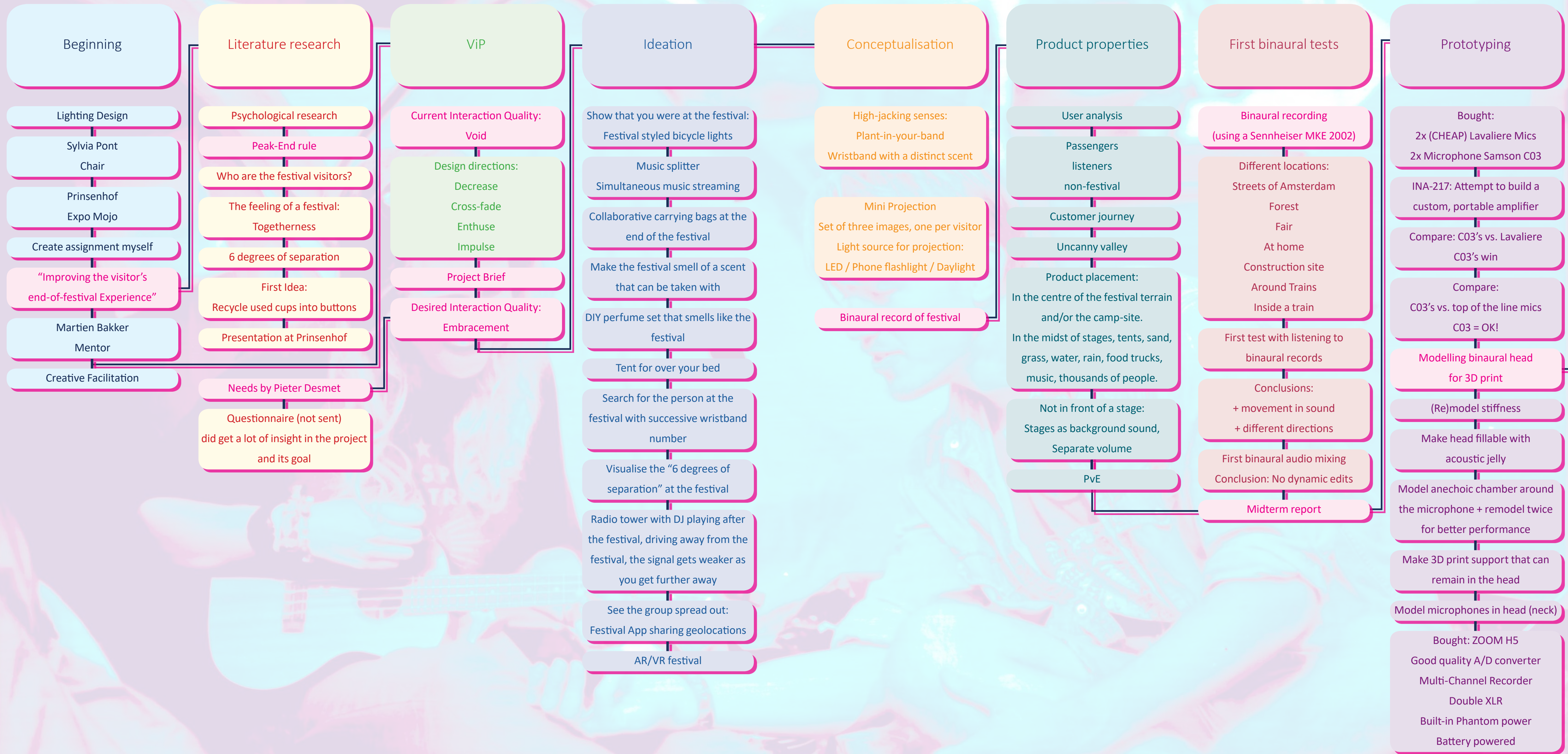
Indicative tests on the reaction to the head and its recordings were performed. The head was tested in front of Amsterdam central station. The installation consisted of the head, a steel structure with padding and clothing, and a sign asking passengers to say something nice. The test was filmed from ten meters away to avoid interference with the passengers. During this 53 minute test, 39 reactions were recorded. This is a lower number of reaction than expected from a festival, because then it is common to step out of one's comfort-zone. It is assumed that this amount of reactions is an indicator for a positive result. The record was edited to cross-fade from reaction to reaction. This sound was tested (n=85, v=45 + m=40) and on average valued a 3.0 (1 to 5 Likert scale, v=3.1, m=3.0). This assessment is expected to be higher when the record is from a festival and the listener is just back from that festival. Proposals for further research and how to assess the value of a test at a festival are added. The installation is expanded to a gathering spot in which the head is positioned in the midst of the visitors to further improve the embrasiveness of the binaural records.





Process





Building Michael

Test prints to check measurements

Iterations

3D print
Print failed at end

Print remaining part
Glue together

Print failed due to lack of wall-thickness
Shell is not waterproof, attempts to close shell

Find right acoustic jelly

Literature research:
Density head contains
Density ~1.3
Head cavities *0.8 = ~1

Cast acoustic jelly into the printed head

Heat started to deform head
this was noticed just in time

Jelly was cooled down more before being cast into the head

Naming the Binaural recording product:
Mike
Michael
Time travelling emotion
Emotion wormhole
Virtual festival
Back on track

Appearance

Compose possible faces with different facial expressions

Test: What is the best face?

Made an online test environment
Included in test:
"what would you like to say?"
Insight in effectiveness of this question

Visibility:
Height formula:
line of sight

Distance user-product: 4 – 1.5m

Dynamic volume
Safety of product
Safety of user

Ears at ~ p50 height

Dined

Improve interaction

Make it a gathering spot

Binaural recording stage for visitors

Seats to sit around Michael

Make Michael part of the crowd

Add sounds by including "instruments" in the installation?

Installation should not influence the recorded sounds directly as this will become a nuisance because of endless repetition

Body

Animal
Bear / Cat
human ears?

Sleepy Joe (Sleeping bag)

Festival outfit

Talk to Future-self,
Time travel device

(Fake) Microphones to clarify that Michael records sound

Explanation

Explanatory signs / text
"read out loud" problem

"Say something nice to your future-self"

"Help, I'm in my Tuesday dip"

Play explaining video over Headphones

Pre-Festival Introduction

Light - RECORDING

QR -code

Suggestions

Priming (Psychology)
Literature research

Use cues

Tests

Recording in front of Amsterdam Central Station

~1h of recording
39 recorded vocal reactions

Video

Test:
Reaction to real life binaural recording
Embracement?

>60 reactions

After the festival

Listening Interaction:
Unintended use:
Without headphones
= underwhelming

Designing distribution of records

Medium:
Spotify
YouTube

Designing user friendly file handling

Playlist name:
[festivalname][day#][HH:mm]

Filename:
[Festivalname]
LISTEN WITH HEADPHONES!
[day#][HH:mm]

Moderate the audio to detect possible conflicts with Spotify terms and conditions?
Flag files with [Explicit] (Spotify)

File duration
10m? 30m?
Tested: duration of interest = 7m
Shareability
Conclusion: file duration = 10m

Continuous Record vs.
Record short periods of time

Privacy
AVG / GDPR
Mojo already asks for all necessary permissions

Further research

Actual (end of) festival test

Acoustics

Better and smaller microphones

Placement on terrain

SLS print of 3D model

Projection of an interactive face on Michael

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fig.2 Visitors in line (SWNS, 2013)

IMPROVING THE VISITOR'S END-OF-FESTIVAL EXPERIENCE

THESAURUS

to improve (verb), improved, improving, to bring into a more valuable, desirable or excellent condition. ~improvement (n.), the change or act of improving
e.g. MOJO uses Thijs' graduation project to improve their festivals

visitor (n.) a person that will go, goes to, is at or went to the festival for recreational purposes.
e.g. The visitor enjoyed the improved festival a lot

end-of-festival (n.) the time from the moment the visitor starts leaving, up to two days after the visitor has left the festival
e.g. The improved end-of-festival caused a better memory of the entire festival

experience (n.) one's perception of an event
e.g. Strangely enough, the end of the festival added value to the experience

binaural (adj.) of, with, or for both ears
e.g. The sound is binaural, making it a lot more interesting than simple stereo sound.

to embrace (verb), embraced, embracing, to take or clasp in the arms; press to the bosom; hug.
e.g. The visitor felt embraced by the sound.

PROJECT SCOPE

The scope, with two companies, the university, me myself and I has to be well defined to not get lost during the project.

My project, as agreed upon with Prinsenhof, is about showing possible innovations in festivals, rather than innovations in the museum. My target group for instance is not the visitor of the museum, but the visitor of the festival. My scope is therefore defined as follows:

To deliver a working prototype of the design made to "Improving the visitor's end-of-festival experience".

This prototype is then to be presented to MOJO before the beginning of the new festival season.

If MOJO is not interested, the product can easily be adapted to another festival, or a whole different field of interest.



Michael



WHAT IS MICHAEL?

Michael is a binaural microphone.

Michael asks the festival visitors to say something nice to him, because he does not feel so good. The auditory reactions are recorded binaurally.

After the end of the festival, the then ex-visitors experience **the void**; a feeling of emptiness after such an amazing time at the festival combined with fatigue.

The binaural records are distributed to the ex-visitors over a popular music streaming service together with an explanation of what the records are and how they should be listened to.

The ex-visitor listens to the binaural records of people passing by and saying something nice to Michael.

The binaural record is a very special representation of the festival and its visitors. The listener will therefore feel as if they are **embraced** by the sound. That what was said to Michael is now experienced as said to the listener.

The festival gives the ex-visitor a remedy for the Void.

The valuation of the festival by its visitors will be higher, as the festival addresses an established psychological phenomenon called the **Peak-End rule**.

Michael is the solution to the Design Brief, as formulated in the Midterm Report. Therefore Michael is the solution to the Graduation Project.

Michael is given a suitable surrounding that further improves the record to be more embracing.



Assignment



MUSEUM PRINSENHOF

EXPOSITION MOJO

The initial assignment proposition from (Museum) Prinsenhof was to create a part of their planned exposition on Mojo Concerts.

Because I had a feeling that assignment would not enable me to show my full potential, I proposed another assignment that I created myself.

CREATE ASSIGNMENT MYSELF

To come up with a good and interesting assignment took a while. The idea to create something in line with the 'innovations at festivals' part of the Mojo exposition was proposed by Prinsenhof.

Partially by remembering my own festival experiences and partially by speaking with friends about their experiences I used crowdsourcing to find the user's problems with festivals.

MOJO

MOJO's role in the entirety of the project has been quite vague. Prinsenhof seemed to not want to 'bother' Mojo with anything, including our much requested questions. Prinsenhof requested more concrete plans before they would contact Mojo about our projects. This could have been a big drawback for me, but since my project isn't focussed on Mojo, but more on innovation for festivals in general, this was less applicable to me.

We all did get a good lesson in how to deal with different clients and how to address them appropriately.

Eventually, all graduating students did get a chance to speak with Ide Koffeman, a member of Mojo, once. This meeting was helpful, as Koffeman could answer us from his own experience as festival organisation. This gave me a better comprehending of questions such as "Why do certain things work and why not?"

Problems often float around personal hygiene and carrying luggage and tents onto and off the terrain. Although these problems have seen improvements, they still exist. These problems are experienced by many, but are also the most obvious ones. Then after some more crowdsourcing, my sister told about the horrible feeling of having to leave the festival and the days following that. This was the trigger to focus on the end of the festival. The assignment, as accepted by Prinsenhof, my chair and mentor, as well as the TU Delft became:

"Improving the visitor's end-of-festival Experience"

Five other students started their graduation project at Prinsenhof around that same time. Most of those projects did involve the Mojo exposition to a bigger extend.





VIP

Vision In Product

Methodology by P. Hekkert and M. van Dijk

THE STEPS OF VIP

[Domain on page 11](#)

[3. Explanations and Justifications on page 22](#)

[2. Interaction Qualities on page 18](#)

[1. Current 'product' on page 12](#)

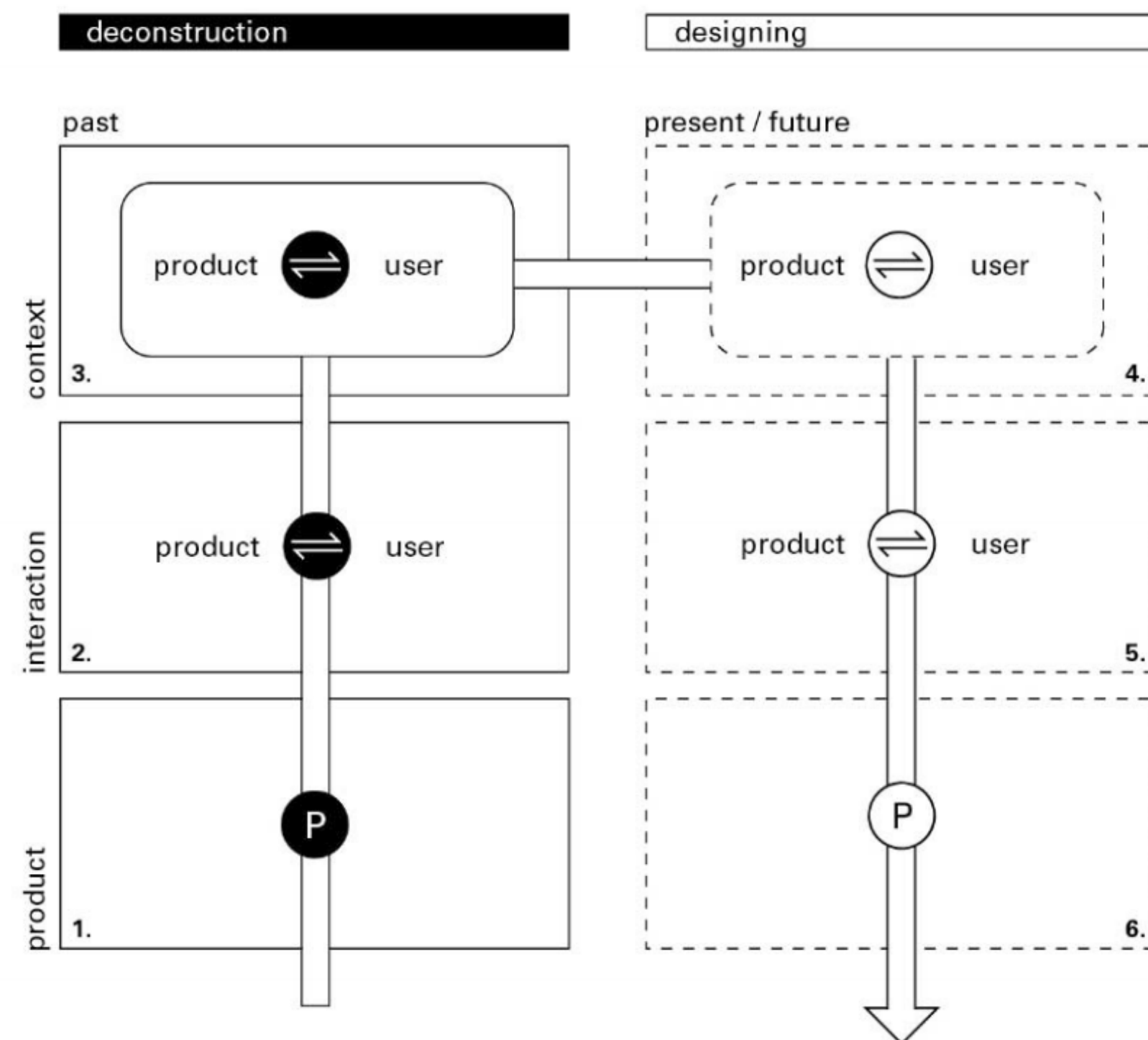
[4. Predictions and Expectations on page 28](#)

[4'. Wouldn't it be nice... on page 32](#)

[5. Avoid a Void on page 36](#)

[6. New 'product' on page 50](#)

fig.3 The ViP framework (HEKKERT & DIJK, 2011)



DOMAIN

The domain for this graduation project is the end of multiple-day-festivals. This narrows down as follows:

- ↳ MOJO organised events
 - ↳ Festivals
 - ↳ Multiple day festivals
 - ↳ The end

WHO

Festival visitors

WHAT

Experiencing the end of the festival

WHERE

Virtually anywhere

WHEN

At the end of the festival

WHY

To improve the visitors overall festival experience and stand out from the other festivals to maintain MOJO's top position.

HOW

We'll come to that...

TIMEFRAME

The Timeframe for this graduation project is from now until the begin of the next festival season (Spring 2019).



1. Current 'product'

CURRENT END-OF-FESTIVAL EXPERIENCE

The 'product' for this VIP is not really a product. However, it is perceived as part of the festival and therefore should be designed as such.

In-depth interviews show that the end of a festival is often perceived as a steep drop in energy and excitement.

The music has just stopped and visitors wake up from the dream-world they have been in during the festival. Soon all the people you just felt so related to, dancing to the same music, feeling the same excitement, sharing the same moment, will all transform back to strangers that you know nothing about. The drive that keeps the crowd on their feet changes from 'How to have the best time ever' to 'How to get away as fast as possible?'

As soon as the music stops, the walls around the festival terrain that formed the border between harmony and the outside world, now enclose the exhausted visitors.

Once the visitor leaves the terrain the realisation hits that the outside world continued as it did before the festival and will forever after. Sitting next to people on the train who haven't the slightest clue of the community that existed until an hour ago.

Feeling alienated from the world they left three days ago, yet no longer belonging to the now dissolved group that so quickly became their new life.

The worst moment comes when the visitor is home and alone. Festivals are all about the feeling of **togetherness**. The new loneliness gives the feeling of **purposelessness**.
(DESMET, P.M.A. & FOKKINGA, S.F. , 2018)

“The drive that keeps the crowd on their feet changes from 'How to have the best time ever?' to 'How to get away as fast as possible?'

PROPERTIES OF THE CURRENT 'PRODUCT'

TARGET GROUP

The target group of this project is the massive group of visitors leaving a MOJO organized festival.

The target group is a diverse group of almost all segments of the population. The difference however, is the ratios of the segments. In the Netherlands, the group of people with an age between 55 and 75 years is twice as big as the group between 18 and 35 years. At the festivals, this ratio is the other way around. Another ratio that is flipped around, is the education level segments, with a festival visitor ratio of 1 (lower educated) to 1.5 (higher educated).
(MOJO, 2018)

END-OF-FESTIVAL PROPERTIES

Away from festival terrain
Take all your belongings
Depleted batteries
Slitting off from your group
Low on energy
Massive amounts of people



["How to Leave a festival in 30 easy steps" on page 16](#) and
["How to get back to reality in 25 easy steps" on page 17](#)

are two caricatural scenarios that sketch an idea of the current end-of-festival experience.

HOW TO LEAVE A FESTIVAL IN 30 EASY STEPS

- step 1* Stop dancing, get back to your tent. Find back your valuables
- step 2* Put all your (dirty) stuff in bags, deflate your mattress, put your bags outside your tent
- step 3* Wait for you tent-mates to do the same
- step 4* Take your (wet) tent apart, put the pieces in bags, place the bags with the other bags
- step 5* Wait for your friends to do the same
- step 6* Divide the bags over you and your friends and pick them all up. Important: you cannot leave anything at this point, because you will not return to this place
- step 7* With the bags in both hands, on your back and your front, enter the endless stream of bag-carrying people hopefully walking towards the exit
- step 8* Drop a bag, struggle to pick it up again without dropping another
- step 9* Loose your friends in the stream, try not to panic
- step 10* Panic. Important: Keep walking
- step 11* Find out the battery of your phone, as well as the one in your power bank is depleted
- step 12* See your friends' faces in the endless stream. Tip: Your friends can be walking in front of you, as well as behind you.
- step 13* Walk over all obstacles the organisation put in place by the organisation. Note: These obstacles, such as staircases, are bottle necks. The walking tempo will be lower here.
- step 14* Tear a handle off one of your bags. Don't worry; the other handle will hold for some more time
- step 15* Stand still just before the exit
- step 16* Regroup with (part of) your friends and tell stories about getting lost and finding each other again
- step 17* Go through the exit. Note: You're leaving the festival terrain at this point. From now on you are on your own. Nothing can save you now.
- step 18* Say goodbye and split from and the friends that use other means of transportation.
- step 19* Walk to your next part of transport
- step 20* Find the right place to wait
- step 21* Wait

- step 22* Wait
- step 23* Wait. Note: This may take some time
- step 24* Get on the transport with all of your bags and leave the area
- step 25* Notice the world outside of the festival area did in fact continue to exist. Please do not feel weird about that or yourself
- step 26* Feel weird
- step 27* Change transportation at least twice. Tip: Do not forget any of your bags
- step 28* Get to your final destination. Note: This might not be your home, as you do not want to be alone at this point. If however, it is your home, and you have people over, prepare some space for a lot of (dirty) bags.
- step 29* For the next days (1-3) try to meet as few people that have not been at the festival as possible. People that weren't at the festival will possibly give you the feeling of being weird, while they are definitely the ones being weird, not being nice to everyone and dancing all day and going to "work" to earn "money" and stuff...
- step 30* Snap back to reality, oh, there goes gravity. See next guide on how to get back to reality

You did it. You are now again able to function in modern day society where acceptance for being yourself is reserved for the few lucky ones that somehow sustain not giving that much of a duck.

HOW TO GET BACK TO REALITY IN 25 EASY STEPS

- step 1* Enter your home, close all doors and windows
- step 2* Put all your bags somewhere. Tip: Do not unpack them yet! That comes later
- step 3* You can charge your phone, but do so carefully; Opening group apps can cause an impulse overload.
- step 4* Eat something healthy. Note: If you have nothing healthy at home, eat something else. If you have nothing at home either order food or skip this step.
- step 5* Drink a lot of water
- step 6* Drink a little more water
- step 7* Take a nice shower. Tip: The left valve is usually for warm water. Imagine; actual warm water!
- step 8* Watch something silly until tired
- step 9* Fall asleep
- step 10* Wake up the next day. This day will not be one to remember fondly
- step 11* "Where am I?!" You're at home, all is well, this is the year 2018
- step 12* Get up, eat, drink Note: Do NOT go to the supermarket for this just yet!
- step 13* Back to bed for a while
- step 14* Get up, for real this time, so get dressed
- step 15* Put on some nice music
- step 16* Unpack a bag
- step 17* "This will take forever" That's not true, diamonds are forever
- step 18* Put all your clothes, shoes included, in the washing machine. Note: The shirt you just put aside because you didn't wear it at the festival? Pick it back up and put it with the rest. Trust me on this one.
- step 19* While waiting in between washing machine sessions, check out the pictures you made at the festival. Note: Open group apps with caution. Others might not!
- step 20* Go to the store. Talk to nobody, don't even look at somebody. You look like sh*t. Nobody will be nice to you. Pay and leave.
- step 21* If it's a sunny day, look at any nature you can possibly find. Nature will understand you. We have drifted so far away from our natural roots. Nature is still simple. Simple is good. If it is a rainy day, go home as fast as you can.

- step 22* Eat
- step 23* Sleep
- step 24* Wake up. Note: Why did you wake up? You could've just kept on sleeping...

Well.. That's it.. You're back to reality whether you like it or not. But at least you still have the memories...

“Snap back to reality,
ope there goes gravity

(EMINEM, 2009)

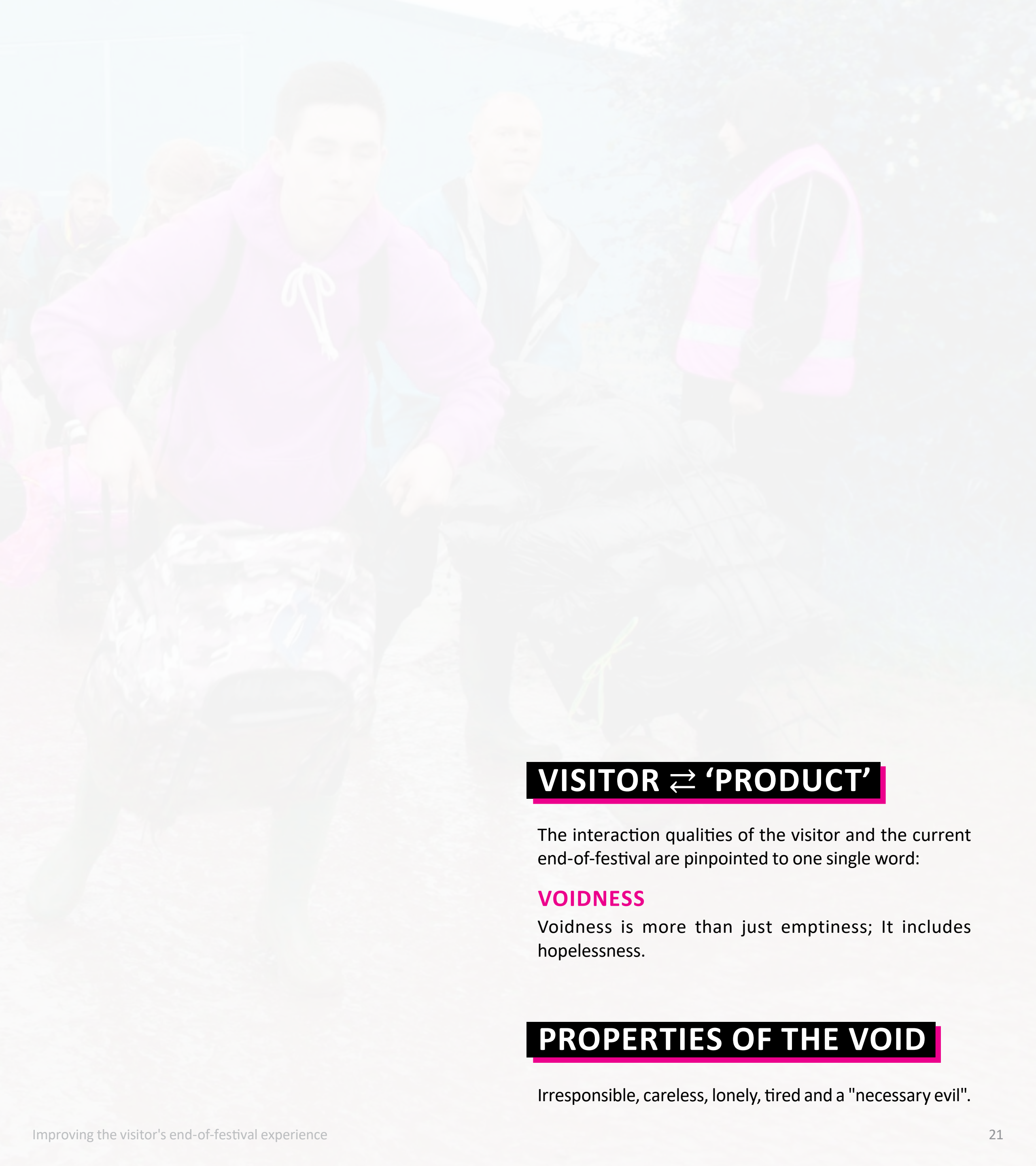


2. Interaction Qualities

VOIDNESS



fig.4 (SOMERSET COUNTY GAZETTE, 2018)



VISITOR ⇔ 'PRODUCT'

The interaction qualities of the visitor and the current end-of-festival are pinpointed to one single word:

VOIDNESS

Voidness is more than just emptiness; It includes hopelessness.

PROPERTIES OF THE VOID

Irresponsible, careless, lonely, tired and a "necessary evil".



3. Explanations and Justifications



fig.5 (N. Spanjer, 2016)

6 DEGREES OF SEPARATION

To connect people, this theory was looked into. The theory states that to get from any person on the world to any other person, the average amount of handshakes

(acquaintances) needed is six. It's quite possible that this number is even smaller at a festival, because the visitors have a lot more in common.

HUMAN NEEDS

Humans have certain needs that, when fulfilled leave them feeling better. These needs are described in Innovation by Emotion (2018, Manuscript in preparation) by Desmet, P.M.A. & Fokkinga, S.F.

Togetherness, as described to be the feeling of a festival before could also be described in the needs:

Belonging; Being part of and accepted by a social group or entity that is important to you.

Acknowledgement; Getting attention and appreciation for what you do and respect for who you are.

Security; Feeling that your conditions and environment keep you safe from harm and threats

Stimulation; Being mentally and physically stimulated by novel, varied, and relevant impulses.

Relatedness; Having warm, mutual, and trusting relationships with people that you care about.

QUESTIONNAIRE

A questionnaire was made, but not sent. It did require to think about what information was needed for the project and thus generated a lot of insight in the project and its goal.

WHY IS THERE A VOID?

The void is not considered a part of the festival. Therefore it is not design to be a smooth ride. The contrast between being at the extremely well organised and design festival and the lack of this organisation is huge. The visitors are left with nothing but the knowledge that the place where they just were ceases to exist, who they were close to are all drifting away, what they had has now become worthless, and with the knowledge that it will take a lot of time to find all this again, if ever.

HOT-DOGS

If so, then why is IKEA losing money on selling hot-dogs at all their stores? Why lose money on hot-dogs when your furniture store is doing great?

PEAK-END RULE

An established psychological phenomenon called the **peak-end rule**, first evidenced in the 1993 study "WHEN MORE PAIN IS PREFERRED TO LESS: ADDING A BETTER END" BY KAHNEMAN, FREDRICKSON, CHARLES SCHREIBER, AND DONALD REDELMEIER, describes that people's judgement is largely based on the peak (positive or negative) and the end of an experience, rather than on the average or the sum of the event.

LOYALTY

One argument one might suggest against spending extra time and money on visitors is that there will always be a substantial group of new visitors available. New visitors do not benefit from last year's well designed end-of-festival experience. This is true, but mistaken.

This combined with the feeling of needing to sleep for days before their regular boring life continues as if nothing ever happened.

From the visitors perspective he festivals carelessness and disinterest is bad. From a business perspective however, not having to deal with he visitors after the festival is good, right?

Surprisingly, the answer is that the hot-dogs actually are profitable, but not directly. IKEA makes perfect use of the Peak-End Rule.

The peak-end rule describes that the festival will be judged by its most positive or negative moment (peak) and its end. Because the influence of the peak and the end on the overall assessment is clear, both can be addressed to improve an experience.

Festivals in general focus on providing a good experience to their visitors during the festival. After the end however...

"First-time visitors spend a significant amount of money during the festival [..], while repeat visitors are loyal visitors who stay longer and spend more money [..], Results reveal that both [..] are important for the long-term sustainability of the festival." (KRUGER, SAAYMAN & ELLIS, 2010).

To have loyal returning visitors requires them to have good experiences.



fig.6 Hot-dogs sold at IKEA

CURRENT SOLUTIONS

AFTERPARTIES

For those that did not yet run out of energy, afterparties offer a chance to make sure that you do. Even-though an endless festival would solve the problem, the concept lacks feasibility. "All good things come to an end" (NELLY FURTADO, 2006).

AFTERMOVIES

A few days to weeks after the festival, ex-visitors are given the aftermovie. Hoping to catch a glimpse of themselves, they watch the aftermovie and experience being back at the festival for a few minutes.

“Don't let a weekend have a weak end”



4. Predictions and Expectations

IN 2019...

A lot will still be the same as the years before. However...

COMPETITORS

There is a trend of a growing amount of festivals. In 2013 there were 774 Dutch festivals, of which 547 (70,5%) were music related. In 2017 this amount has grown 23,3% to 954 festivals, 688 (72,1%) of which were music related. The growth of festivals with camp-sites has grown steadily, with in 2017 a total of 400.000 camp-site visitors (VVEM, 2017).

CONCLUSION

With little changing in the festival industry except for a lot more competitors, an obvious task would be to make sure that MOJO keeps standing out of the rest.

fig.7 Amounts of festivals and visitors 2013-2017 (VVEM, 2017)

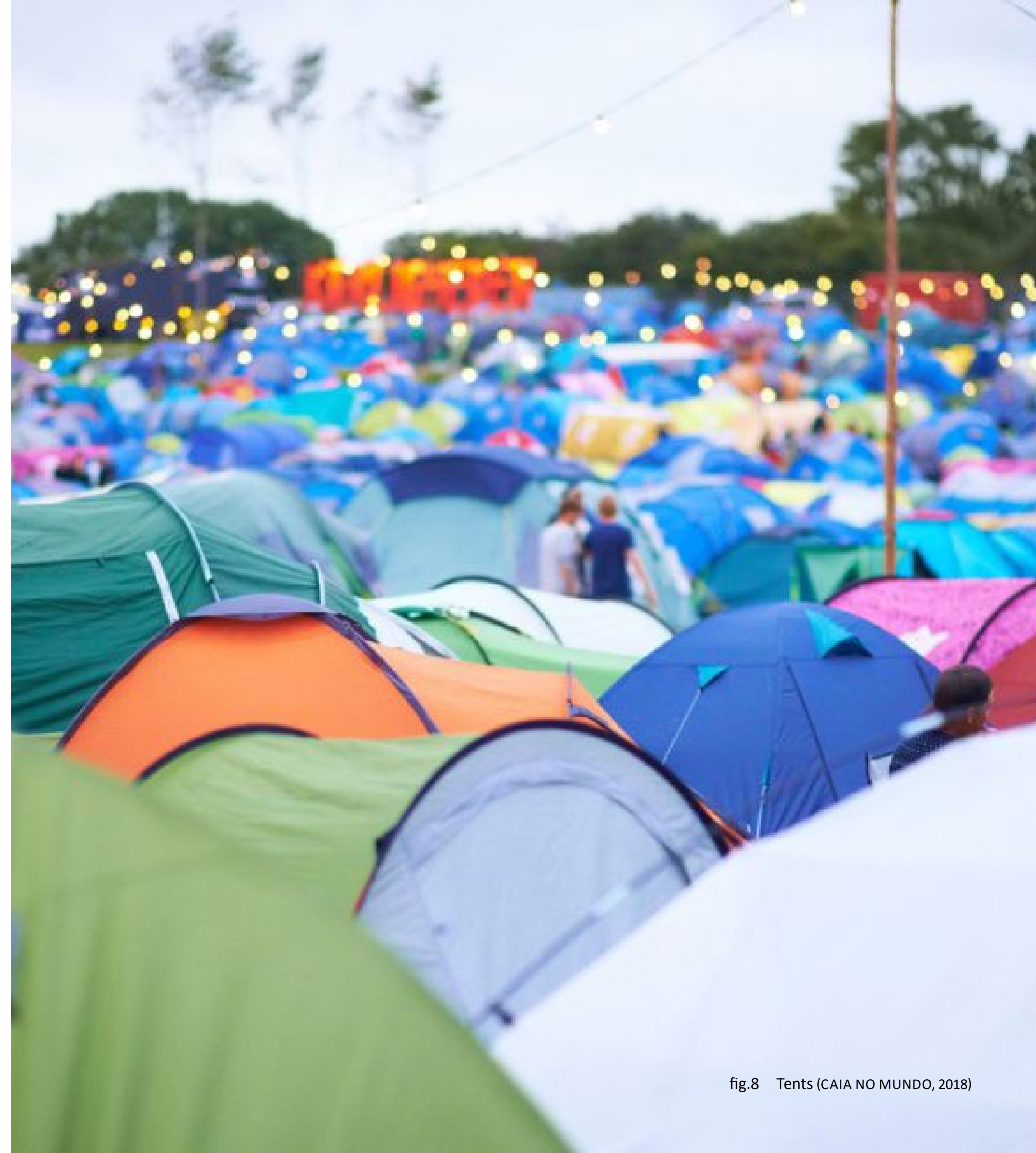
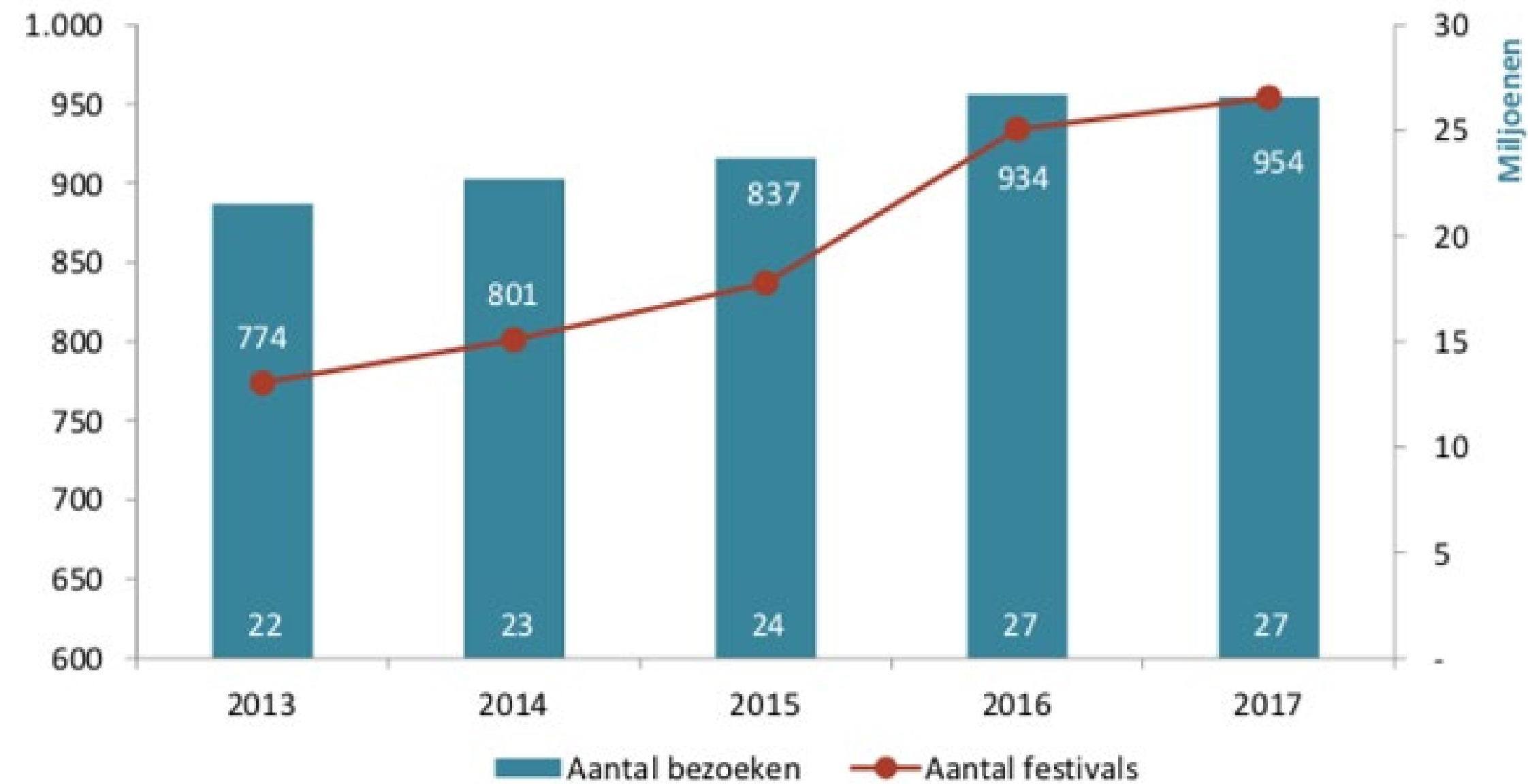


fig.8 Tents (CAIA NO MUNDO, 2018)



4'.. Wouldn't it be nice...

(The Beach Boys, 1966)

WHAT MIGHT IMPROVE THE END-OF-FESTIVAL?

Now that we have narrowed down the problem to the Void and have some idea of what the (near) future could bring, we can finally speculate about what could change this experience from negative to positive.

I WANT PEOPLE TO FEEL SUPPORTED

Support can be many things. A listening ear, comfort food. Sharing thoughts, saying something nice or just someone paying attention.

“Uh, damn right I like the life I live, 'cause I went from negative to positive.” (THE NOTORIOUS B.I.G., 1994)

The first step is to define a **design statement**.

“Damn right I like the life I live,
'cause I went from negative to positive.”





5. Avoid a Void

INTERACTION QUALITIES

"4. Predictions and Expectations" and "4. Wouldn't it be nice..." leaves us with new possibilities that can be incorporated in the new 'product'.

The interaction quality will be:

TO EMBRACE

The new product will embrace the visitor. The embracement should give the feeling of being supported. Embracement can be achieved in many ways.

To come up with the right word took a lot of tries and effort. First of all, there's three ways of helping: To help face the pain, To help one face the pain themselves, To help by distracting from the pain.

Secondly the answer was needed to the riddle: It's only good if it does THIS. Which turned out to be: Making you feel okay WITH your misery

WHAT IT COULD HAVE BEEN:

- Comfort
- Festival extract
- Hole filler
- Boost
- To connect
- Anaesthetize
- You're here and you're okay
- Feel free to be
- Mirror: you are the same you as you were at the festival
- Feel connected
- Alone Together: Solo-Togetherness
- Escape rope
- Free hugs
- Pink glasses
- Scent candle
- Maggie sauce

- Gradient
- Self-reliance
- First aid kit
- Survival kit
- Jack

WHAT IT DEFINITELY ISN'T

- Same as the festival
- Slowly dying festival (Slowly phasing out)
- Fierce
- Hard work
- Difficult
- Boring
- Only extra pollution
- Kill time only to kill time

THE VOID AS A CURVE

How should this embracement work? The void takes place during the time between the festival and the visitor's everyday routine, say after at most three days after leaving. The void is visualised as a curve of the theoretical visitor's experience in [fig.10 "Visitor's theoretical experience curve"](#).

FOUR WAYS OF BRIDGING THE VOID

Four possible changes to this curve will eliminate the Void. These changes are recognised as design directions. The design directions are displayed in [fig.11 "Four design directions"](#).

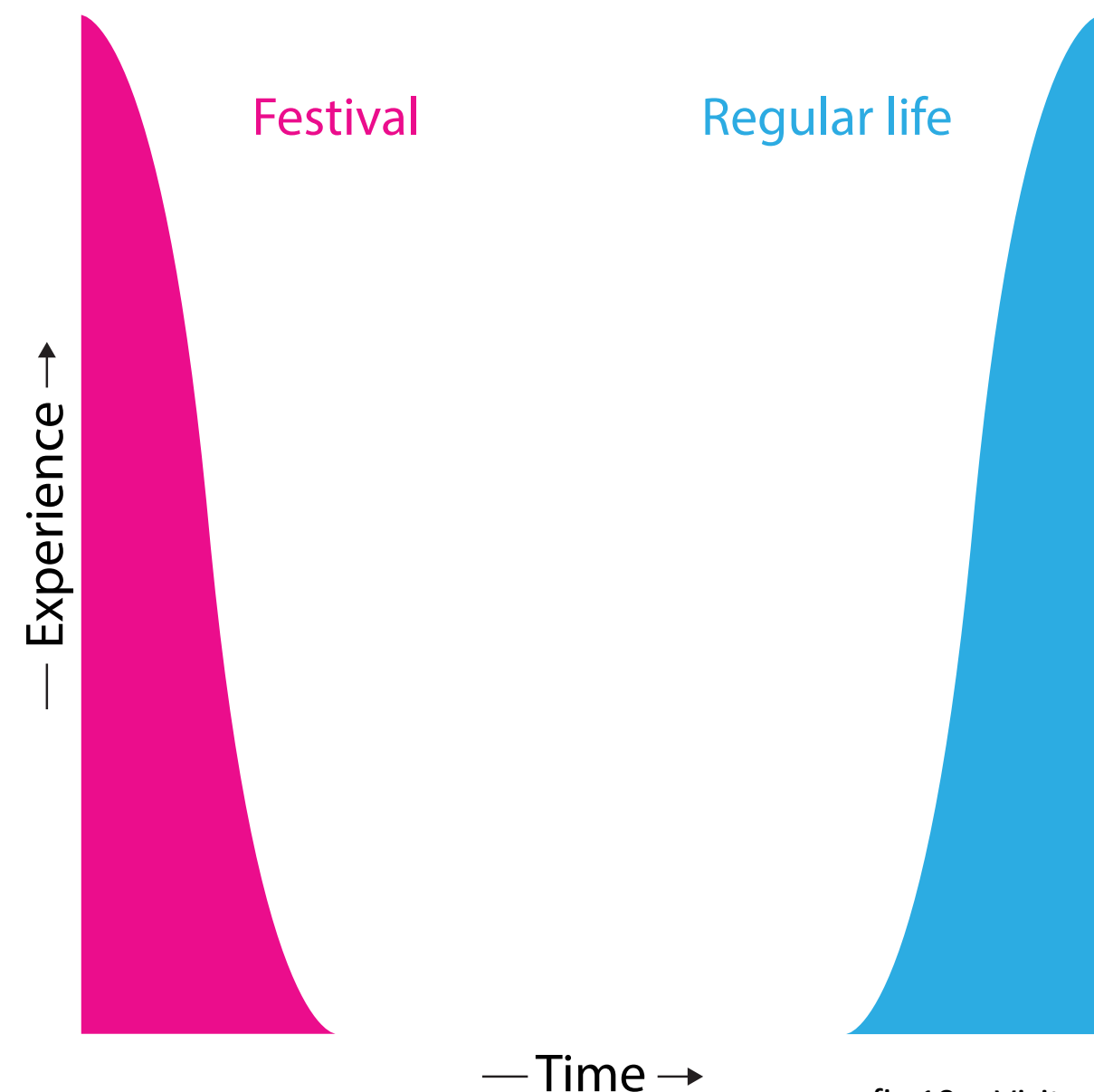


fig.10 Visitor's theoretical experience curve

The design directions (from left to right) are:

- PROLONG** Extend the experience of the festival long enough to let the visitor adjust to their everyday life
- ENTHUSE** Make the visitor long for the feeling of being home.
- CROSS-FADE** To increase the experience of everyday life while offering a slow decrease in festival experience.
- IMPULSE** Distract the visitor from their feelings by taking their attention elsewhere.

fig.11 Four design directions



Improving the visitor's end-of-festival experience

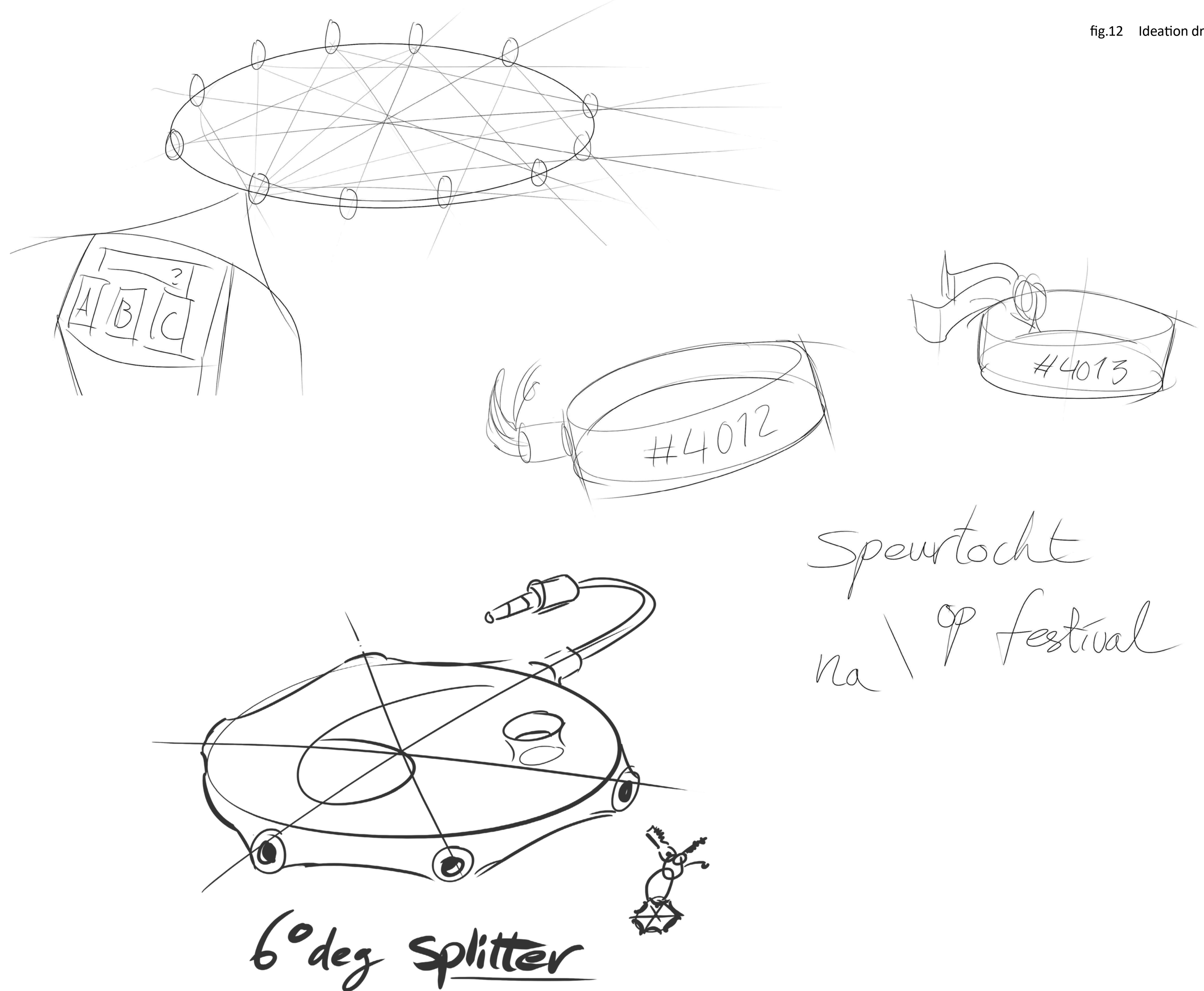


Ideation

The curves inspired to start thinking about possible solutions or parts of it. These first ideas need to be purged as well as looked at from different perspectives. Therefore some have been drawn or otherwise elaborated upon.

The pink ones are shown in [fig.12 "Ideation drawings"](#).

- ▷ Show that you were at the festival: Festival styled bicycle lights
- ▷ **Music splitter: Simultaneously listening to music**
- ▷ Cart: Collaborative carrying bags at the end of the festival
- ▷ Scent: Make the festival smell of a scent that can be taken with
- ▷ DIY parfum: set that smells like the festival
- ▷ Tent for over your bed at home
- ▷ **Search for the person at the festival with successive wristband number**
- ▷ **Visualise the "6 degrees of separation" at the festival**
- ▷ Radio tower with DJ playing after the festival, driving away from the festival, the signal gets weaker as you get further away
- ▷ See the group spread out: Festival App -> sharing geolocations
- ▷ AR/VR festival





Conceptualisation

TOWER OF HAPPINESS

Based on Prolong and Cross-fade.

Special kind of sound recording installations are placed on different locations on the festival terrain. The goal is to record the festival in sound. The festival in sound is visitors passing by and interacting with the installation. The goal is not to record the music played at the festival, although it can be recorded as background-noise. The special recordings are called 'binaural sound'. These record a spatial '3D' sound and therefore **embrace** the listener with

the record. The foreseen interaction between the visitors and the tower is that the visitor will vocally soothe the now co-visitor and future co-listener and support them when they feel down. The future listener might even be their future-self!

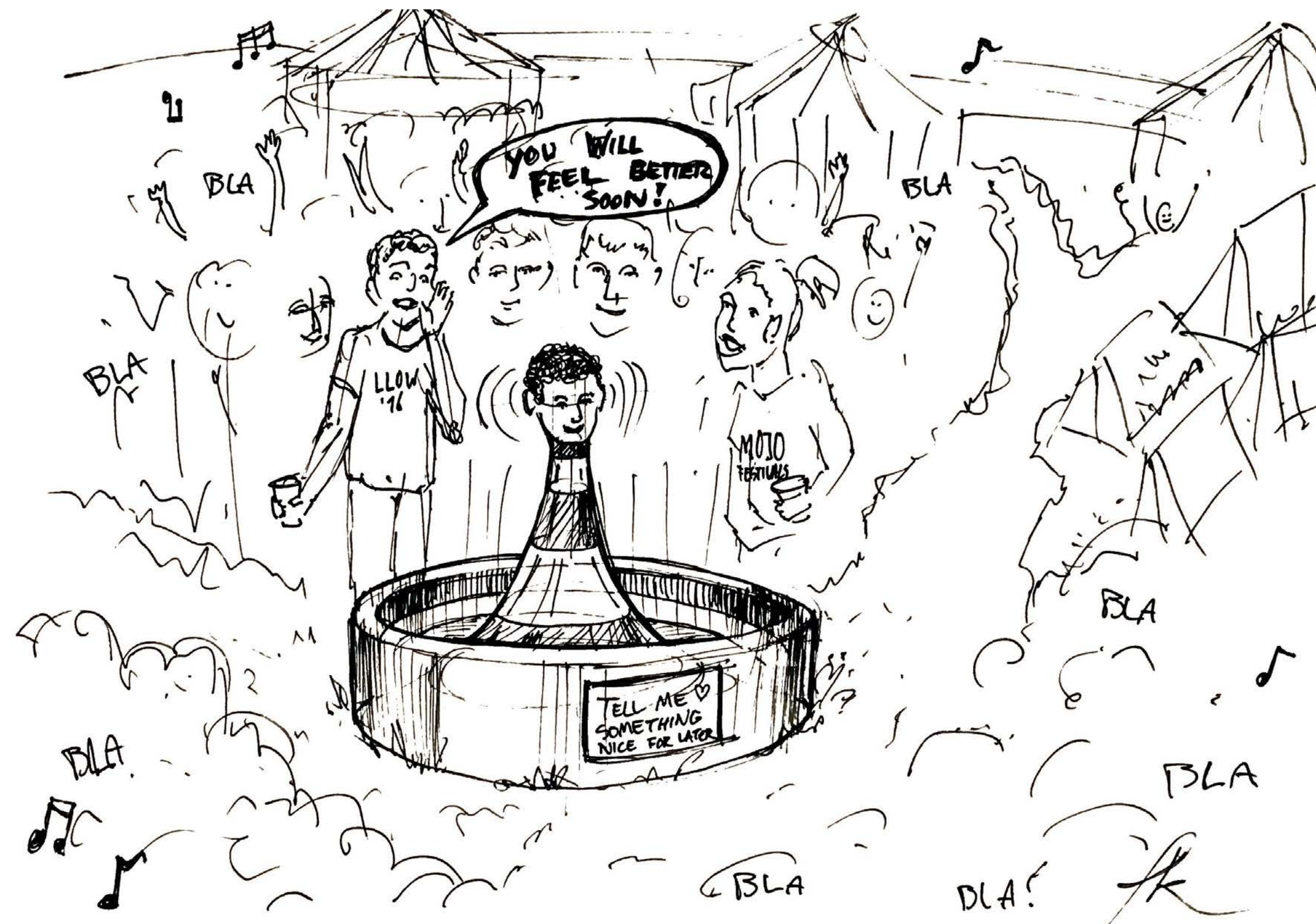
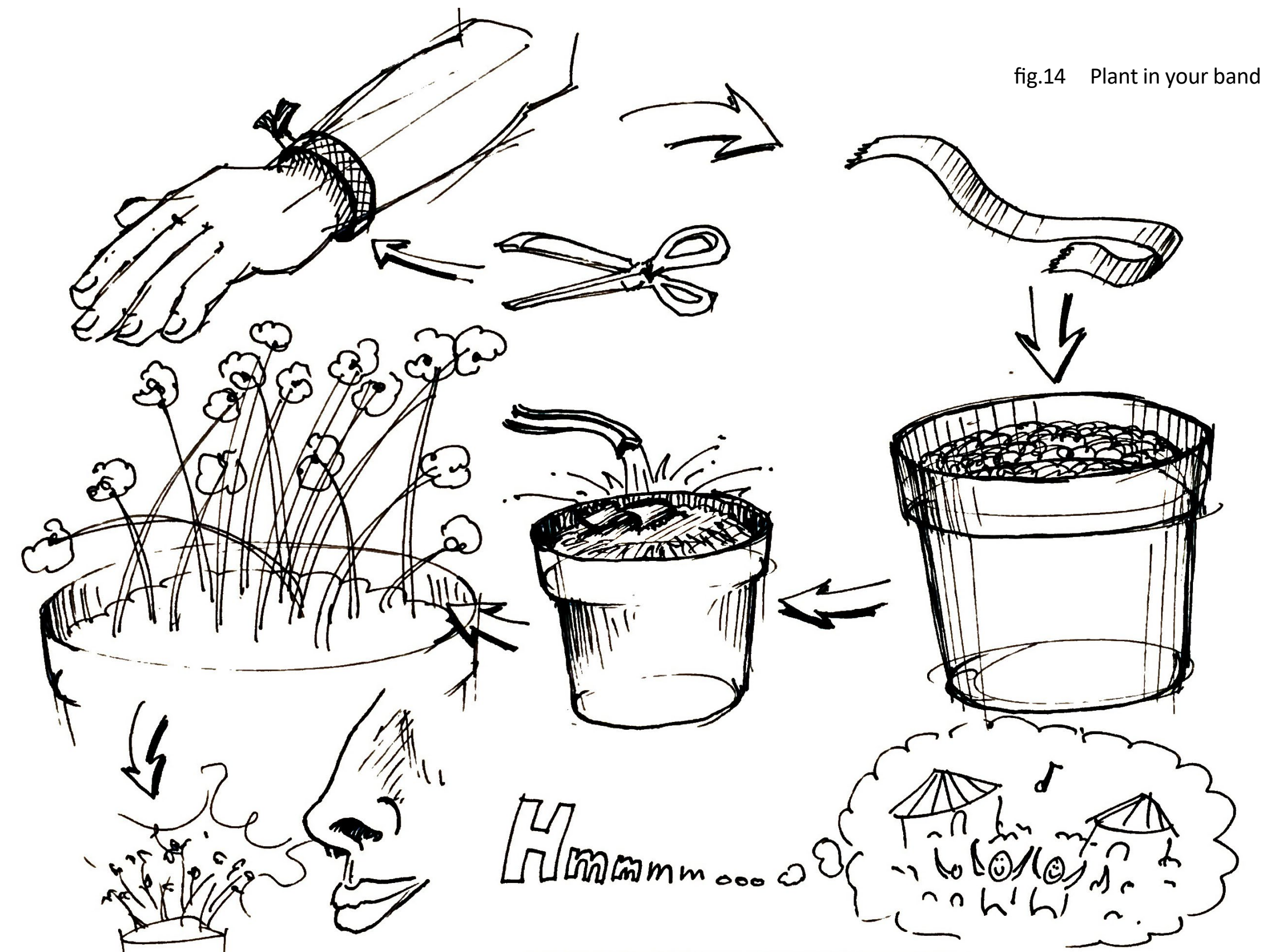


fig.13 Tower of happiness

fig.14 Plant in your band



PLANT IN YOUR BAND

Based on Enthuse and Impulse.

The festival will hijack a scent. This is achieved by first enriching the terrain with the scent. The scent should be something natural and floral. Secondly each visitor, as always, is given a wrist-band to show they belong at the terrain, but this time the wrist-band contain seeds of the very flower that grows at the festival. When the festival ends, the visitors are instructed to, when home, put the wrist-band in a jar and water it. This gives the visitor a little purpose in life. After some time the seeds will grow into the flowers with that very same scent. The scent will **embrace** the visitor with memories of the festival.

Speaking from a biological perspective, like in the book Biological Psychology by J. W. Kalat, the olfactory bulb (olfaction = the sense of smell) is an interesting sense organ as the brain is unable to **not** smell.

The thalamus is the part of the brain that sends sensory information to the right art of the brain, with the exception of the information from the olfactory bulb. The basal ganglia is the part of the brain that controls what information is processed, like a traffic light on a crossroad. Information from the olfactory bulb however, is also not controlled here. Instead, the information from the olfactory bulb is sent directly to the hippocampus (memory & space) and the amygdala (emotion). This is why smell is so strongly linked to (emotional & spatial) memory.

EMOTIONAL PROJECTION

Based on Cross-fade and Prolong.

A small projector that uses the light of ones phone or flashlight is given to the visitor as a thank you gift from MOJO. The projector holds a static image of a festival setting like the roof of a tent, people in front of a concert, the camp-site at night, etc.

The projector won't be too bright, so it can be used in a quite dark room only. The goal is to **embrace** the visitor with the image of the festival and therefore the feeling of the festival.

CHOICE

A choice between the three Ideas is made based on the predicted feasibility and the predicted **embrace** (see p.38).

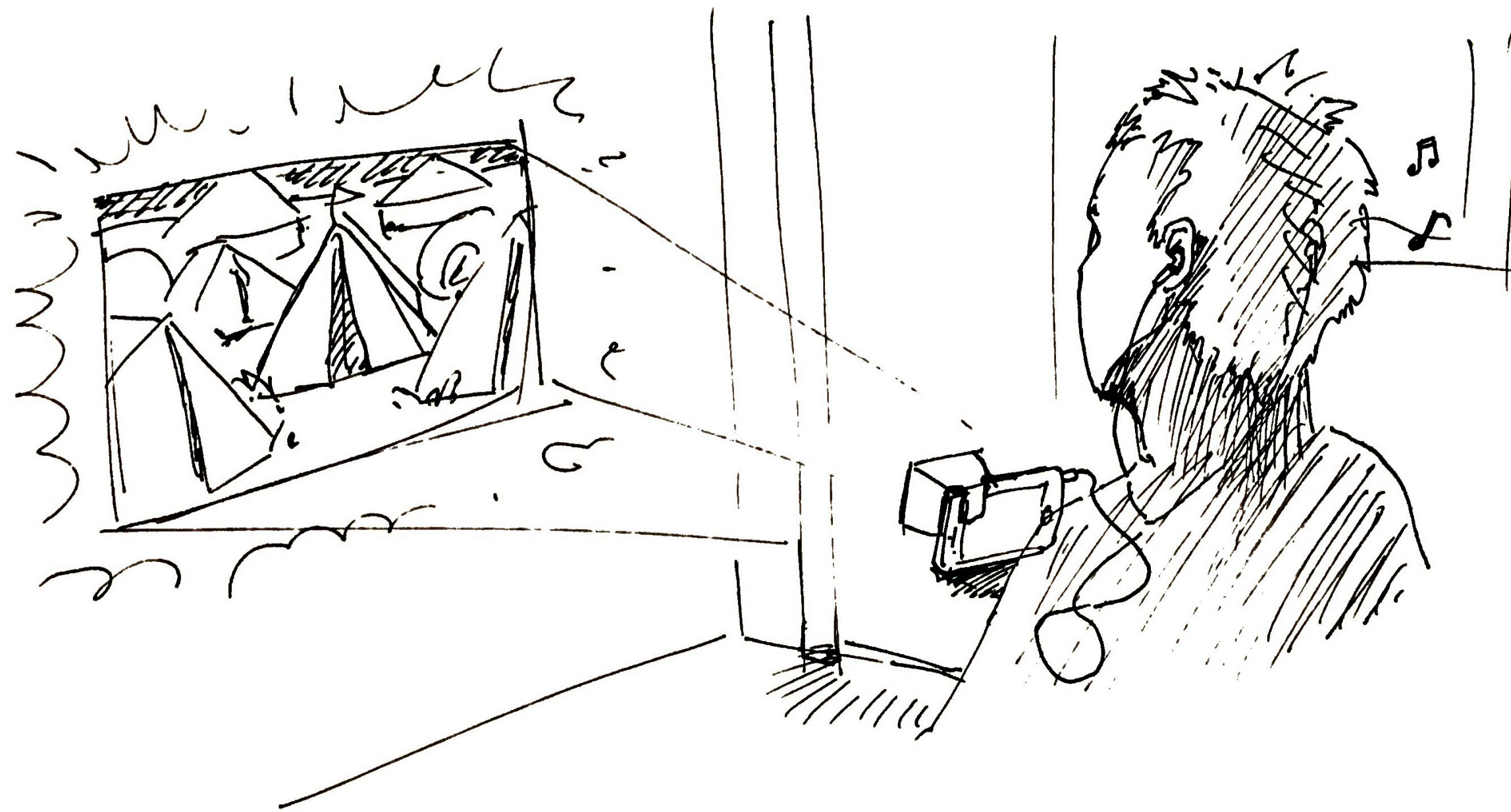


fig.15 Emotional Projection

TOWER OF HAPPINESS

FEASIBILITY

The recording technology has been proven long ago [more on that later \(p.52\)](#). The bottleneck of the lack of headphones that caused the technology to lose popularity is no longer present, as "The worldwide headphones after-market is projected to grow 4% this year to 375m units" (FUTURESOURCE, 2018).

EMBRACEMENT

Binaural audio has proven to trick listeners into thinking that the sound played in their ears comes from somewhere else. Tests have revealed that listeners experienced to be "[somewhere else]" [more on that later \(p.52\)](#). The amount of embracement is therefore considered quite good. This is however subject to on one hand the quality of the recording and on the other the quality of the playback (MØLLER, 1992).

PLANT IN YOUR BAND

FEASIBILITY

The festivals already give (often hollow) wristbands to their visitors. Filling these with seeds shouldn't be too much of a hassle. However, to make an festival smell of something to create the psychological link between the smell and the festival might be problematic. Next to that, the product requires the visitor to plant the wristband in earth they have to get and to water the seeds regularly. This decreases the chance that the link with the smell is eventually experienced.

EMBRACEMENT

As explained, scent is very strongly linked to memory of emotion and space. If the seeds do grow to start giving the smell, the desired experience is probably achieved. However, to what part of the memory of the festival the link is made is unclear.

EMOTIONAL PROJECTION

FEASIBILITY

Projecting an image is nothing new, and small lenses can be made cheap. Using the light from already owned devices makes sure that the product can be made without electronic components. The room that the projection will be shown in should be quite dark, as the amount of light, in combination with low quality lenses will cause a not so bright image. Although possible cheap, the product will in such high quantities still require an investment.

EMBRACEMENT

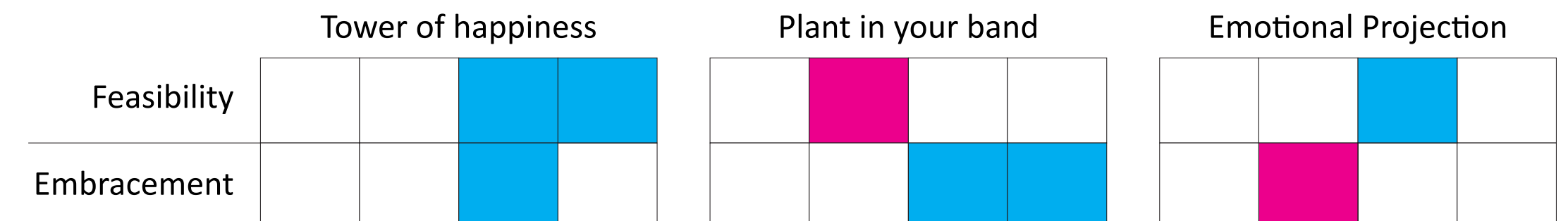
Because the images would be made beforehand and therefore not seen exactly by the viewer, the link to a memory might not work. Also, the usage of the product as foreseen requires some effort: Darkening the room, putting on music and focussing a set of cheap lenses. If done correctly, the projection may help to get in the desired mood.

CONCLUSION

The Harris profile [fig.16 "Harris profile of the choice of the ideas"](#) visualises the previous information.

The **Tower of happiness** suits the project best and has a high feasibility. The use of scent as a stimuli for memory should be studied in further research, because of the possible high embracement. The book to start this research with would be the already mentioned: Kalat, J. W. (2015). Biological psychology.

fig.16 Harris profile of the choice of the ideas





6. New 'product'

PHOENIX

Like the mythical Phoenix, the new 'product' rises from its own ashes. It is burned down in ViP step 1,2 and 3 and is then reconstructed by narrowing down its properties in 4, 4', 5 and 6.

The 'product' end-of-festival experience is spiced up with the introduction of a new product.

PROPERTIES

The product is made up from its properties. For this product those properties are:

- Embracing
- Effective
- Interactive
- Buildable
- Scalable
- Desirable
- Attractive
- Unambiguous
- Privacy-safe
- Records good quality binaural audio
- Records at P5<X<P95 ear-level
- Balance between background noise and front noise
- Allows for live-streaming audio to a computer
- Festival-proof (hufferproof)
- Weatherproof
- Environmentally sustainable
- An addition to the festival (as opposed a change)
- Not a gimmick
- Standalone
- Plug and Play

“This is like teleportation!”

BINAURAL

The special kind of spatial recording is nothing new. The technique was popular during the 1960s. Binaural audio was a competitor of Stereo, which clearly won. The problem with Binaural recording is that sound can (still) only be recorded live, whereas Stereo records can be composed in post-production even from Mono records. Next to that, back in the 60s not many people used to listen with, nor own headphones. This made listening to binaural audio and therefore recording it much less popular.

RELEVANCE NOW

Nowadays headphones and earphones have gained immense popularity and extend far beyond listening to music at home. Therefore listening to binaural audio is no longer a bottleneck.

The BBC R&D is still trying to figure out how to compose binaural records with pre-recorded sound and computer generated sound. The added relevance nowadays for the BBC is its value for Virtual Reality (BBC, 2012).

TESTING BINAURAL RECORDING

A couple of tests on binaural recording were executed to find both how to record audio in general, what makes binaural audio recording special in terms of recording and what sounds are specifically interesting for binaural listening?

The binaural record tests were performed using a Sennheiser MKE 2002.

RECORDING LOCATIONS

- Streets of Amsterdam
- Forest
- Fair
- At home
- Construction site
- Around Trains
- Inside a train

The recordings, without any mastering, can be found here: <https://soundcloud.com/ttyzz/sets/binaural-records-1>

IMPORTANT As with any binaural recording, the recordings are to be listened to using headphones or earphones.

Recording audio in general is more than just pushing a button. There's many types of microphones with different characteristics for different sounds as will be elaborated upon in a later stage of the process. The first two important factors in recording audio that came up during the tests are **noise** and **gain**. The amount of noise can influence the listening experience a lot. Especially when the goal is to achieve a realistic sound experience. Too much noise distracts the listener from the rest of the records. Gain is a multiplication factor that takes care of the 'volume' of a record. Because different stages of a recording cause different kinds of noise, the gain can be used to minimize the noise. However, when the gain is too high, the sound might surpass the maximum volume of the record and



fig.17 Pete Philly during a binaural test

cause information to become 'clipped' and lost.

Audio records take this into account by often applying a dynamic recording volume, that makes sure that the audio is recorded at good volume, with little to no clipping, nor too much noise.

In binaural records, more than in stereo records, the relative volume of two sounds in the same recording provides the listener information about the position of the sound. Therefore, dynamic recording volume has to be used more cautiously. The gain therefore has to be less dynamic, and more pre-set.

TESTING BINAURAL LISTENING

The listening experience was perceived very well during the tests. All listeners (n=10) were asked to listen to different sounds with their eyes closed without a lot of explanation. Because the sounds play only on the headphones it was hard to know what was happening, but almost all listeners at some point looked around to see where a sound was coming from, to find that it was part of the record. Another observation is that all listeners had to smile at least once during the binaural experience.

Next to tests were the listeners where in a controlled environment, a recording was also sent to a group of people (n = 20) without any explanation beyond the headphone requirements. The reactions (~10) from this group differ more. Some people experienced technical difficulties that eliminated the binaural effect. The take-away from these difficulties is that the listening experience, although quite simple has to be explained clearly so people know when something isn't right. For this an introduction recording can be used that both explains what should happen and tests whether the binaural experience is perceived well.

REACTIONS

A few of the listeners' reactions during or after the listening test:

"This is like teleportation!" - Joep

"That's trippy" - Kostis

"This really wakes me up" - Anke Marij

"This is really weird" - Laura

Pete Philly, a world-wide well known Dutch musician was also included in the tests. His reaction on a couple of the recorded binaural audio files:

"This is all types of chill ... It's hella epic ... I feel safe, while I

also feel like I'm right there in the crowd, like a safe-haven"

CONCLUSIONS

What is considered nice binaural sound are movement in sound and sound coming from different directions. These are factors to keep in mind when designing the product.

MIDTERM REPORT: THE SUMMARY

ViP is used to find and (re)design the end-of-festival experience. The found current interaction quality of the current experience is named The Void. An established psychological phenomenon called the Peak-End rule is used to explain why festivals will be judged better if the end is a good experience. It is predicted that MOJO will find itself competing with more festivals each year. Therefore, it is more important to deliver value to their visitors and so keeping their top festival position; in this case by improving the end-of-festival experience. The found desired interaction quality is called embracement. One concept is chosen. This concept features one or more binaural microphones that records sound at the festival and later embraces listeners by letting them experience the feeling of the festival, the so called embracement, at home. Properties of the new product are constructed. The relevance for this product is further elaborated upon and basic tests are done to give an indication for the user's reaction to binaural records. The product is named Michael. A **Design Brief** is constructed from the entirety of the midterm report.

Michael meets all the properties of the product.

DESIGN BRIEF

A festival installation for recording binaural audio, to be played back by visitors after the end of the festival as a solution to the Graduation Project ["Improving the visitor's end-of-festival experience"](#).

SCOPE

To deliver a working prototype of the design. This prototype is then ~~to be displayed at the museum, as well as~~ presented to MOJO before the beginning of the new festival season.

INTERACTION QUALITY

Listening to the audio using the visitor's own playback device (headphones/earphones) should **embrace** the visitor thus filling the undesirable **void** that was otherwise experienced.

GOAL

The **void** is filled in order to have a more positive end-of-festival experience which will result in a better overall evaluation of the festival because of the Peak-End rule.

The better evaluation helps MOJO festivals to stay at their top position while there is a trend of a growing amount of competitors every year.

PROPERTIES OF THE PRODUCT

- Embracing
- Effective
- Interactive
- Buildable
- Scalable

- Desirable
- Attractive
- Unambiguous

- Privacy-safe

- Records good quality binaural audio
- Records at P5<X<P95 ear-level
- Balance between background noise and front noise
- Allows for live-streaming audio to a computer

- Festivalproof (hufferproof)
- Weatherproof
- Environmentally sustainable
- An addition to the festival (as opposed a change)
- Not a gimmick

- Standalone
- Plug and Play



Prototyping

HOW DID MICHAEL COME TO BE?

The established interaction of a binaural microphone that records messages from visitors at the festival and playing it back to them after the festival had to be embodied.

THE TECHNOLOGY

The binaural head is the major part of the technology. Binaural recording is not simple. Two separate microphones have to be placed behind shapes that resemble human ears as closely as possible. The ears have to be placed at a distance from each other that also resembles human ears. The shape around these ears also effects the binaural quality of the microphone. This again has to resemble a human head. The density of the inside of the head also affects the binaural quality.

Basically, a head, that resembles a human head as close as possible, but with two microphones inside had to be designed in such a way that others could reproduce the process. The reproduction is necessary to ensure the

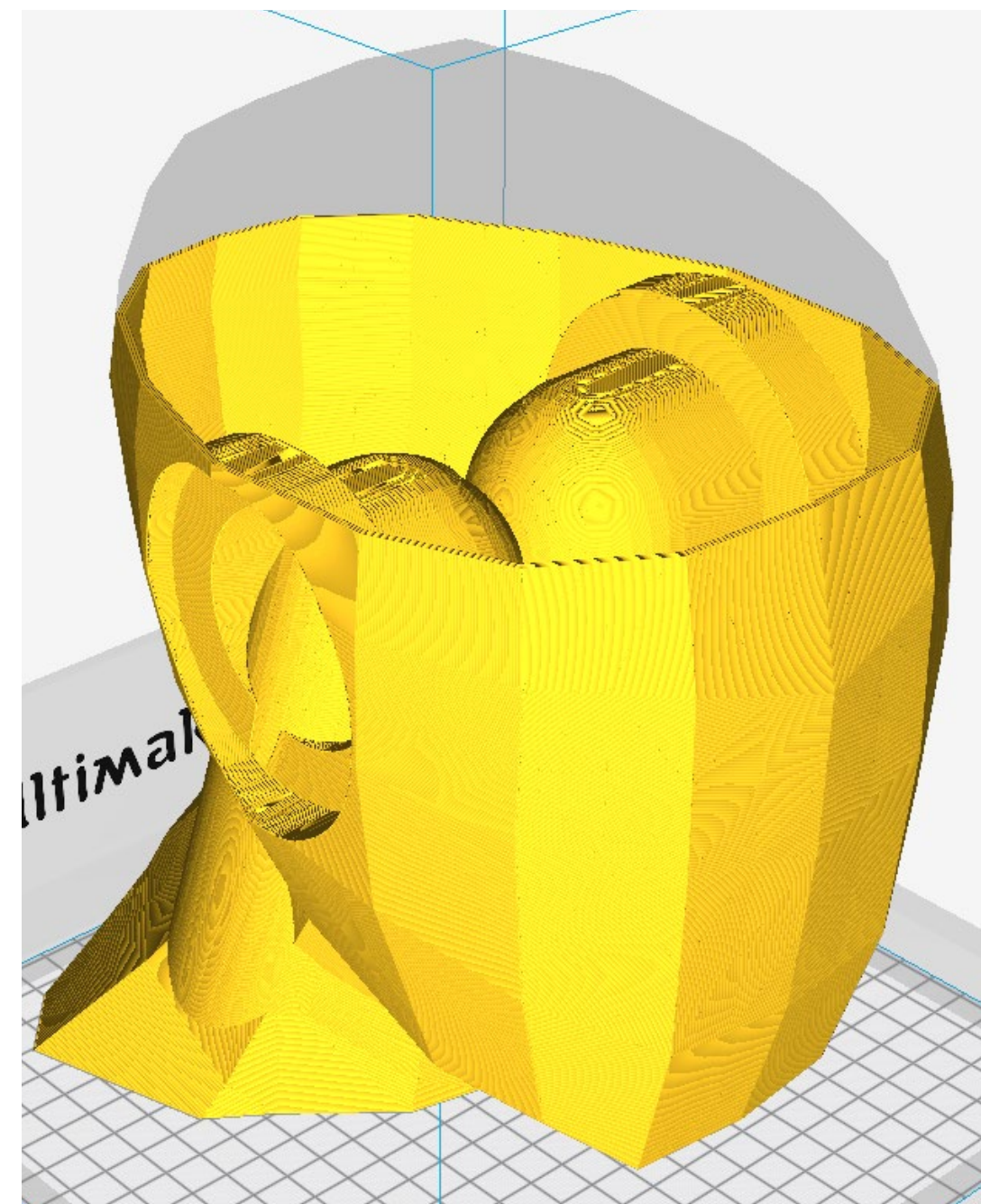


fig.18 An early stage model, sliced for 3D printing.

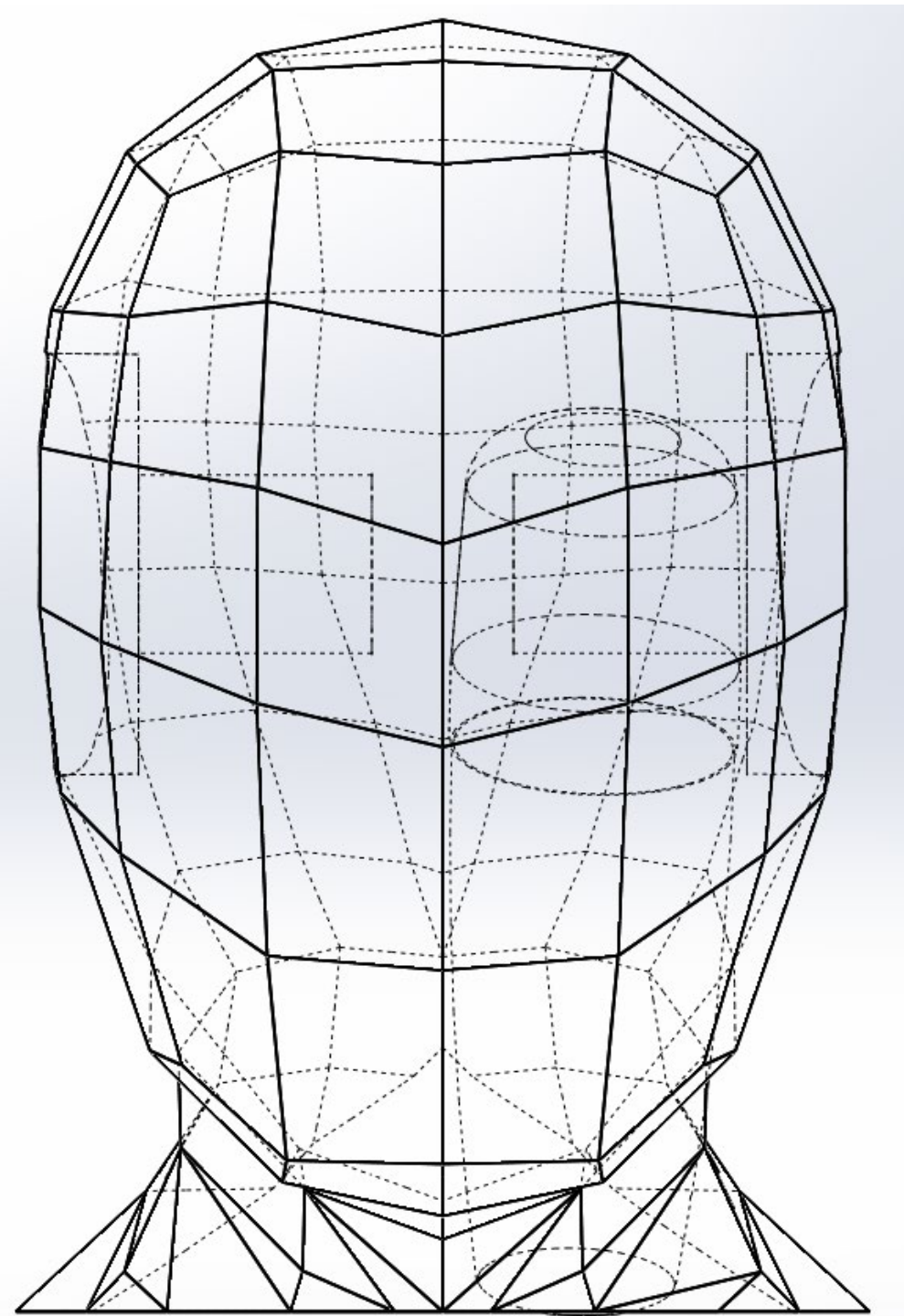


fig.19 A wireframe view, with one microphone in place.

scalability of the project. If a festival wants ten binaural microphones, this should be possible.

DESIGN

This was no easy task. The design was made with an iterative process that consists of many tests of many features with every step. The complex head-shape was chosen to be 3D printed, as this is a cheap, good for making complex shapes, and very well usable production technique for rapid prototyping because of its speed with low quantities (< 100 pieces).

A 3D model of a head with neck was made after images of real human heads. The model was deliberately made in, what is called a 'low-poly' style. This was chosen to both reduce the computing power needed during the design of

the inside of the head, and secondly to try to not hit the Uncanny Valley, more on that later (p.72). Both these early decision have proven to be very useful.

MICROPHONES

The cavities that capsule the microphones are of course dependant on the shape and size of the microphones. The size of the microphones depends partially on the size of the part of the microphone that actually 'listens'. For this 'membrane', a bigger size often means a better, more accurate recording of the sound.

Two relatively big, but good quality Samson C03 microphones (€58,00 each) were purchased. The microphones performed well enough in a test against top of the line PDA 4006 microphones (€ 2.099 each!).

The bodies of the microphones were opened up to see if anything could be replaced. Unexpectedly, the bodies could not be removed or replaced by smaller bodies, due to the way these microphones block electromagnetic signals. Removing any part of the body caused the quality

fig.20 One of the microphones, without the body



of the microphone to drop below acceptable levels.

THE +48V OF THE OPERA

The microphones need Phantom power to work. Phantom power (48V) is a popular way of powering microphones. Most devices that deal with external microphones have an option to turn Phantom power on.

However, the microphone does not use all this power. In fact it uses more like one or two volts. Instead of 48V, a way of powering the microphones with 18V was constructed. This is useful because this enables the use of portable and compact battery power (2x9V)

The signal that comes from the microphones is a relatively weak signal that dances on (and under) the 48V Phantom power. To use this signal, an amplifier has to be used.

Attempts to make a custom amplifier, using TI-instruments INA217s, also powered by the pseudo-Phantom +18V power to ensure maximum portability failed. After a couple of attempts, no more precious time could be justified.

fig.21 A wireframe view, with one microphone in place.

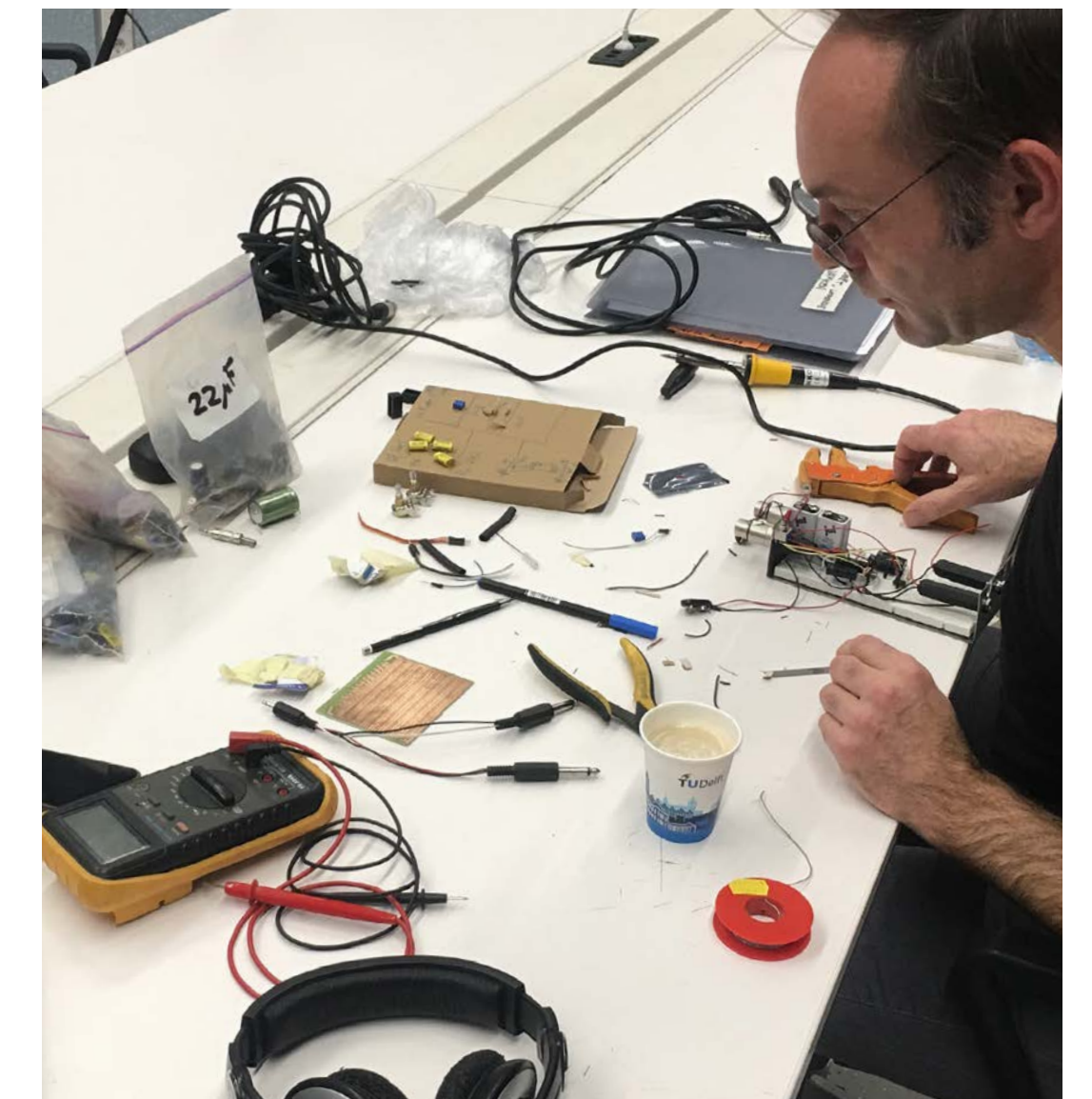




fig.22 Iterations on the parts of the binaural head that embody the microphones

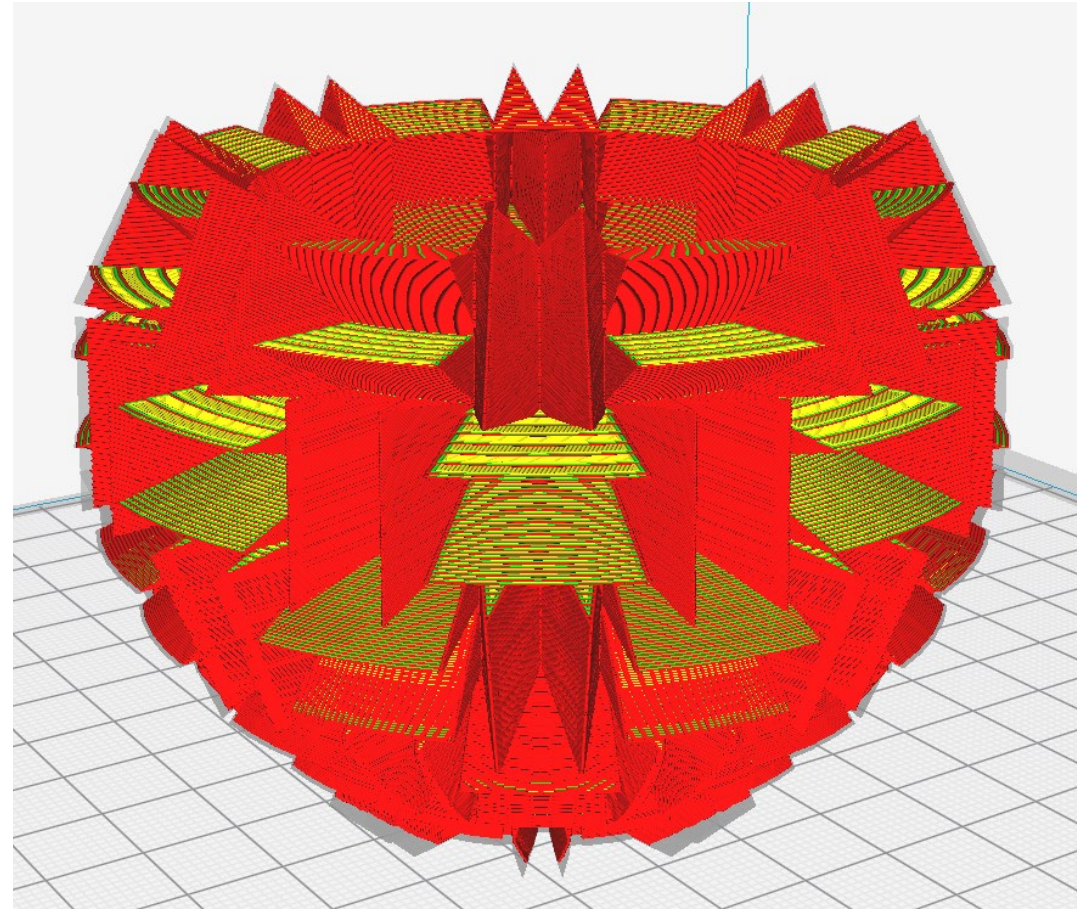


fig.24 A sliced model of an anechoic cap.

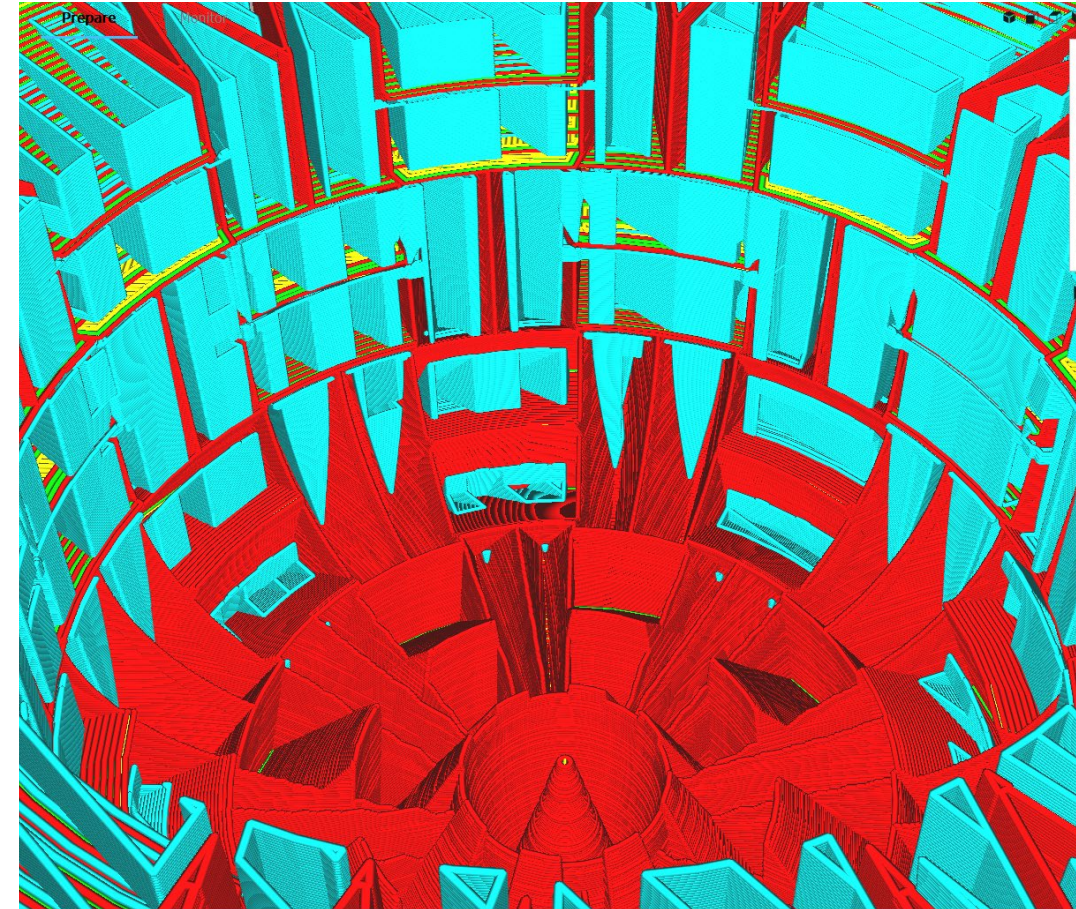


fig.23 The inside with the automatic print support.

A portable hand-held recording device, the ZOOM H5 (€219,00) was purchased. The device features (+48/+24V/+12V) Phantom power, which made the previous tweaks obsolete.

Another bonus is the added quality of the better AD-converter (analogue to digital audio), compared to the AD-converter of the camera (Sony ILCE-7) that was used before. The microphones can now be used to record and digitally save audio.

ECHOO... OO.. O..

The cavities could now be shaped after the body of the microphone. Upon testing the 3D prints however, it became clear that capsuling the microphones cause an echo that very significantly reduces the audio quality.

The shape of the cap that capsules the top and therefore the membrane part of the microphone was redesigned a couple of times, see [fig.22 "Iterations on the parts of the binaural head that embody the microphones"](#) The final shape was inspired by the typical anechoic chambers used to create what is also called a dead chamber.

"Sound levels at Microsoft's anechoic chamber go as low as -20.3 decibels. That's amazingly close to the limit of how quiet things can be on our planet:

-23 decibels or so, which is the amount of noise made by air molecules bouncing off one another." [\(NBC News, 2015\)](#)

During tests, the anechoic cap shape indeed shows little echo. The shape is however a lot bigger than the first designs. This relation makes sense when learning about acoustics, and how anechoic chambers work from the Master Handbook of Acoustics (2001) by [Everest, F. A.](#)

The bottom part of the head needed one iteration and one final check to see if the microphone would fit into the cavities as well.

The shape was intersected with a copy of itself to ensure that the two microphones could still fit inside the head. Tests show no noticeable difference in echo between the full anechoic shape and the intersected model.

PUT IT TOGETHER

The shape was placed inside the 3D model of the head. To be able to put the microphones inside the head, the print had to be divided in at least two parts. Because of the choice of the position of the splitline, the top part could be printed upside down.

This became especially useful after the first 3D print tests.

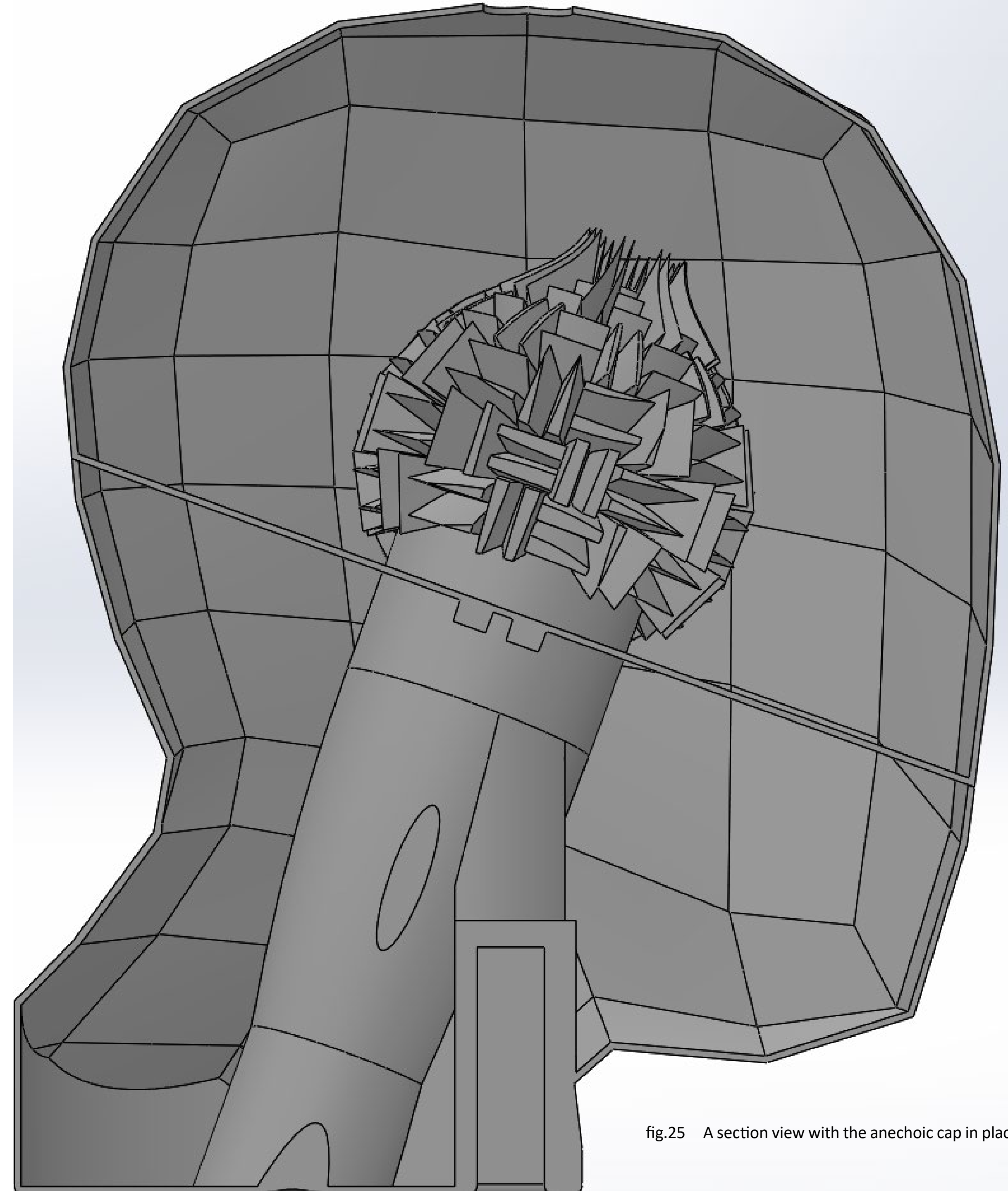


fig.25 A section view with the anechoic cap in place

The amount of support material that was needed to be able to print this complex shape on the available Ultimaker 3D printers (non-SLS printer) was far to great. The support material had to be removed because it filled the small anechoic chambers and cause echo. The support could be manually removed, but this was hard and made the printing of the head hard to reproduce.

I NEED SUPPORT

A massive redesign was done. All of the support material was manually designed in such a way that most of it could remain in and on the final print. This required advanced insight in the process of 3D printing as well as advanced SolidWorks (Auto-CAD) skills and a lot of computing power because of the combination of multiple very complex shapes into one 3D model.

The model also features a hole that allows a square staff of 15 by 15 mm to be used as a connection point for the head to the body. Next to that, the head features ribs for stiffness that connect the microphones to the 15x15mm

connector and to the top part of the head. This can also be seen in [fig.25 "A section view with the anechoic cap in place"](#).

The print of the top half of the head, that consists of the two anechoic chambers, with support, and the outer shell took 5 days and 7 hours. Compared to all previous printing times of no longer than a day. (simultaneously) Printing the bottom part on another printer took 2 days and 13 hours. The bottom print showed no problems, but the top part ran out of PLA (the used plastic filament). The top 8 mm had to be printed separately and glued on later.

Next to that, the top half did not print a fully solid shell due to choosing a too thin wall thickness in a successful attempt to decrease the printing time. This was a problem because both the printed parts had to be filled with a substance with a density that resembles the density of the insides of a human head; approximately 1.04 g/cm³. ([Barber, T. W., Brockway, J. A., & Higgins, L. S., 1970](#))



fig.26 Test print of the anechoic chamber



fig.27 Waiting for the acoustic jelly to set



fig.29 Fitting the printed parts on each other



fig.28 Casting test with the acoustic jelly

AGAR AGAR

Acoustic jelly, made with Agar Agar powder was chosen because it's density is close to that of water (1.00 g/cm³). The microphone heads contain various cavities, thus the lower density without these cavities comes close to a real head.

The problem with the openings in the shell of the upper part caused fluids to leak out. This had to somehow be prevented. An attempt to cap the holes using paint helped, but did not fully fill all holes.

The bottom part was cast with the jelly that has to be boiled in order for a chemical reaction to start. When pouring the then still hot liquid into the head, the PLA started to deform. Luckily this was noticed before any real damage was done. The jelly was kept in a bucket up until the point that it started to sit. The liquid cooled down

enough to no longer noticeably deform the print and the bottom part was filled.

The top part was eventually filled by filling the microphone cavities with paper that would later be removed and wrapping the print in plastic. Then the liquid was boiled and set to cool until the very last moment. This caused the jelly to sit as soon as it came in contact with the shell and become too thick to leak out. Now both parts were filled with jelly.

Because of the deformation of the lower part during the first fill with too hot jelly, the cavities for the microphones shrank and did not fit the microphones anymore by less than half a millimetre. This problem was resolved by heating up the microphone bodies before forcing them into the jelly filled 3D prints.

The top part was placed on top, making the microphones fully capsuled by the head. Two piercing model ears (left and right) were purchased. These are made of a low Shore plastic that to the touch, as well as to the eye resemble human ears.

The microphones were plugged in to the ZOOM H5 and sure enough, the record was clearly binaural. A very low frequency (between 0 and 400 Hz) noise disturbed the sound a lot. The Samson C03 microphone has a toggle that gradually cuts off the low frequencies. A test was done to see if this cut did not negatively affect the required frequencies. This was not the case, so the low-cut was left on.

The next day, a new test showed disturbing results with one microphone not working. After inspection it was clear that both microphones came in contact with a little bit of water that managed to still leak from the jelly. The microphones were both (with great force) taken out of the heads and repaired. The top part with the glued layer was punctured to allow water to drip out and minimize the chances of having to repeat such procedures.

A print with 0.8 mm wall thickness instead of 0.4 mm wall, and making sure to print both parts in one run each would resolve these problems. The use of a different jelly, with a similar density, but less fluid, would be preferred and needs further research.

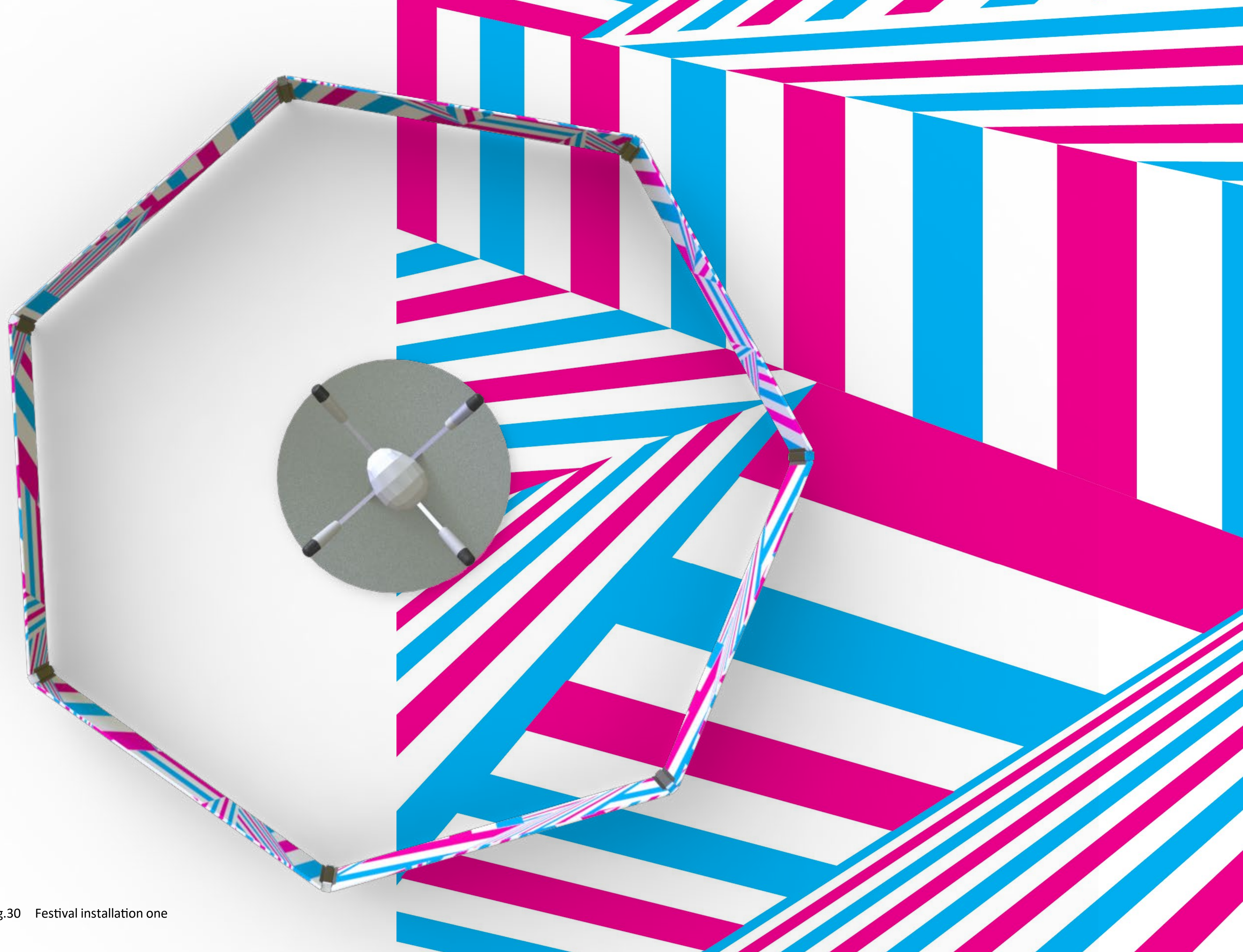


fig.30 Festival installation one



Appearance



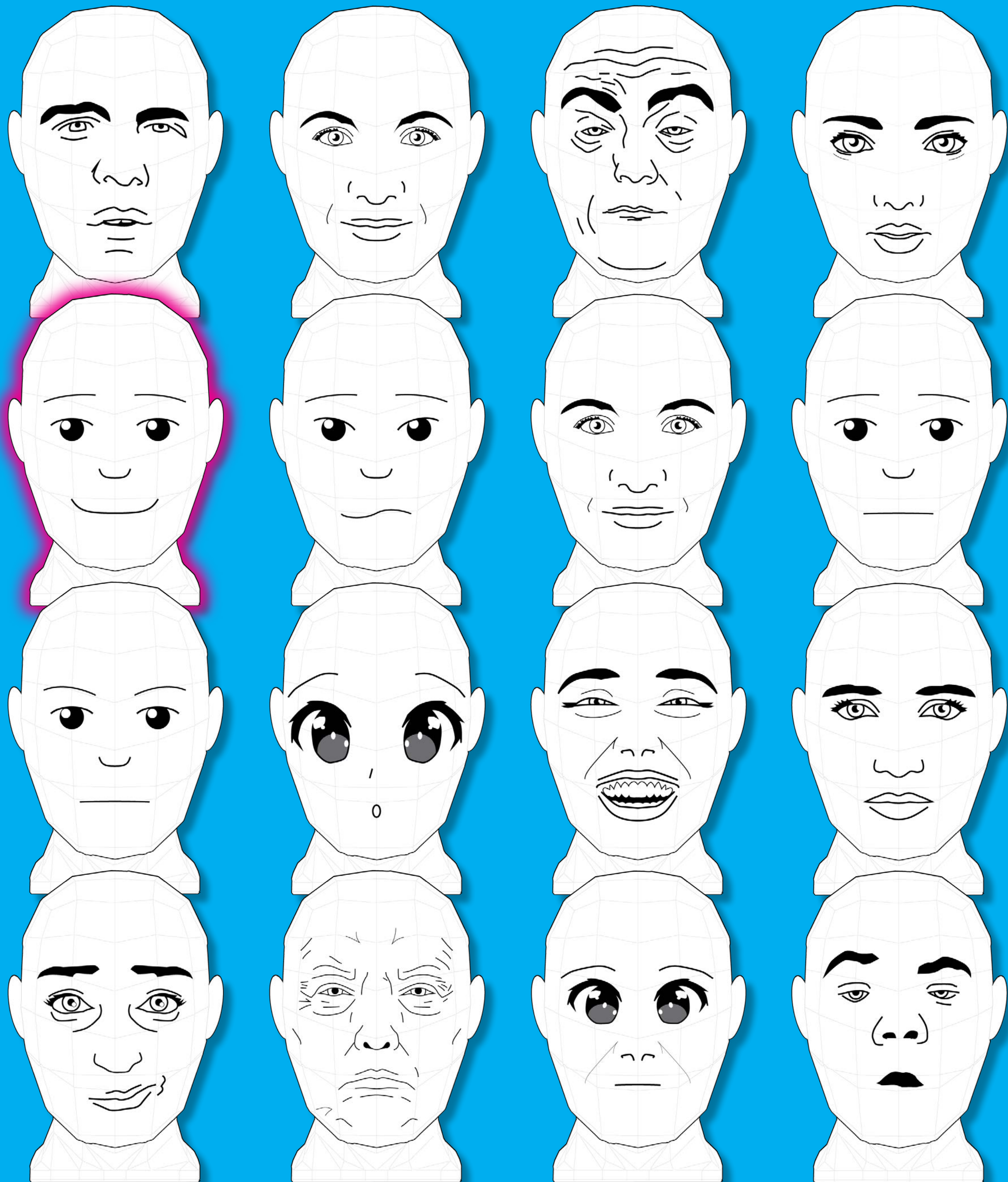


fig.31 The line art faces left to right from 1 (left top) to 16 (right bottom)

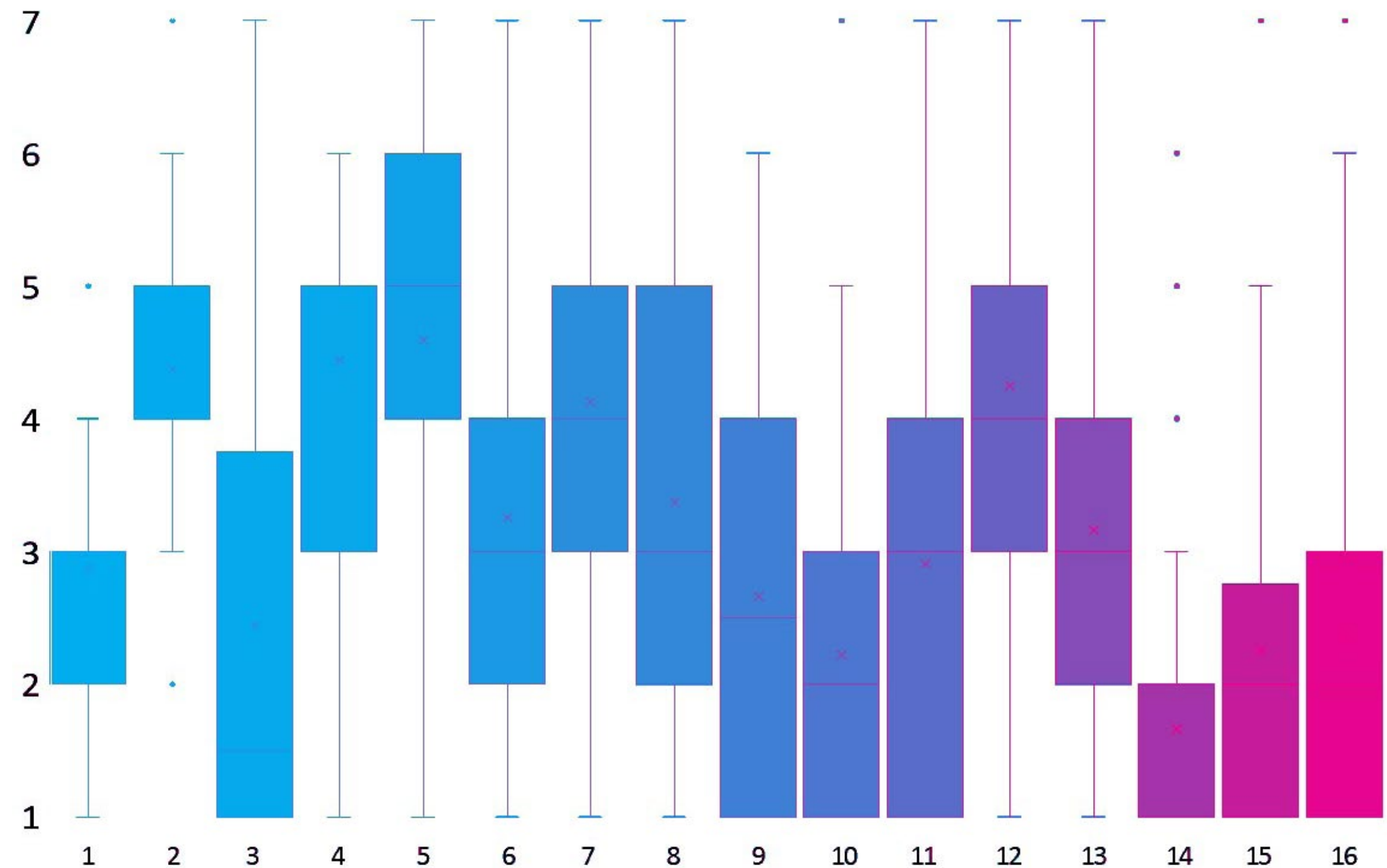
THE FACE

A very important factor in the likeability of the device is of course the face. An online test environment was self-made that displayed 16 different line art faces, see [fig.31](#) "The line art faces left to right from 1 (left top) to 16 (right bottom)". The participants (n=32) were asked to give each face a rating from 1 (negative) to 7 (positive) on whether they to say something to each face that might make them feel better. Face #5 was rated highest with an average score of 4.6/7 and was picked.

A cap was put on the head. This made the head more appealing, as some participants suggested that the head looks scary without hair. It also formed a dampening of sound, like most listeners will experience from their own hair and therefore will experience a more realistic binaural sound.

A pair of glasses was added to further decrease the creepiness of the microphone.

fig.33 Box-plot of ratings per face



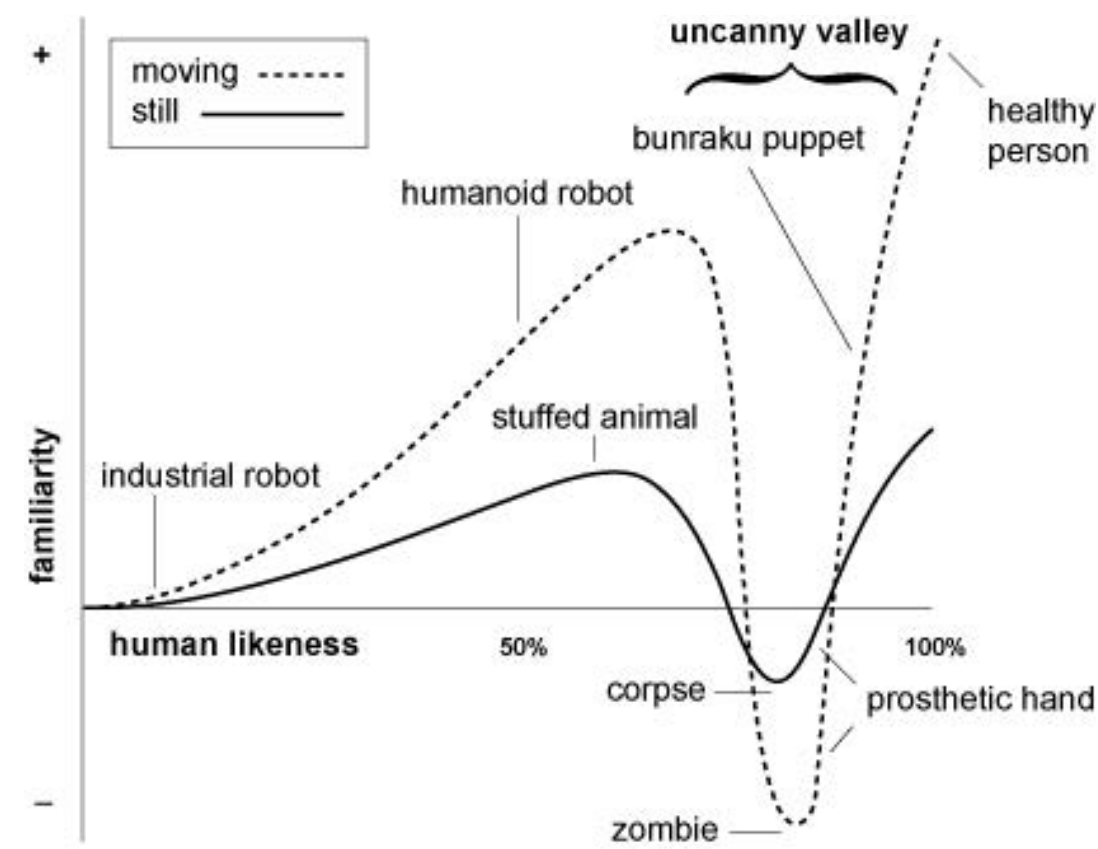


fig.32 The Uncanny Valley (M. Mori, 1970)

UNCANNY VALLEY

This creepiness can be explained using the [Uncanny Valley \(M. Mori, 1970\)](#). The curve in [fig.32 "The Uncanny Valley \(M. Mori, 1970\)"](#) depicts the relation between the familiarity of objects to their human likeness. As can be clearly seen, there is a drop in familiarity when the human likeness reaches between certain levels. This drop is called the Uncanny Valley. Uncanny means strange or mysterious, especially in an unsettling way.

The binaural head should be designed to stay out of the Uncanny Valley, on either side. To reach the human likeness on the right side of the Uncanny Valley is very hard, whereas making something less human like is easier.

THE NAME

Naming the Binaural recording product took a couple of tries. Possible names were:

Mike

Michael

Time travelling emotion

Emotion wormhole

Virtual festival

Back on track

THE BODY

A steel structure was welded to support the head. Weighing about 10 Kg, the support was designed to support the entire bottom of the head, as well as fit into the previously designed (15x15mm) support-hole. The square tip of the support was still warm (not hot) from the welding, while inserting it into the head's support-hole, which ensured a tight fit in the head.

The support has two holes that allow for the XLR cables

Michael is a reference to the MOJO festival Lowlands. The last couple of years a running gag has evolved into common knowledge: Michael is lost. At seemingly random moments during lowlands, visitors will yell "MICHAEL" at the top of their lungs as if they are looking for someone. Others do the same, forming a sort of wave of people yelling "Michael". Next to that, the name can be heard as mic. all, which is a reference to microphone all -> record all.

(one of the most common connector types for microphones) to be plugged into the microphones from the bottom.

For the recording test, Michael was given an outfit that was chosen from three options: A doll-bear, a bathrobe, or a festival visitor.

A trial with the bathrobe revealed that this made Michael



fig.34 The bathrobe outfit

fig.35 The doll-bear outfit

very uncanny. The doll-bear outfit was not picked because it would probably cause people saying things to Michael that would, when listening to the record, be strange to hear for humans without the context of wearing a bear suit.

The festival visitor was chosen and created. The support

features a clamping part that clamps around a tripod's upper pipe. Another part represents the shoulders of the body. Padding material is fixed to the support to represent a fuller, less slender body type, to further reduce the uncanniness. The padded body was put into clothes to let the support look like a dressed doll.

CLEARNESS

To guide the visitor into speaking to Michael was a hard task. The explanation has to be vague enough to allow for creativity, yet clear enough to understand what the purpose is. The advantage of having to deal with festival visitors is that it is to be expected that they feel more comfortable taking initiative and being creative.

Setting a certain mood by saying "Hi I'm Michael, I don't feel so good" triggers a reaction from the visitor

The guiding part can be giving a simple task like "Please say ...".

The creative part, guiding the visitor to say something in

a specific direction can be "something nice"

Finishing with a goal to direct the task in, "to me"

"Hi, I'm Michael, I don't feel so good. Could you please say something nice to me?"

After testing this, the request was changed because people kept calling the microphone by its name, which in the end was weird for the listener, because now people were calling them Michael; [more on that later \(p.82\)](#).

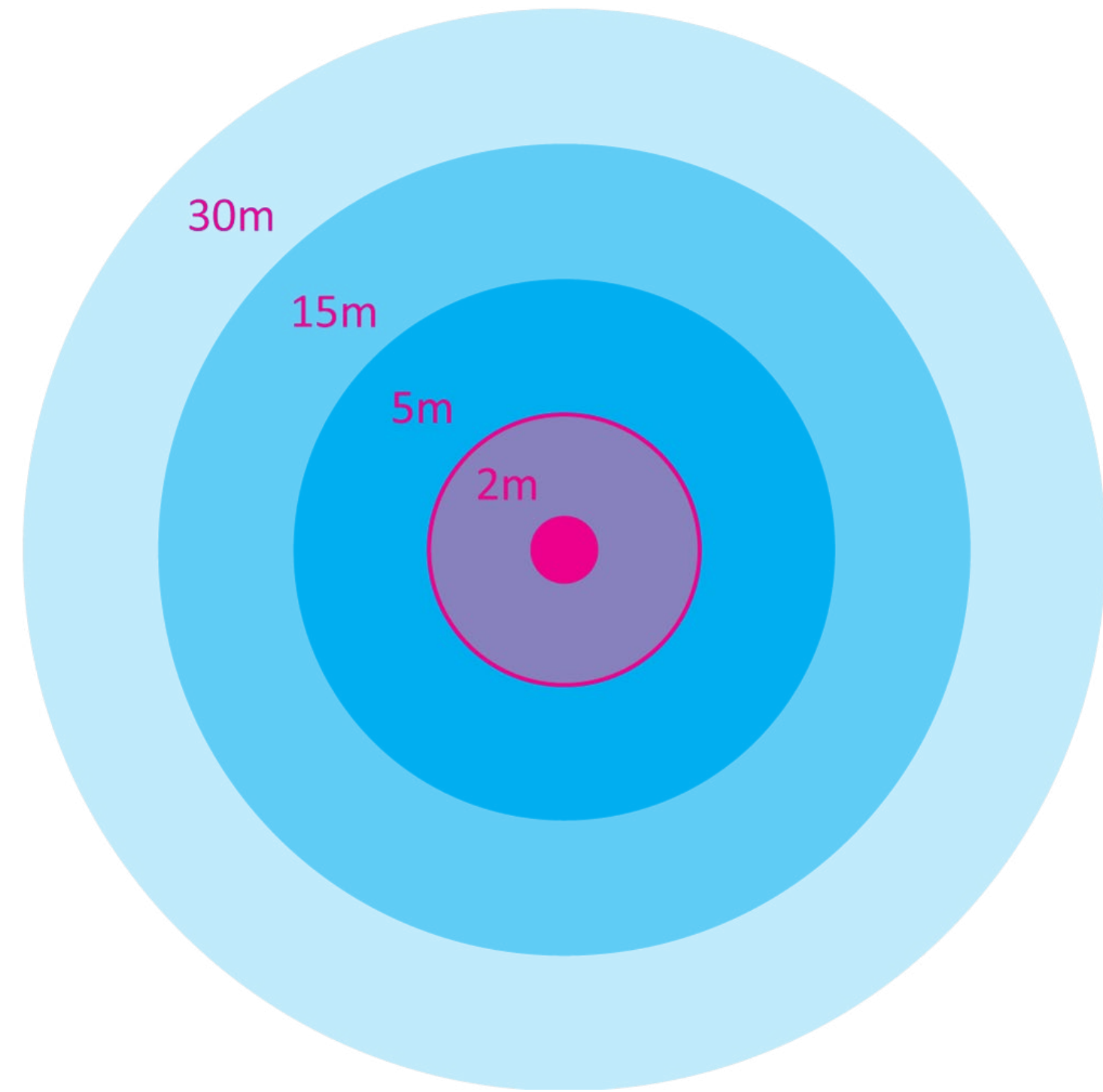


fig.36 Different distances between visitor and product

VISIBILITY

For Michael to be attractive to visitors, he has to be seen first. From 30m away he should be visible when few people are around. From 15m he should be visible when there's people around. From 5m people should interact with Michael. Within 2m of Michael, no interactions should take place to reduce the chance of audio recording clipping (too loud) and for the security of both Michael and the visitors.

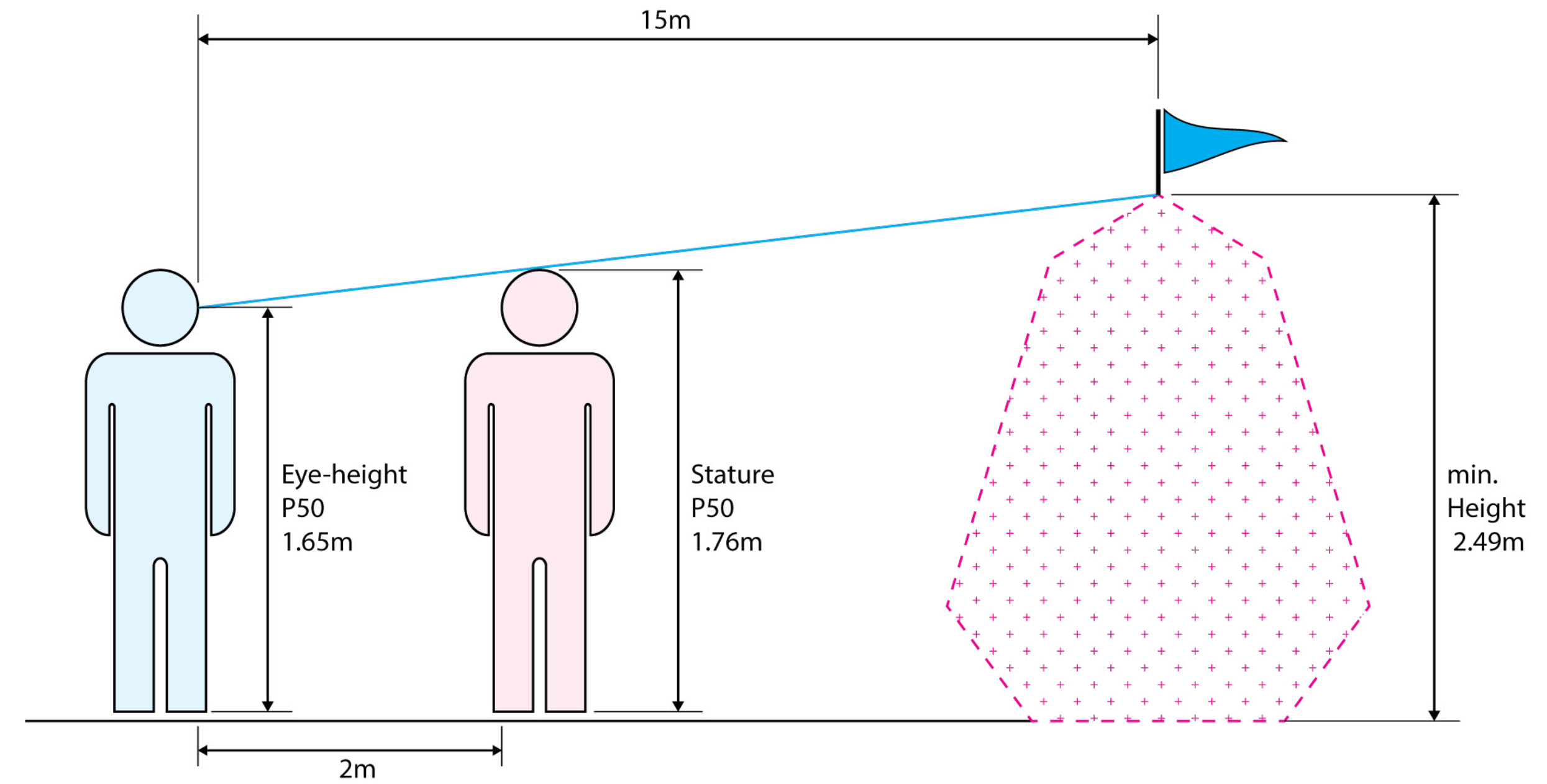


fig.37 The desired height

HEIGHT FORMULA

The visibility of Michael is important to attract visitors. To ensure visibility in a crowd, a flag is added on top of Michael. The height is calculated using two people with p50 heights (1761mm), standing 2m apart. The height of the flag (h_{visual}) can be calculated using the following formula:

$$h_{\text{visual}} = h_{\text{eye}} + (h_{\text{eye}} - h_{\text{stature}}) / (d_{\text{distancepersons}} * d_{\text{distancevisual}})$$

with $h_{\text{visual}} = 2489\text{mm}$ or $\sim 2.5\text{m}$ when;

$$h_{\text{eye}} = P50 = 1649\text{mm}$$

$$h_{\text{stature}} = P50 = 1761\text{mm}$$

$$d_{\text{distancepersons}} = 2.000\text{ mm}$$

$$d_{\text{distancevisual}} = 15.000\text{ mm}$$

The values come from [Dined.](#)



Tests

Video

Test:
Reaction to real life
binaural recording
Embracement?

>60 reactions

RECORDING TEST AT AMSTERDAM CENTRAL STATION

GENERAL IMPRESSION

Nice reactions.

Not many reactions, many people did not dare. They stood at a distance for a while but didn't say anything.

A very clear explanation of Michael's situation was not given yet there were many groups who did say something.

Several children undoubtedly walked towards Michael, which shows me that the Uncanny Valley was avoided. This was not expected after having had Michael at home during the night.

In this 54-minute recording, 39 times something was said to Michael.

DIFFERENT CROWD

Less playful

On their way

Many tourists

More English speakers

Less comfortable, because;

Less accepted by the rest of the people on the streets

Less tipsy

WHAT WAS SAID?

The reactions show a pleasantly surprising result.

RECORDING

The background noise works very well.

The sound was very dynamic (passing trams, cleaning trolleys and roller cases, as well as many footsteps and voices)

REACTIONS TO MICHAEL

Not scary, but people did think Michael is strange.

COMMENTS

People started mentioning Michael's name. This distracts when listening to the records.

Anything becomes a use cue, so Michael should not feature things like headphones that aren't supposed to be used. In addition, it appears that listening to what is recorded in real-time does not give a desired effect because the ambient noise is heard through the headphones, so no clear difference in sound is noticed. Having the headphones at a distance could add to the understanding of the product, but could also be distracting.

Perhaps a less cheerful expression can be chosen because the microphone says it is sad but is smiling. Although that may also mean that people start to mirror the sad expression and not like it anymore.

DISTANCE

Some people still had the tendency to speak into the ears, rather than in the direction of the ears. It is only so many people, so the addition of an extra barrier probably does more damage than it does good, because such a barrier can also startle people.

TECHNICAL

Binaural quality is very good

Recording at level 6 seems ideal.

After -9dB Limiter, Amplify everything evenly, with the Max peak to -0.1 dB.

Left channel + 5dB gain added afterwards, by ear.

Noise is noticeable.

Great sound in strong wind.

Low-cut on mic helps suppress heavy / deep noise without removing too much detail.

EQ makes a lot of difference and is therefore necessary, but easy to automate.

LISTENING TEST

DOES THE SOUND EMBRACE THE LISTENER?

To answer this question a test was performed where participants were asked to listen to a compilation of the actual reactions from the previous test. The participants were then asked to give a rating (from 1 (no) to 5 (yes)) on whether or not listening the record would help them during a post-festival-dip.

A total of 85, with 45 female and 40 male participants gave an average rating of 3.05 (Female avg=3.1 stdev=1.24, Male avg=3.0 stdev=1.20).

REACTIONS

Most participants that elaborated on their rating, both high and low, said that they felt as if the people speaking to Michael weren't talking to them. This was either because made compliments did not feel sincere, because the speaker mentioned the name Michael, or because the background noise (not background sound) distracted too much.

CONCLUSION

The average is not very high. However, for a test that only slightly touches the intended use. It would be very interesting to see what a test at a festival will do.

ANALOGY

Imagine watching the aftermovie of a festival that you did not go to. Would that excite you as much as one of a festival you did just attend?

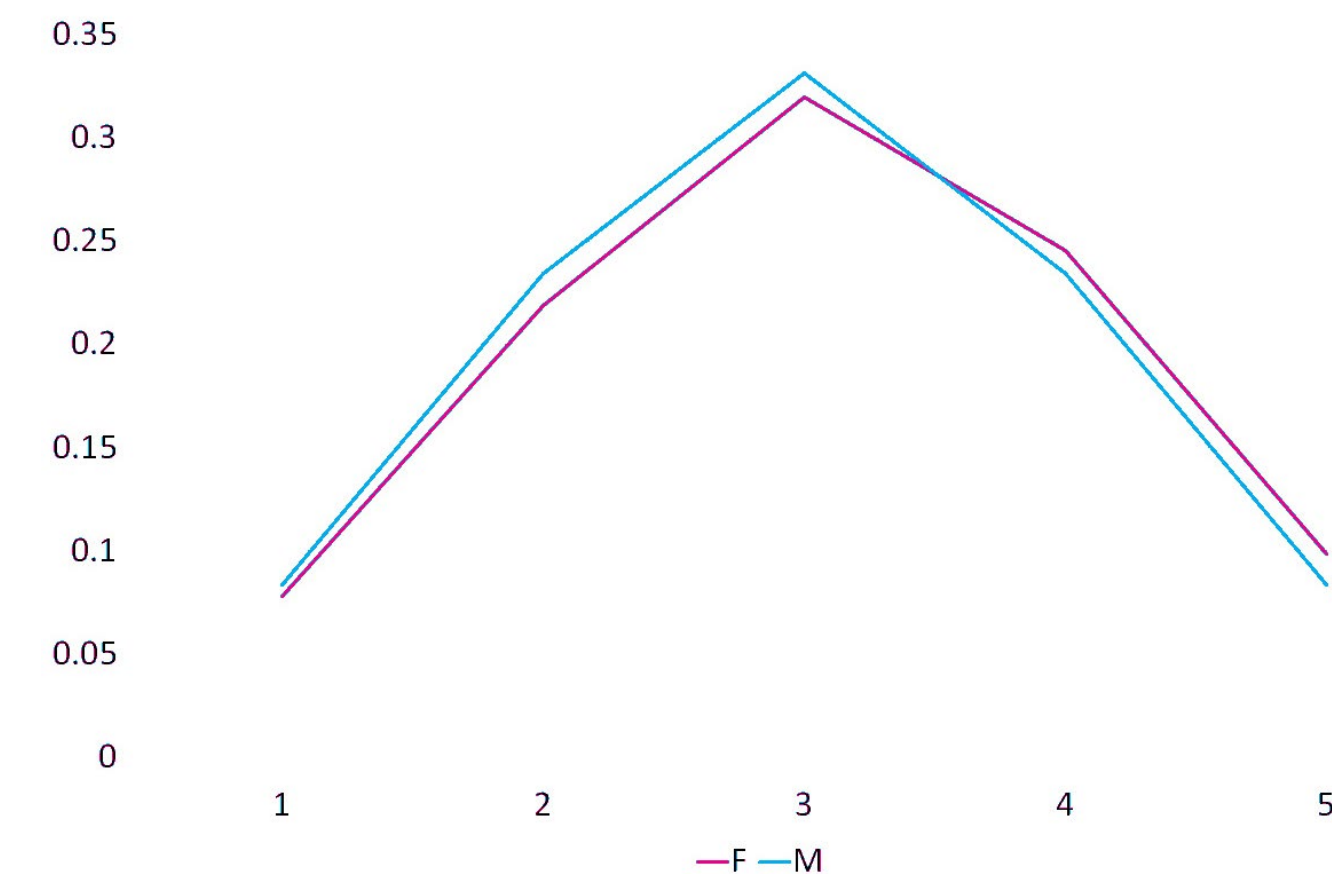


fig.38 Box-plot of the test results

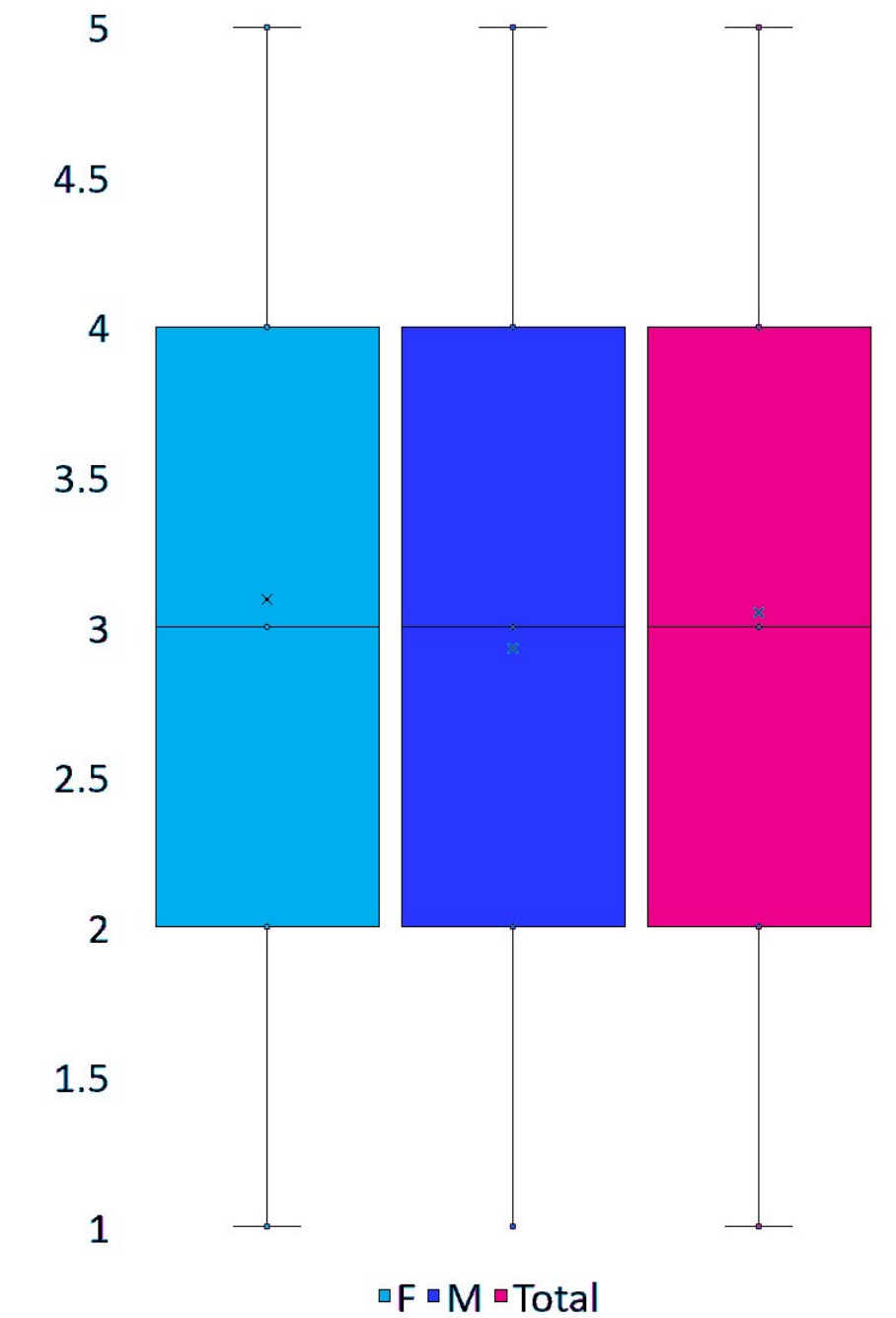


fig.39 Normal distribution of the test results



Improve interaction

EAR-HEIGHT

When the ears are positioned at P50 height (*Dined*), the total difference in the listeners ear heights will be the lowest. The ear-height does affect the binaural experience as the height of a source of sound, relative to the listener or microphone is information that our brain can decode from the sound-waves.

REQUEST

The new request after the test was made to prevent the visitor from calling the microphone Michael.

Options are:

“Say something nice to your future-self”

“Help, I'm in my Tuesday-dip”

"3D microphone - I record sound for when you feel bad. Can you tell/sing/play me something nice?"

This last one is chosen because it is a clear request, yet leaves room for creativity. It features the suggestion to make sound other than just talking.

Options besides textual explanation are:

Play an explaining video over headphones near Michael.

A pre-festival introduction mail about Michael to all visitors



fig.40 Installation one

A QR -code with an explanatory website
None of these are implemented

SUGGESTIONS

Another very interesting option is to use priming (psychology). The idea is to give the visitor example words and sentences that are in line with the desired sort of reaction to Michael. The examples should be placed as such that the exact words are not visible when the visitor is reacting to Michael, to prevent them from just reading what is already written down.

USE CUES

By using (fake) microphones to clarify that Michael records sound, (false) use cues are used. This means the use of the archetype of a microphone; an image that people are used to and easily understand.

Another use cue that could be used is to have a red RECORDING light near Michael.



fig.41 Installation two

PART OF THE CROWD

By making Michael into a gathering spot, He becomes part of the crowd, which in turn might improve the embrasiveness of the records.

INSTRUMENTS

The record could be spiced up by including "sound makers" in the installation: Tools to make noise. However, the installation should not influence the recorded sounds directly as this will become a nuisance because of the endless repetition of the same sounds.

SEATS

By including seats, people will sit around Michael, further including him in the crowd. Seats will cause people to take some more time with Michael.



fig.42 Installation three

STAGE

The installation could feature a "binaural recording stage" for visitors to play music to Michael. This way visitors are triggered to get even more creative.

SUGGESTIONS

The priming suggestion words and sentences [\(see p.84\)](#) Like "you will be fine" and "I care about you" could be written on the outsides of the installation. These sides can be seen from a distance, but are out of sight when visitors come near or when sitting around Michael. The inner sides can be used to write the request [\(see p.82\)](#) on.

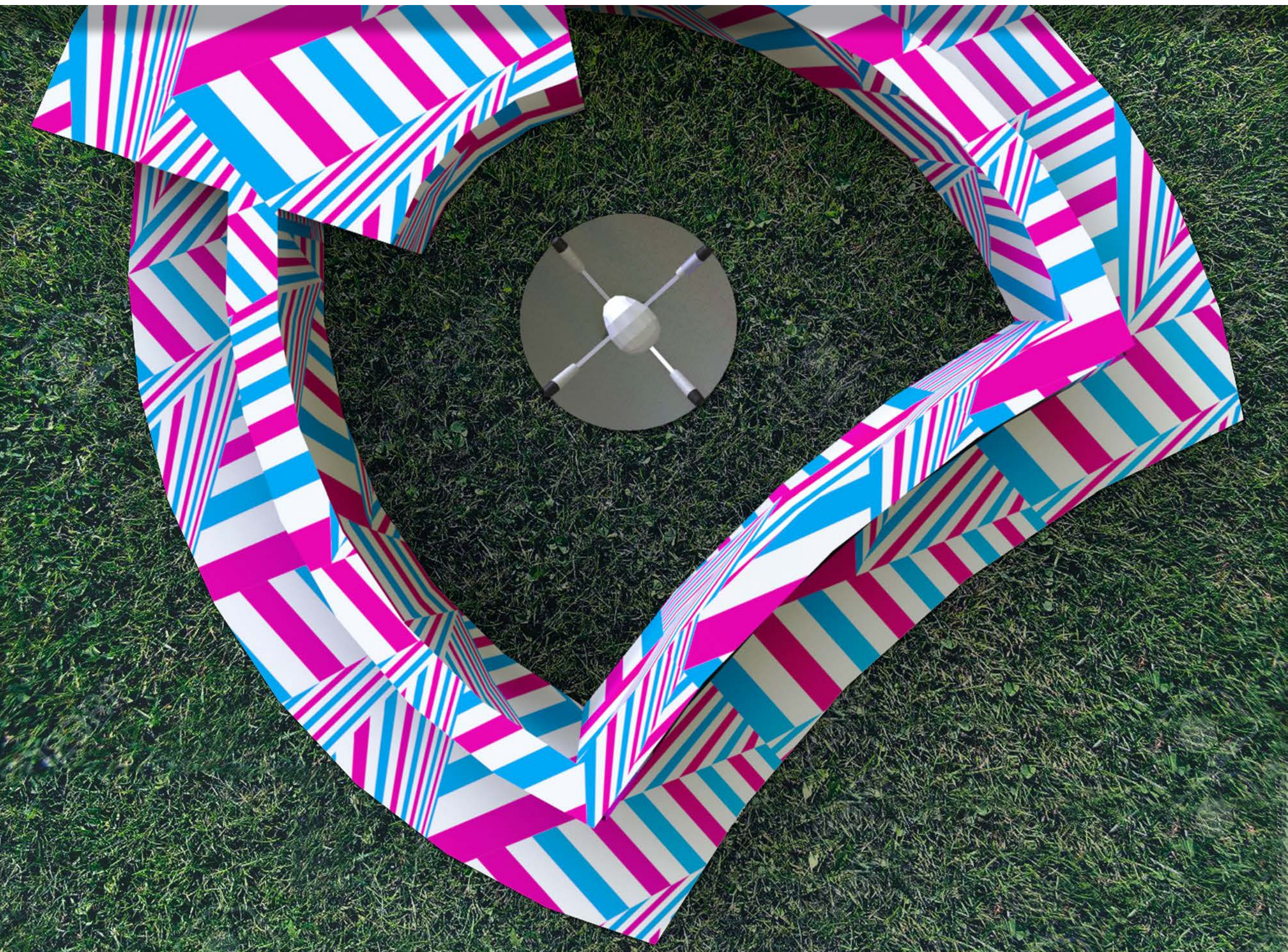


fig.43 Installation four

THE INSTALLATION

The shape of the installation greatly influences the way visitors will make sound around Michael. The shape should also trigger creativity, yet keep visitors from going too near to Michael. The shape also needs to allow for suggestions to be written around the outside.

Comparing the installations on these previous properties, installations four and five fit best. Because installation four offers a better protection of Michael this is the preferred one. However, securing Michael and the visitors from each other, installation five could become equally interesting.



fig.44 Installation five

UPDATED INSTALLATION

See [fig.45 "Updated Installation four"](#) with the implementations mentioned before and featuring a few minor updates.



fig.45 Updated Installation four



After the festival

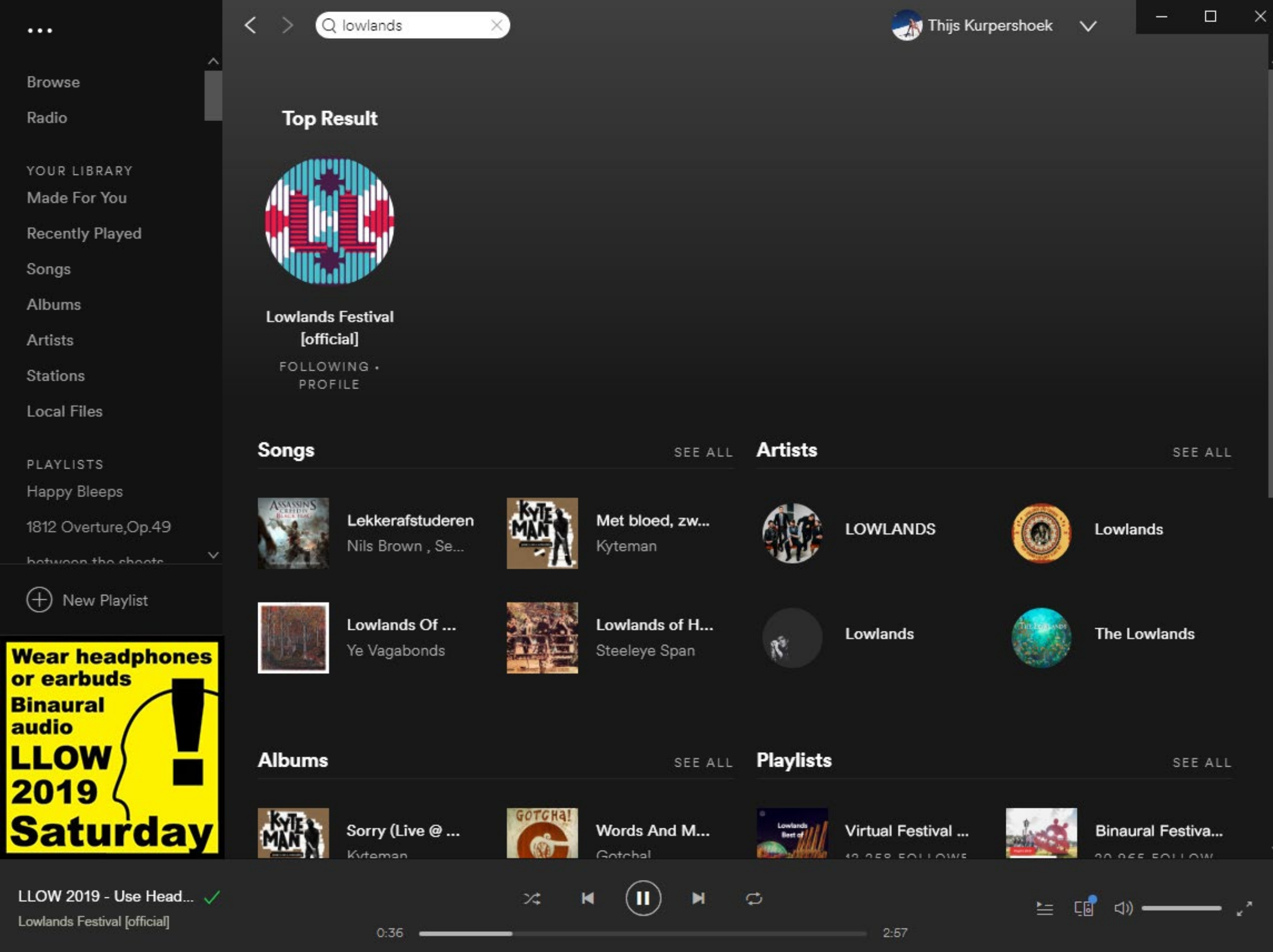


fig.46 Three example screens of the popular music streaming-service with the binaural records.

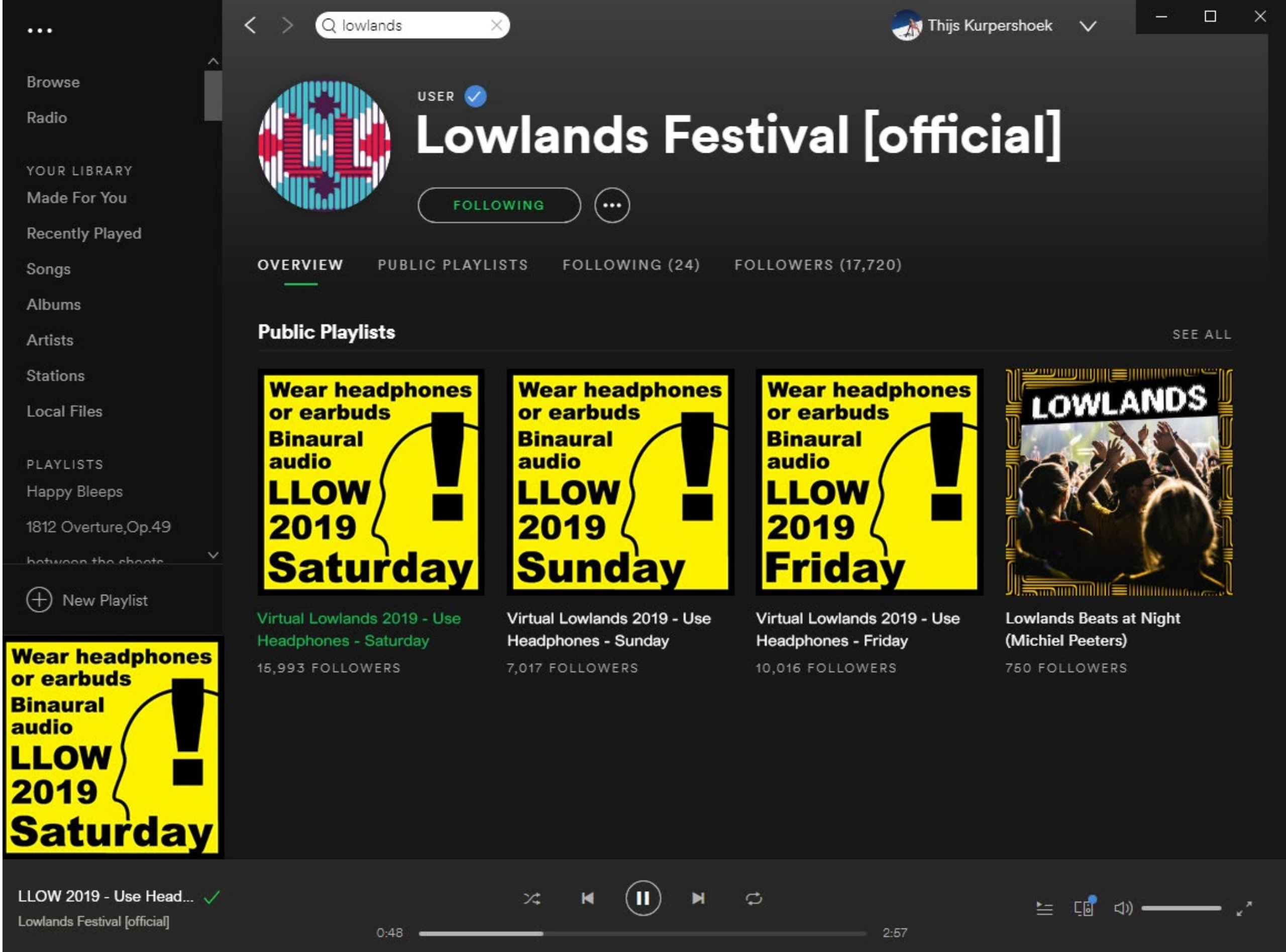


fig.48 Example screen with playlists

COLLECTING

The organisation collects the records from Michael. The files can use a little tweaking to make them from raw data to something that is nice to listen to. Settings like EQ can be pre-set before the festival and should again be applied the same on all records to prevent the EQ from decreasing the binaural effect.



fig.47 A sign that shows the importance of wearing headphones.

UPLOADING

FILE HANDLING

User friendly file handling was designed. This consists of playlists that are collections of all files from one binaural microphone from one day.

Playlist name:

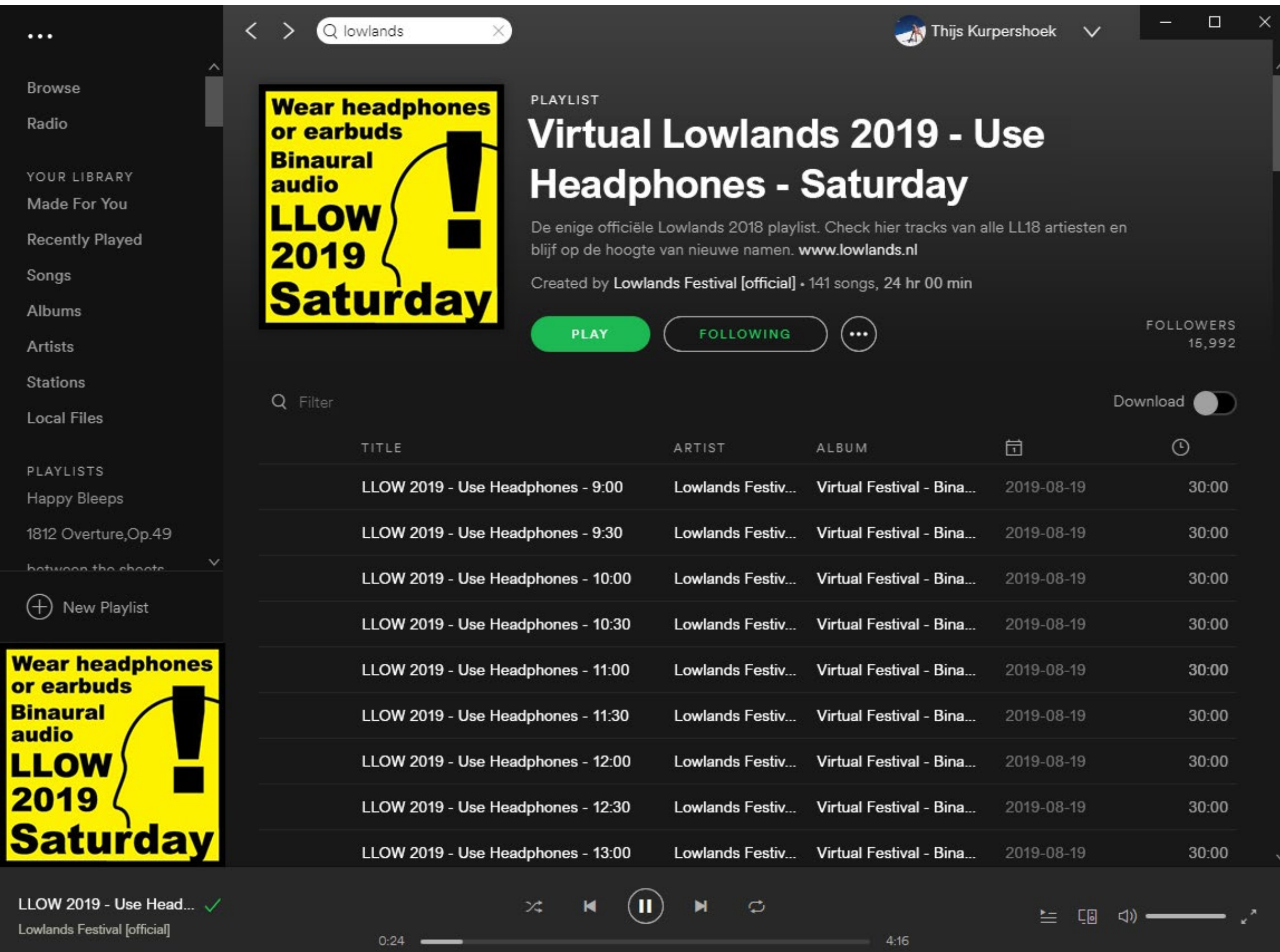
[festivalname][day#][HH:mm]

Filename:

[Festivalname]LISTEN WITH HEADPHONES![day#][HH:mm]

Spotify features a flag for [explicit] records, meaning they contain words or sounds that kids should be prevented from. Because anything could be said to Michael and moderating all of it would slow down the uploading a lot. Another option is to just flag all files as explicit to prevent conflicts with Spotify's terms and conditions.

fig.49 Example screen with binaural records



FILE DURATION

The files can be split up to any length. What is the ideal duration for each file? 10 minutes? 30 minutes?

When testing it seems the duration of interest is about 7 minutes. Also for shareability, file duration should not exceed 10 minutes.

CONCLUSION

The ideal file duration is 10 minutes.

DISTRIBUTING

THE WORD 'HEADPHONES'

Does 'headphones' cover the idea of:

IN-EAR, ON-EAR & OVER-EAR?

Technically it does. Headphone producers market all their products as headphones. But when asking around, people seem to confuse headphones with over-ear headphones. Therefore, when the use of more characters is possible, the preferred term is 'headphones or earbuds' to prevent listeners from unintended use.

UNINTENDED USE

Listening to the binaural records without headphones is a very underwhelming experience. The sound is less rich than typical stereo sound because of the subtleness of all the sounds.

NOTIFY

Visitors can be reached by their e-mail address they received their tickets on and socials such as Facebook, Twitter and Instagram.



GDPR – PRIVACY

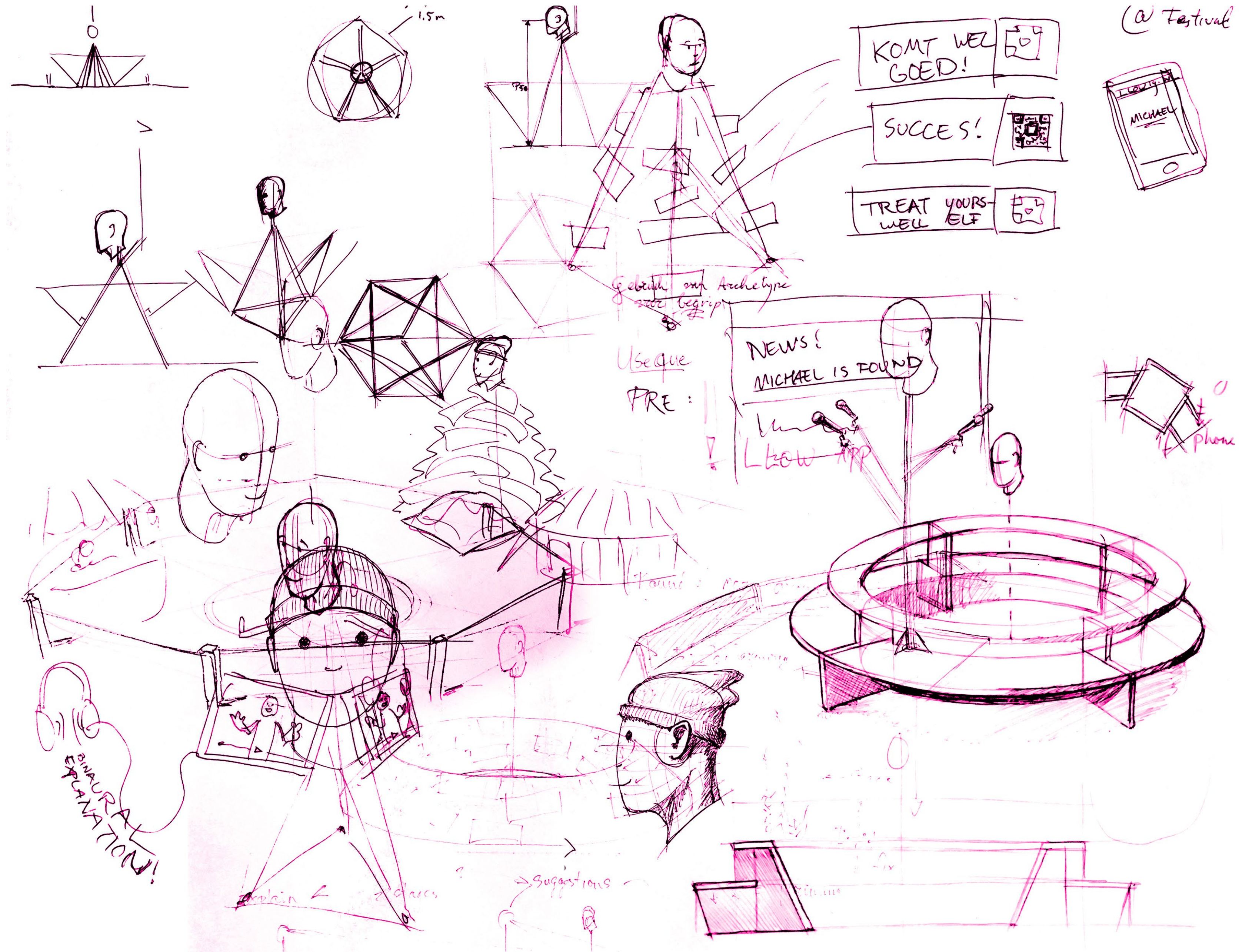
Mojo demands the visitors to accept their privacy terms when buying a ticket. The terms include a segment specifically on recording, capturing, or otherwise collecting personal data such as pictures and video, but these extend to include voice as well. Mojo is therefore free to record binaural audio with Michael.

STAKEHOLDERS

Mojo can raise the perceived value delivered to their visitors through the Peak-End rule using Michael. The records can also be used for advertising next year's festivals.

A festival simply must have an aftermovie nowadays, but this, like anything once started with one festival that tried this. Mojo can be the first with an aftersound.

Visitors will have a way to briefly feel as if they are back at the festival and feel embraced by it. Mojo really cares about and for them, even after the festival.





Further research

ACTUAL END-OF-FESTIVAL TEST

A real test at an actual festival would give a lot more realistic information about the implementation of such a product.

How to test Michael?

To test Michael on his results for the valuation of the festival, a test group will be divided in two groups A and B. Both groups will be asked to rate how they feel (1 to 5) at the moment they come home. Then an AB test is performed in which group A is given the binaural sound and group B is not. After an hour both groups are asked to rate how they feel again. A month after the festival both groups are asked to rate the entire festival experience.

ACOUSTIC JELLY

An acoustic jelly that does not remain as wet as Agar Agar does could be chosen to prevent any leaking. Next to that and more importantly, the wall thickness of the anechoic cap should be fixed to prevent holes being printed.

BETTER AND SMALLER MICROPHONES

Better microphones could improve the (binaural) quality of the records and therefore possibly enhance the embrasiveness. Smaller microphones could fit in better anechoic chambers and better fit next to each other inside the head.

PLACEMENT ON TERRAIN

The placement of the installation, especially relative to other stands and stages and paths, should be tested to find the best place for the binaural recording.

SLS PRINT OF 3D MODEL

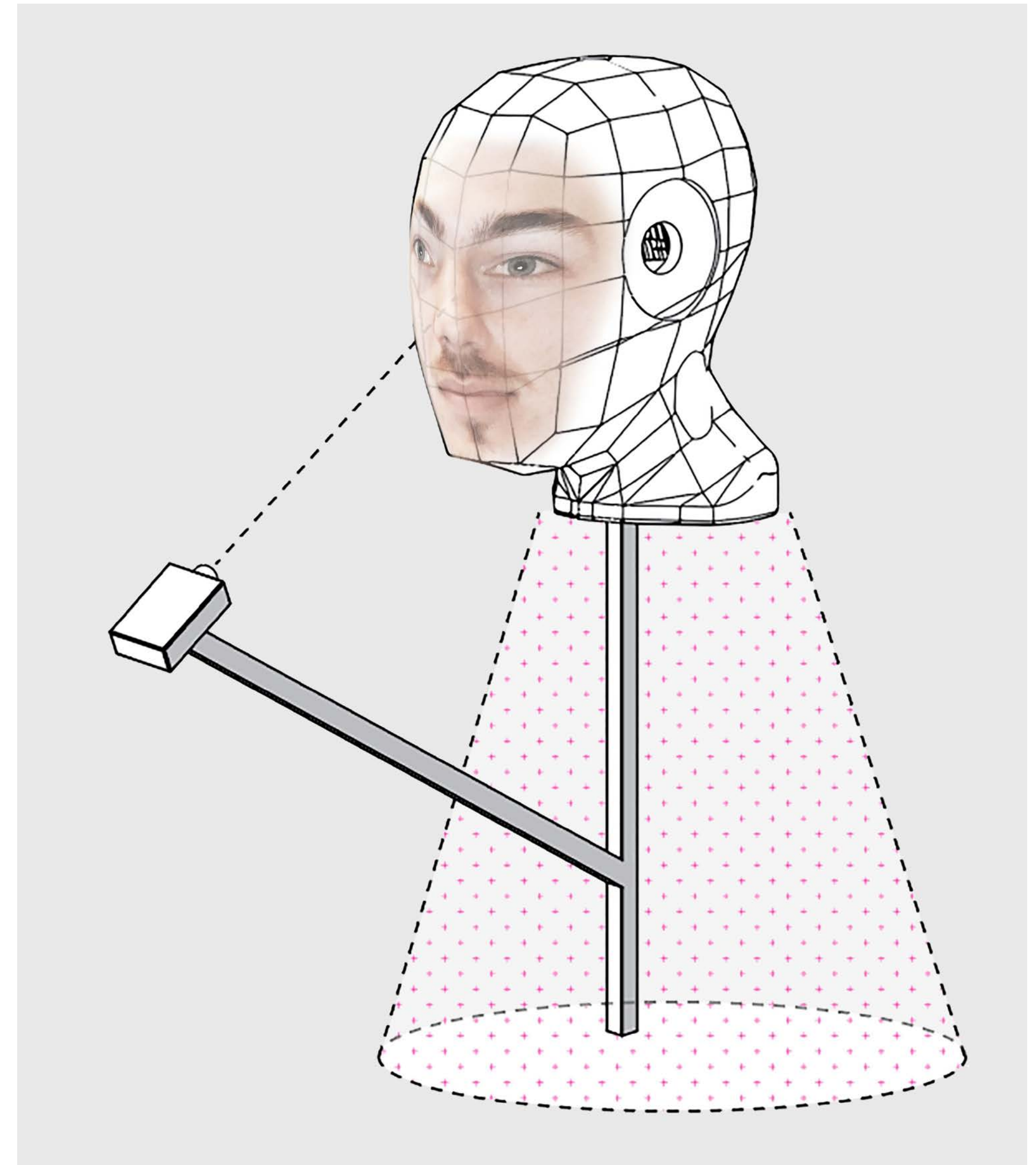
The head consists of so many features that an SLS print could print with a lot more ease and a lot less extra material. The print itself would however be more expensive.

THE USE OF SCENT

The olfactory bulb, that in humans handles scent, follows a special neural path that makes it perfect for triggering memories. Perhaps a sister of Michael should deal with sound and memories of a festival.

PROJECTION OF AN INTERACTIVE FACE ON MICHAEL

A projection of a head could replace the printed face and make Michael react to the sound he hears. Do keep the Uncanny Valley in mind!





TRIMARK KNOWOUT

PRELIMINARY

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Appendices

Improving the visitor's end-of-festival experience

Graduation project for Museum Prinsenhof Delft & MOJO

Master Integrated Product Design

Student T.J. (Thijs) Kurpershoek

Chair Prof. dr. S.C. (Sylvia) Pont

Mentor Ir. M.F. (Martien) Bakker

