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Applying Lean Approach to Attraction Design: A Case Study of Heureka Tinkerlab

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Laurea University of Applied Sciences **Abstract**
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Today's science centers are facing the challenge of leisure time becoming more disruptive. Research shows that visitors have growing expectations towards the attractions and, instead of being passive and waiting to be entertained, are more willing to participate in co-creating their own unique experience with the tools and the platform provided by the science center. Heureka is currently building Tinkerlab, a creative studio that will draw inspiration from tinkering and the maker movement and is scheduled to open in 2017.

The purpose of this thesis is to study how to prototype experiences using service design tools in Heureka's Tinkerlab. The objective is to build prototypes and engage visitors and employees in the design process. The project was conducted during the fall of 2015 and spring 2016 in Heureka's science center. Service design tools are used for ideation, testing and iterating the concept proposal.

Prototyping generated two types of insights. The first was information of the science center visitors, such as practicalities regarding interactions, consuming the content and requirements regarding usage of the space, materials and tools. The second was information about Heureka's requirements, including practicalities regarding the setting up of content and space for visitors and practicalities regarding maintenance, materials and tools from the provider's point of view. Based on these insights, five design drivers were created, namely safety, easy access to materials and tools, easy to keep clean, enough challenges for skilled and beginners and visual cues making challenges easy to start with. During the course of the project, new design canvases were created and 60 new ideas for themes and challenges were ideated by different participants.

In conclusion, this study builds on top of Lean thinking and suggests using new canvases for attraction design. A Lean attraction design process is introduced. Two new templates are created for ideating a theme and a challenge, and designing it further on location. Based on these findings, the three most important tools for experience design are prototyping, age-based user segmentation and participatory observation.

Keywords: Edutainment, experience prototyping, Lean design, Lean Attraction Design, tinkering, user involvement.

Laurea-ammattikorkeakoulu **Tiivistelmä**
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Lean lähestymistapa kohdesuunnitteluun - Esimerkkinä Heurekan Ideaverstas.

Vuosi 2016 Sivumäärä 111

Vapaa-aikamme muuttuu sirpaleisemmaksi. Tänä päivänä tiedekeskukset, kuten Heureka kilpailevat ihmisten ajasta eri alojen vapaa-ajan palveluiden kanssa. Tutkimuksen mukaan vierailijat eivät enää koe olevansa passiivisia viihdytettäviä, sen sijaan he haluavat aktiivisesti osallistua oman kokemuksensa suunnitteluun ja toteuttamiseen. Tiedekeskuksen tehtävä on tarjota tähän sopiva alusta ja työkalut. Heureka rakentaa luovaa näyttelytilaa, joka tutustuttaa kävijää maker-kulttuuriin sekä värkkäykseen. Uusi luova tila avautuu 2017.

Opinnäytetyössäni selvitän, miten värkkäyskokemuksia voi suunnitella ja testata palvelumuotoilun avulla Heurekan Ideaverstaassa. Tavoitteena on ollut rakentaa prototyyppeja värkkäyspalvelusta ja testata palvelukokemusta vierailijoiden ja työntekijöiden kanssa sitouttaen heitä samalla prosessiin. Opinnäytetyö on toteutettu syksyn 2015 ja kevään 2016 aikana. Palvelumuotoilun työkaluja on käytetty ideointiin, testaukseen ja konseptiluonnoksen analysointiin.

Yhteinen prosessi tuotti tulokseksi kahdenlaista tietoa. Ensinnä vierailjoiden näkökulmasta liittyen käytännön haasteisiin, konseptin sisältöön, interaktioihin, fyysiseen tilaan, materiaaleihin ja työkaluihin. Toiseksi se tuotti tietoa työntekijöiden näkökulmasta: mitkä ovat käytännön haasteet liittyen verstaan pystytykseen, ylläpitoon sekä materiaali- ja työkaluhaasteisiin. Asiakasymmäryksen perusteella luotiin viisi suunnittelun peruspilaria: turvallisuus, materiaalien ja työkalujen helppo saavutettavuus, puhtaanapito, haastavien tehtävien luonti eri taitoryhmille sekä visuaaliset vihjeet eli työn helppo aloittaminen. Projektin aikana luotiin uusia canvas-pohjia sekä eri tahot tuottivat yhteensä 60 uutta haaste- ja kohdeideaa.

Nopealle testaukselle rakentuva työ tuotti tulokseksi uuden muotoiluprosessin: Lean Attraction Design. Kaksi uutta canvas-pohjaa luotiin haasteiden ideoinnille sekä tarkemmalle työstämiselle kohteessa. Työ antaa viitteitä siitä, että prototyypit, ikäryhmäpohjainen segmentointi ja osallistava havainnointi ovat tärkeitä työkaluja kokemusperäisten palveluiden suuunnittelussa.

Avainsanat: elämyssuunnittelu, koulutusviihde, Lean design, Lean Attraction Design, osallistava suunnittelu, värkkäys.

Table of Content

1 Background and Introduction

"A tinkerlab is a welcoming space that celebrates the processes of experimentation, exploration and critical thinking."

Rachelle Doorley 2014,1

There are signs of a new industrial revolution. Mark Hatch, CEO of TechShop and the writer of the Makers Movement Manifesto, says that we are still "riding out the waves of the last big things, the computer revolution and the explosion of internet." (Hatch 2014, 3) Klaus Schwap, founder and executive chairman of World Economic Forum, claims we are already experiencing the arrival of a fourth industrial revolution. The new era is unique for several reasons. First, because it evolves in exponential space and there is no precedent for the speed of breakthroughs. Second, the majority of industries are disrupted. Third, entire systems of production are effected. (Schwap 2016.)

According to Hatch (2014), the nature of making things is changing and will have a tremendous impact on our lives. A multiplicity of trends, such as cheap, powerful and easy-to-use tools and access to open data, capital and markets, are coming together to push the makers movement forward. According to Chris Anderson, editor-in-chief of Wired and the founder of 3D Robotics, the biggest transformation will happen in *who* is doing things. Anyone with access to tools can be a designer, and the definition of a hobbyist and a small entrepreneur are merging. (Anderson 2014.)

1.1 The transformation of the Service Industry

Pine II and Gilmore write that traditional service industries are becoming more experimental when they compete for the same money with new experiences (Pine II & Gilmore 2011). Consumers are introduced to new forms of experiences, such as 'eaterteinment', meaning combined entertainment and eating and 'shoppertainment', meaning combined elements from retail, shopping and entertainment. In the educational field, the focus is shifting from the educational providers to active learners. The emerging model is called 'edutainment', which according to Pine II & Gilmore describes experiences "straddling the realms of education and entertainment." (Pine II & Gilmore 2011, 48.)

Edutainment is liberating the education from the classrooms. According to Heureka's Executive Director Tapio Koivu and Experience Director Mikko Myllykoski (Heureka 2015), trends shaping the future of science centers include leisure time becoming more disruptive; guests' growing expectations about the experience and willingness to participate more; lean processing directing the way people innovate with high speed; and the fact that experimental

approaches and learning as a concept are going through a major change. Due to various experimental learning programs outside school systems, science centers no longer have the leading role in learning experiences, but they can still act as a platform for various workshops and communities. (Heureka 2015.)

1.2 What is Tinkering?

Rob Semper, executive associate director of Exploratorium, the well-established tinkering studio in San Francisco, writes that the Tinkering Studio is a place where art, science, engineering and design meet; most of all it is a place where people get to make what "*they* want to make" (Wilkinson & Petrich 2015, 10). Semper highlights that while tinkering sometimes might look like "directionless activity" it can lead to "important learning experiences for scientists and artists and everyone else." (Wilkinson & Petrich 2015, 10.)

Tinkering has no direct translation in Finnish, in the Finnish scene it has been translated as 'värkkäys'. The word tinkering was already used in 1300s to describe travelling tinsmiths and their various gadgets. Nowadays tinkering describes a mindset of "thinking with your hands and learning by doing" (Wilkinson & Petrich 2015, 13.) Tinkering can happen with various materials and tools, e.g., using familiar objects in an unfamiliar way or developing new ways to see by playing around with camera.

1.3 Research Objective

The objective of this thesis is to study how to prototype experiences by using service design tools. Tinkerlab Ideaverstas was chosen for this case study because of its experimental nature and because of Heureka's interest in developing and adapting new design processes and exploring the possibilities of Lean thinking and co-creation with visitors in mind.

To reach this goal the following research questions are posed:

- What is tinkering and what do tinkerers do?
- How is setting up a Tinkerlab different from other Heureka attractions?
- How can we involve staff and visitors in the design process?
- How can we use service design tools and Lean methods in the design process?

This case study has been conducted together with the Heureka Ideaverstas team and science centre visitors in the period between November 2015 and April 2016. The total duration of the Ideaverstas project was 18 months. Due to the limited timeframe of my participation, the thesis focuses solely on the first phase of the project. The schedule is defined in more detail in chapter 5.

Heureka is expanding its premises and designing a creative studio for tinkerers and makers. The working title for the upcoming attraction area at Heureka is Tinkerlab Ideaverstas. This thesis sets out to explore how service design tools and Lean methods can be used for attraction design in the context of a science center. Since tinkering is explorative in nature and the core idea of tinkering is making and building things, the main emphasis is on experience prototyping.

The working hypothesis is that the role of the visitor is changing from that of a passive guest into an active participant who is co-creating the experience with the tools and the platform provided by the science center. The value of this emerges from interactions between the visitor and science center, between visitors themselves and in interactions between visitors and tinkering communities. The purpose of the attraction area/creative studio is to make new makers and to encourage visitors to engage in learning by doing, i.e., making things with their own hands and feeling joy while at the same time learning about the scientific and phenomenological background of the chosen themes and challenges. The position of the creative studio within Heureka's overall structure is shown in Figure 1.

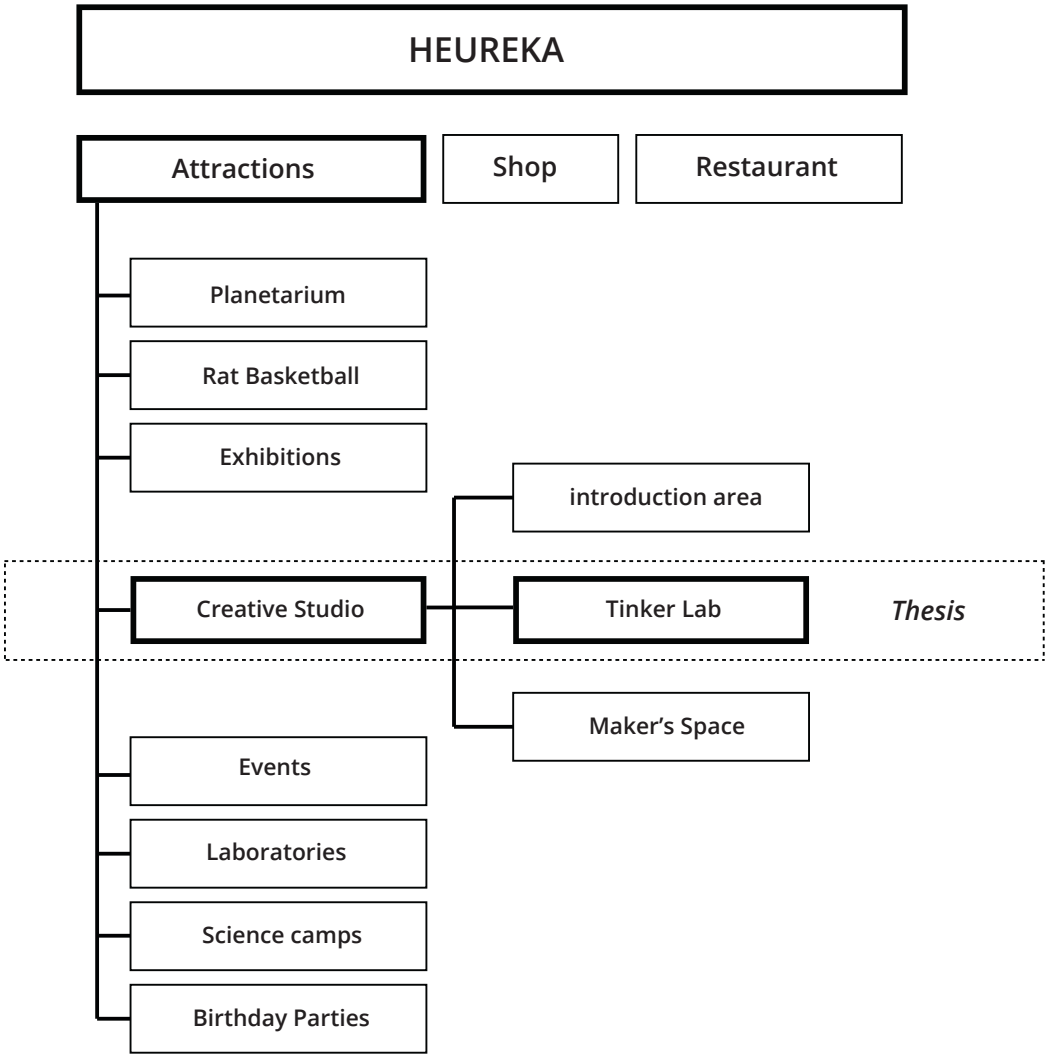

Figure 1: The planned structure of Heureka in 2017. The focus areas of this thesis are highlighted by the bold boxes.

1.4 Structure and Framing of the Thesis

This thesis is based on research- and development work with a focus in new service development (Ojasalo et at. 2014.) I began with exploring and immering myself into the world of tinkering and tinkerers with the aim of understanding the phenomenon on a detailed level. I explored the tinkering phenomenon inside Heureka premises, but also outside of Heureka, in various makers spaces and creative studios. Subsequently, I explored service prototyping and studied different practical methods together with the staff and visitors of the science centre in order to find new ways to work and develop potential methods to change the processes.

Finally, I contributed to Tinkerlab Ideaverstas' project by selecting service design tools and methods for current and future design purposes.

The process of creating a completely themed space from ideation to a public launch is long and starts with a feasibility study and market analysis that leads up to a soft launch for a certain target groups. This is followed by the final, public launch and iterative development of the space. The process from the ideation phase to the public launch might take anything from months up to several years and requires participation from various fields and professions.

My role was to help the Heureka Ideaverstas team in defining the core experience for the tinkering area. This was done mostly with experience prototyping. The collected insights will contribute to the design brief and design drivers of the upcoming space. I will explore how service design tools and methods can be used in the process of ideating, testing and iterating the concept. The process description and the set of tools are delivered to the science centre for their future design purposes. This thesis does not cover the content of the actual design themes or visitor challenges in the final studio. The theming of the physical space, the design of the actual machines as well as any digital apps, online extensions or marketing of the upcoming studio is also not covered.

1.5 Study Methodology

This thesis is qualitative in nature. This means that, as opposed to a quantitative analysis, the results of this thesis are not based on numbers or relations between numbers. In qualitative analysis, data is considered in its totality. The researcher needs to explain all the pieces of the phenomenon that is investigated, and all the findings should be aligned with the proposed interpretation. Qualitative analysis consists of two phases "the purification of observation" and "unriddling." The first phase, the purification of observation, consist of two parts. First, "a particular theoretical and methodological point of view" is used for observing data. In order to find the point of view, materials can be thematized. The amount of data is then reduced by combining observations using a common denominator or a rule. The idea behind combining observations is that "in all material there are specimens of the same phenomenon." (Alasuutari 2000, 13.) The second phase, unriddling, means that the phenomenon being studied is given an explanation based on the produced cues and available hints. In this phase, the researcher should come up with an explanation where all the observations support the conclusions being drawn.

1.6 Data Collection Methods

I have chosen different methods for collecting data, such as survey, interviews, participatory observations and prototyping. Data was collected mostly in experience-prototyping sessions held in Heureka premises. With the Ideaverstas team we also benchmarked various tinkering spaces, themes and challenges, and analyzed a large amount of documentary evidence. However, benchmarking or documentary analysis are not within the scope of this thesis. After each prototyping session, the insights were collected and delivered to the team in a written format.

1.7 Structure and Content by Chapter

Chapter 1 and 2 introduces the reader to the subject matter. In chapter 1, the subject and context of the thesis and the key concepts are introduced. Chapter 2 first introduces the case company, Heureka Finnish Science Centre, and the creative studio plan, which Ideaverstas is a part of. Next it discusses segmentation, in particular the different age groups who are the primary users of tinkering space. It then goes through the history of tinkering and introduces the idea of the world as a classroom and learning by doing becoming a norm. Finally, a short guide on how to set up a tinkering studio is provided.

Chapter 3 goes through related experience design theories. The subject is approached from both a business- and people point of view. Here, I reflect my conclusions on service dominant logic by Lusch and Vargo (2014), the business thinking in Pine II and Gilmore's (2011) thoughts on how firms can stage their experiences. I also analyze the meaning of making and discuss how the flow theory by Michaly Csikszentmihalyi (2002) explains feelings of happiness and what is a hand-mind connection.

Chapter 4 covers the service design tools and methods that I have used in the design process. There are many tools in service design that can help in creating concepts, and I focused exclusively on those that were relevant at the time I was working on the project. This thesis is built upon a Lean thinking, and what this means in practice is briefly explained. Finally, I go through the tools that I have chosen for Tinkerlab, which are interviews and survey, observations and participatory observation, experience prototyping, crafting personas, roleplaying, bodystorming and objectstorming.

Chapter 5 presents the practicalities and results of the Tinkerlab Ideaverstas case, including the processes, tools and methods used, and the obtained results. Here, I also summarise and conclude the project and introduce future studies.

1.8 Key Concepts

This thesis discusses the key concepts of *edutainment, experience prototyping, Lean design process, Lean attraction design, do-it-yourself ethos and tinkering* and related concepts, such as *actors, interaction space and value-in-use, flow, immersion* and *immersive experience*. This chapter describes the main concepts to the reader.

Edutainment is a popular name for content that has been designed to educate and entertain people at the same time. The term was first introduced in 1948 by The Disney Company to describe its True Life Adventure Series. (Davies & Eynon 2013.) Making technology and science accessible and entertaining was a popular theme in America in the 1950s and 1960s, and was influenced by space travel and computing. It was also Walt Disney's vision when setting up Tomorrowland as an educational section in Disneyland in the 1950s. Since then, the educational entertainment has grown even bigger in various medias, such as games, toys, corporations, museums, theme parks and science centers.

Experience prototyping means simulating a service experience with a service prototype. The methods can vary from informal role play to fullscale recreations. Services can be staged by acting out scenarios with, e.g., design team, staff or customers. According to Stickdorn (2013) the designers should keep the mentality of leaning by doing through out designing the entire user experience.

Lean design is a design process derived from the "Lean", which originally was the set of management practises based on the Toyota Production System. The Lean Startup by Eric Ries (2011) introduced methods for entrepreneurs to get into the feedback loop of continuous innovation with customers by building fast prototypes and measuring and validating the results. ***Lean Service Creation*** is a method developed by Futurice Oy and it builds on top of the Lean design and The Lean Startup. The Lean Service Creation consists of sixteen different canvases, which list a complete set of tools and methods to work on a customer's intial problem, the product launch and the subsequent follow ups. In this thesis I use the term ***Lean attraction design*** when I discuss the lean methods of developing an exhibition area in a science center.

Do-it-yourself ethos refers to a cultural movement where people do things by themselves and feel good about it. Making things can be seen as "a crucial dimension of personal psychology" (Gauntlett 2011, 56). One example of the new movements based on the idea of DIY is the makers movement and ***tinkering***, which can be described as a mindset of "thinking with your hands and learning by doing" (Wilkinson & Petrich 2015, 13). In practice, tinkering

can happen with various materials and tools. It can be for example using familiar objects with unfamiliar way.

Actors refer to (human) entities capable of acting purposefully. They can act within structures such as attitudes. Actors are also time bound; their actions are influenced by their past (including beliefs, values and ideology), present (including their everyday existence) and future (goals and desires). (Lusch & Vargo 2014, 56.) ***Interaction space e.g. platforms*** are physical and/or digital places that enable actors to co-create and interact with each other. Platforms might have branded identities or they might be brand neutral. The purpose and function of the platform is to enable interactions between the participants. (Choudari 2015.) ***Value*** means an actor-specific benefit; according to Lusch and Vargo (2014) it is an increase in the wellbeing of one particular actor, and every instance is always unique. Due to its phenomenological nature, it cannot be added, only proposed. The value proposition states the benefits the actor can expect from a company's products and services. (Osterwalder et al. 2014.)

Flow in this thesis refers to "a state of joy, creativity and total involvement, in which problems seem to disappear and there is an exhilarating feeling of transcendence" (Csikszentmihalyi 2002). Flow theory will be presented in more detail in chapter 3.4 The Maker Experience. The word ***immersion*** refers to a Late Latin noun of action "to plunge in, dip into, sink or submerge" and its 1640s meaning of "absorption in some interest or situation" (Online etymology Dictionary, Lukas 2013). ***Immersive experience*** in this thesis refers to a visitor experience, where the visitor is immersed into an action in the context of some particular designed physical entertainment place. According to Lukas (Lukas 2013, 4), even a trip to a grocery store is in a sense immersive. People are immersed in situations, but when we talk about immersive worlds, "we mean a place where people want to be." Immersive experience can therefore be defined as an experience that people want to experience.

2 The Place and the Platform for the New Generation of Makers

" Making is fundamental to what it means to be human. We must make, create and express ourselves to feel whole. There is something unique about making physical things. Things we make are like little pieces of us and seem to embody portions of our soul."

Mark Hatch 2014, 1

What is the maker movement and how will it change our live? Anderson (2012) calls this new phenomenon "The new industrial revolution." There are two notable sides. First, the design has gone digital. Anyone can upload files and send them over to fabrication. Second, the digital natives, the generation born in the age of Internet are "starting to hunger for life beyond the screens" (Anderson 2012, 18). The biggest real-world impact will be the economic shift, with hobbies become companies.

2.1 The Finnish Science Center Heureka

The Finnish Science Center Heureka is a non-profit organization managed by The Finnish Science Center Foundation. Heureka introduces science and technology to public through engaging exhibitions, planetarium films and events. Located in the Tikkurila area of Vantaa, it first opened its doors to the public in 1989. The idea of Heureka was developed by the docents Tapio Markkanen, Hannu I. Miettinen and Heikki Oja. The original founding members of Heureka are the University of Helsinki, Helsinki University of Technology, Federation of Finnish Learned Societies, and former Teollisuuden Keskusliitto (1975–1993, nowadays merged into the Confederation of Finnish Industries). Its roots go back to the beginning of 1980s. First, there was an exhibition called Fysiikka 82 at Helsinki House of the Estates. In 1982, the science center project was founded, supported by Suomen Akatemia, Opetusministeriö and other foundations. During 1983–1984, a Science Center Foundation was established. In 1984, the City of Vantaa offered a location for the premises, and in 1985 an architectural competition was held. From two nominees, "Heureka" by Mikko Heikkinen, Markku Komonen and Lauri Anttila was chosen as the winner, and the science center was named after the winning proposal. (Heureka 2016). An image of the Heureka building is shown in Figure 2.

Heureka's mission is to provide "the joy of discovery for everyone." This is manifested in four tenets, namely promoting enthusiasm for learning, providing an environment for inspiration, a foundation of science and research and by creating world-class exhibitions and experiences for visitors. Heureka attracts around 300 000 yearly visitors in Finland, but larger audiences are reached abroad as Heureka's exhibitions travel around the world. (Heureka 2016).

Figure 2: Heureka Science Center, press photo.

In December 2014, the Board of the City of Vantaa approved Heureka's expansion plan. The Expansion area is being built at the southern end of existing Heureka property. The expansion plan will bring 2000 square meters of new space while 1000 square meters of the old space is renovated. The expansion is expected to be ready by the end of 2016. (Heureka 2014,34).

The expansion area makes it possible to add new areas for attractions. The new creative space is planned inside the newly renovated entrance inside the 'old' Heureka premises. In the current plan, the complete creative studio is divided into three sub areas 1. Introduction area, 2. Tinkerlab and 3. The Maker's Space. (Heureka 2016.)

2.2 The New Generation of Innovators

In order to gain knowledge from the field, I conducted four industry-expert interviews. An interview with the experience designer Saara Viteli in 2015, an interview with Lean service design consultant Hanno Nevanlinna 2016, and an interview with a concept designer Fabio Florencio, specialized in STEM (Science, Technology, Engineering, Math). With Florencio I discussed childrens' cognitive development, and how age and motor skills should be taken into account in design. Findings from Viteli's, Nevanlinnas and Florencio's interviews were used as a knowledge base for designing experience prototypes on a practical level and for analyzing the results from the events.

2.2.1 Selected Future Forecasts and Tinkering

In January 2016, I interviewed a textiles teacher, who wants to remain anonymous, in an elementary school in Helsinki. The goal was to better understand what the perspectives in the makers movement are and how it relates to the Finnish curriculum. I based my questions on a forecast by futurist Marina Gorbis (2015) who claims that in the future the whole world will be a classroom, and asked her to respond to each of the claims in Table 1.

Future forecast
- Every moment can be a learning moment
- We are moving from degrees to reputation metrics
- We are moving from grades to continuous feedback mechanics

Table 1: Selected forecasts by Marina Gorbis (2015).

The findings from the interview can be divided into two categories. The positive sides of tinkering (Table 2) and the positive sides of the Finnish school curriculum (Table 3). Therefore, the two should support each other in the future. Tinkering was considered a good hobby. When students are active in hobbies, it shows in a positive way in a classroom with regards to arts and crafts, and also in other fields such as music and math. Finally, the pride of doing something by own hands is a remarkable feeling, which can be seen from students and should be nurtured and cherished.

Tinkering
- It is important to make things with the hands
- Active hobbies are evident in a classroom in a positive manner as advanced knowledge
- All kids want to take pride in doing something by themselves with their own hands

2: The positive sides of Tinkering

The Finnish school system provides a certain level of skills to everybody. If the learning is moved away from a controlled environment, we face the question of how and by who the skills can be measured. When the learning flow is controlled, and a certain level of skills is provided at the school, students can be evaluated for their future studies. The teacher interviewed considered the system to be fair.

Learning at school
- Finnish school curriculum provides a basic level of skills for everybody
- The learning flow is in control
- People can be evaluated when they apply to future schools
- The system is fair—grades are given to arts and crafts as well

Table 3: The positive sides of Finnish Curriculum.

2.2.2 Age Group Segmentation

The motor- and sensory skills of a child affects experience design decisions and can be analyzed. Age groups can be categorized in various ways. The generation of people born between 1946–64 is called the baby boom generation in United States, in Finland they are called "suuret ikäluokat", and the period are narrowed down to 1945–57. The Generation X, named after a novel by Douglas Coupland is defined as the individuals born between 1965–76, in the United States they are sometimes also called Baby bust (Table 4). A common factor to this group is that they are the oldest generation using today's media in a similar way than people born on digital age. People born between 1977–1997 are called digital natives, Generation Y or Millenials. These people are the first ones who have experienced digitalization from their childhood. People born since 1998 can be called the Next Generation or Generation Z and they are present-day children. (Tapscott 2010.)

Baby Boom Generation 1945-1964 (in Finland Suuret ikäluokat 1945-1957)
Generation X 1965-1976
Millenials, Generation Y, Digital Natives 1977-1997
The Next Generation 1998-today

Table 4: An overview of generations born after 1945 (Tapscott 2010).

When defining target groups, children, from infants and toddlers to early teens, cannot be seen separately from their parents or be described as a general target group (Trendsactive 2015). However, we can analyze parents and their behavior and make some generalizations based on their parenting. Tapscott (2010) lists down eight characteristics of Millenials (Table 5). According to him millenials are co-operation oriented innovators, who value freedom and transparency, enjoy work and are conscious about the environmental aspects of the products they buy. He also states that Millenials are changing the consumer markets and the way marketing is done. They value experiences and are out of the reach of traditional media.

1. They want to have a freedom in everything from choosing products to freedom of expression
2. They like to customize things to their own
3. They are researchers and evaluate products, offers and even the business decisions
4. They value transparency and make conscious decisions as consumers
5. They like to enjoy their work and appreciate playful atmospheres at work, college and social life.
6. They co-operate and connect
7. They act fast and value real-time feedback
8. They are innovators

Table 5: Eight characteristics for Millennials (Tapscott 2010)

Tappscot (2010) writes that compared to previous generations, the hierarchy of knowledge and the role of a child in family are changing. For example, on technical issues children can provide expert knowledge. According to (parent.co 2015) Millennials are also changing the way of parenting (Table 6). They are more team oriented and use social media for advice and support. Children are provided space for independent learning activities.

1. They are discarding the one-size-fits-all thinking and craft "an individualized approach to family life", meaning they are using various methods and sources instead of a general model.
2. They use social media and networks as a tool to seek advice and support. 3. Millennial parents are more team-oriented and therefore they embrace changing norms.
4. They reflect and question. Millennials are more relaxed. They appreciate unstructured playtime and provide kids with space for independent learning experiences.
5. They help children "cultivate a strong sense of identity." As a generation they aim "to cultivate kids' unique external and internal identity and self-expression"

Table 6: 5 Ways of how millenials are changing the way of parenting (parent.co 2015).

2.3 From Passive Entertainment to Tinkering

Gabrielson (2015) writes that tinkering offers an alternative path for students to learn at their own level using the best working methods for them. According to Gauntlett (2011), the twentieth century can be called an era of the sit-back-and-be-told culture and an arrival of media such as television has affected the way people arrange their lives enormously (Gauntlett 2011). One of the famous criticizers is Ivan Illich (2013), who argues that schools should be disestablished, because they make students to "confuse teaching with learning" "grade advancement with education" and "diploma with competence".

According to Illich (2013), most learning happens casually, outside of schools, and therefore it is just an illusion that teaching leads to learning. The liberal education should be separate from the obligatory attendance. According to Hatch (2014), natural interest in learning happens through making. Futurist Marina Gorbis (2015), speaking in a podcast, forecasted that in the future "the whole world is a class room", that "we are moving from episodic to continuous learning—every moment can be a learning moment" and that we are moving "from degrees to reputation metrics" and "from grades to continuous feedback mechanics" (Gorbis 2015.)

2.3.1 Growth Drivers for the Tinkering Movement

According to Hatch (2014), a number of trends have pushed the makers movement forward. Democratization of tools, access to knowledge, capital and markets and a new focus on communities and a desire to make authentic things, to name a few. In 2005, the founders of the movement, Dale Dougherty, Sherry Huss and Dan Woods, with the help of Tim O´Reilly, launched the "touchstone" of the maker movement, the *Make Magazine*, and accompanied it with an annual gathering called Maker Faire. In the first Maker Faire, held in San Mateo, California in April 2006, 25 000 people gathered to meet their kind. Since then, Maker Fairs and Mini Makers Fairs have spread around the globe. (Hatch 2014.)

Last year, the first Mini Maker Faire was organized in Espoo, Finland; in August 2015 Otaniemi Campus by WÄRK ry, which is a non-profit organization founded to support the do-it-yourself ethos in Finland. Wärk ry has also organized Finnish versions of the makers fairs in 2012 and 2013 under a name WÄRK:fest. (Espoo Maker Faire 2014.) The Espoo Maker Faire gathered makers from around Finland, and participants included workshops by Heureka.

According to Hatch, the first thing to do, is to make Makerspace, equipped with the proper set of tools, acts as a physical place for likeminded people to get together. The key is that no-one *needs* to make things, members come together, because they *want to*. The big part of the process is sharing designs. Hatch asks: "if you make something, but don´t share it, was it made?" it is also about sharing skills and knowledge.

The manifesto (Table 7). encourages people to give away something they make; this can also be part of the social innovation context. We learn by making. According to Hatch, the community of makers starts to flourish when a good set of tools is provided. Movement encourages makers to be playful, make discoveries and reach out to likeminded individuals discovering "the joy of making." Participants should support each other and finally, one should embrace what will naturally occur on the journey. (Hatch 2014.)

The Maker's Movement Manifesto	
Make	Creative expression is fundamental for ouselves ro feel whole.
Share	We make things to share and are wired to show off our creation.
Give	When you give things away, you are giving a small piece of yourself as a gift.
Learn	making brings back the natural interest in learning.
Tool up	Complete makerspace helps makers to fully emerge.
Play	Being playful helps you to be surprised and excited about the discoveries.
Participate	As we are not islands, reach out to makers around you.
Support	Improve the world around us by giving support of various kinds.
Change	Embrace the fundamental change in you as you progress your maker's journey.

Table 7: The Maker's Movement Manifesto by Mark Hatch (2014) lists 9 principles that define the core of the movement.

2.3.2 Past Influences on the Movement

The maker movement today draws from the longer history of arts and crafts and do-it-yourself movements. This is possible due to the changes in all three areas. First, the raise of digital do-it-yourself culture, meaning easy access to digital desktop tools. Second, sharing designs online and collaborating with others in online communities has become a cultural norm. Third, the common design file standards have shortened the path from idea to production (Figure 3). Products can be manufactured locally or globally. Anderson argues that the maker movement today is still "where the personal computer revolution was in 1985—a garage phenomenon" (Anderson 2012.)

Figure 3: The enablers of the makers movement.

Crafting is popular because it has become a social activity, a part of the community and a "movement with appealing values, that people want to be part of" (Gauntlett 2011, 64). There are also a number of personal reasons explaining the phenomenon. Knitter Sabrina Gschwandtner suggests that handcrafts are popular because they act as a reaction against a "hyperfast culture, increasing reliance on digital technology and the proliferation of consumer culture." People interviewed for Handmade Nation magazine argue that homemade things carry the idea of "authentic and personal" and also, for some of the interviewed, the traditional art appears serious and analytical and even limiting and boring. (Gauntlett 2011, 65.)

According to Anderson (2012), desktop has changed everything. Already long time ago, technologists predicted that the computer will one day conquer every home, but they could not imagine why ordinary people would want one. Some technology experts brainstormed it could be used for recipe-card management in the kitchen. For a long time, computing was something regarded as room-sized constructions used by big companies. An observation called Moore's law, named after Gordon E. Moore, states that the processor power doubles every two years, and at the same time the price declines. Moore´s law, which has proven to be correct for many decades, eventually led us to today's situation. (Anderson 2012.)

Apple and IBM PC were the first to introduce us the desktop computers, and in 1985 Apple released the first desktop laser printer. Along with Mac, they started the desktop publishing phenomenon. (Anderson 2012.) Anderson argues for "taking publishing out of the factories, liberating it." But the real impact of this phenomenon was "the idea of publishing online." With the web, the idea of "publishing" transformed into idea of "posting." Shortly, the industry once working for governments, big companies and research industries are today working for all of us (Anderson 2012, 57-58).

Anderson (2012, 63-66) argues that "transformative change happens, when industries are democratized e.g. handed over to "regular folks." The revolution, which came along with the

web, was that “anyone could make anything, given enough talent.” According to Anderson, people have changed spending habits from spending time on professional content, to consuming more amateur content. Eventually the time was right for Facebook and its kind.

The places with shared production facilities are growing at a rapid pace. In 2012, there were “nearly a thousand” makerspaces around the world. The number has grown ever since. In 2012, the Obama administration launched a program to bring makerspaces into a thousand American schools. Thousands of maker projects are funded via crowdfunding such as Kickstarter. (Anderson 2012, 18-19.) In Helsinki, there are makerspaces in various locations, such as city libraries and universities. New makerspaces have been founded to other cities across the country.

2.4 Structure and frameworks for tinkering space

Gabrielson (2015) argues that there are things, which cannot be learned without experiencing them in a personal matter. Hands-on learning is required in many fields of profession such as cooking, music, sports, and even philosophy. Gabrielson (2015) highlights that girls in particular should be encouraged to tinker, since usually it is the boys who are naturally encouraged to find solutions and e.g. take things apart, whereas girls are specifically told not to. However, the workshop environment should feel natural and fun to all.

2.4.1 What does a Tinkering Session Look Like?

According to Gabrielson (2015), tinkering usually just happens. However, if one would like to facilitate good tinkering, using frameworks can be beneficial. Tinkering can be free-formed and open-structured, or it can be a facilitated classroom-type of tinkering where everybody makes same products. In freeform tinkering, project models (example products) are the key element. Gabrielson (2015) writes that at his work at the Watsonville Environmental Science Workshop, they try to maintain 50 different project models, which span on various areas of interest. These models are hanging on the wall and ceilings with instructions. Instead of cookbook-type of instructions, kids learn to follow model. For wild kids, there are under-table storages that contain household supplies that can be altered without instructions. Conversely, in classroom-type tinkering, materials are selected for a single project and everyone creates their own version of it. In classroom-type sessions, students are also asked to discuss what happened, what they learned, and what kind of observations they made. The challenge with this approach is to have everybody interested on doing the same thing.

There should be chosen structure, but also a general framework created around it. According to Gabrielson (2015), the results vary depending on the framework. In a studio type of space,

which has all materials and tools available, the space invites people to start and continue the projects of their choice. Competition instead focuses on achieving a certain goal. This is common e.g., in school science classes and engineering clubs. Cooperation is good for big projects, because many people can get involved. Cooperation also works in the context of solving real-life problems, such as understanding how bicycles work or gardening. Individual expose means individual tinkering for a goal, but not necessary with competition. This type of projects can lead to e.g., collecting items and setting up a “mini museum” or products.

2.4.2 The Role of Facilitators and Trainers

Gabrielson (2015) argues that students should be the center point in tinkering, and facilitators should spend only 20% of their time on teaching. Facilitator should constantly engage with students and offer them a challenge and get them engaged in solving it. This should lead to “joyous desperation”, meaning the tinkerers wanting to solve challenges. For the challenge there should be many options and many materials and there should be a balance between the noise and mess.

Gabrielson (2015) writes that the essence of the tinkering space is to get tools and materials available for tinkerers. He compares tinkering space to sports. Good facilities are essential in learning. In the community Science Workshops staff, tools, materials, work stations, project models and inspirational hands-on exhibitis are blended into a same room. A good ventilation is important. The place should be suitable for storing a large amount of objects. In addition to storing objects, finding donors will make studio owners’ life easier. A good set of tools is required. However, one should be prepared that good quality tools are stolen and tools get broken. According to Gabrielson (2015), safety should always come first and all tools should be tested beforehand and should be safe to use.

The main goal of a facilitator should be to make fragile kids, kids who fear failure, have a taste of success, making frustration management part of the facilitator’s core competencies. Managing “tinkerer’s high”, what the author compares to long-distance running, is and essential part of the overall experience when exploring science, engineering, technology or art. Families can create memories by tinkering together. While tinkering, mistakes should be embraced and the process should be more important than any end result. Facilitators should know when to step aside. They should also connect observations to theories, and tinkering to possible careers. Thoughtful tinkering should be embraced. The best projects are the ones that are exciting and appealing to all ages; projects that are challenging but still doable during a single visit; projects that can be made with recyclable materials and projects that can be replicated and that clearly communicate an idea of a certain phenomenon.

3 The Engine of Innovation and Experience

Learning by doing, the ultimate goal of tinkering, happens when the hand and mind work in seamless connection. Figure 4 presents the theoretical framework for this thesis.

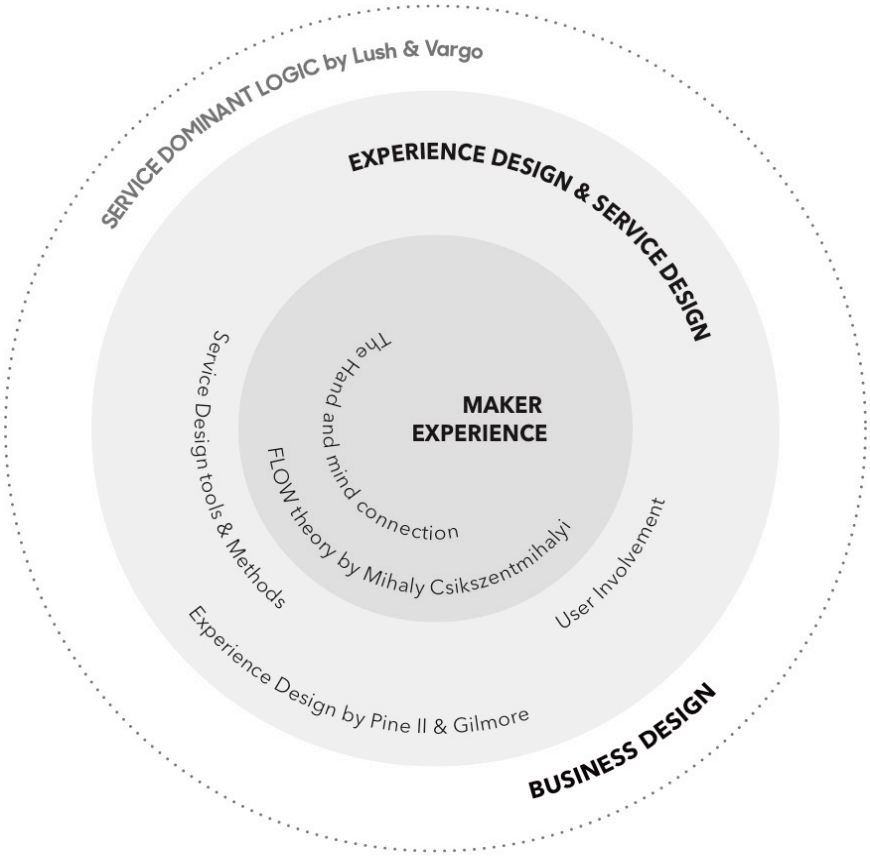

Figure 4: Theoretical framework for the design of the Tinkerlab experience.

The outer layer introduces reader to the context. In attraction design, the business design falls under the service-dominant logic (SDL). Althoug I introduce SDL, business design is not within the scope of this thesis. I only describe the business design to illustrate the business problem and goal in context. The middle area represents the experience design and service design. This is the focus area in my thesis. I have chosen the experience design theory by Pine II and Gilmore as a background for how businesses should set the stage for their services. I also study themed physical environments. Next, I briefly introduce the idea of user involvement, which refers to on what levels users can participate in the experience design process. The service design tools and methods are explored in more detail in chapter 4. Lastly, in the heart of the circle is the maker experience. I explore the hand- and mind connection and for deeper understanding of the maker experience, I have chosen the flow theory by Csikszentmihalyi (2002). The maker experience is covered in prototyping exercises. However, the more

detailed reflections should happen in the phase of testing, and defining the final content for the attraction, which is again not within the scope of this thesis.

3.1 Service Dominant Logic and Business Design

In SDL, value is intangible. Instead of value being embedded into products e.g. goods, only in the use of resources is the actual value created. Whereas goods are often made homogenous and utilize the idea of standardization, services are unique, and it is natural to customize offerings. Value in services is co-created in interactions, and the actor and the experience are inseparable. Compared to goods, service experiences are perishable. The offering might be tangible, but the value is perishable. (Lusch and Vargo 2014.)

Lusch and Vargo (2014) argue that in SDL, the firms are not the central actors, the goods are also not the central purpose of exchange. The key factor are humans, who in their search of wellbeing co-create with and combine resources from their private life, firms and public sources. As a result, firms must change their thinking regarding their role in value creation. The value in markets cannot be added because it is a result of co-created process utilizing exchange, integration and the use of resources. According to writers, value is "determined by the actor as beneficiary" and firms can only offer a value-proposition in the form of services and application of resources. But the value is not just a function of resources, it is also dependent on how the actor integrates other resources with the firm's resource offering. (Lusch & Vargo 2014, 21.) Actors, in their roles as customers, are active and creative resources and they should be involved collaboratively in value creation (Lusch & Vargo 2014, 49).

In service-dominant logic, value is phenomenological and is created through use in a specified context. Lusch and Vargo (2014) propose that the aim of the enterprise is to enable customers and stakeholders to create value by themselves. In order to solve problems, organization should be developed creatively and the surrounding service ecosystem should be guided. Service ecosystems can be persons with individual skills, a set of tools or a global ecosystem. It can be a self-adjusting system, in which actors, linked by value propositions, are connected though exchanging services.

Business design starts with finding a problem worth solving (Nevanlinna 2016). After this, the business goals and limitations should be studied in more detail and a business model should be created around the concept. The business goal in the case of Heureka is to set up a new creative space, which would attract makers, inspire visitors to become innovators themselves.

3.2 Experience Design and Setting up the Stage

Pine II and Gilmore (2011) argue that many examples of staged experiences come from the entertainment industry. Therefore, it is sometimes incorrectly concluded that just by adding entertainment elements to a firm's current offering, economic values will begin to rise. They argue that the key issue is how to *engage* customers. The engagement can be defined by two axes. The *level of participation*, meaning whether the participation is active or passive, and **the** *kind of connection* e.g. the *environmental relationship*, meaning if the attention is drawn from a distance, such as watching a game (absorption), or through immersion such, as playing a virtual reality game where the player goes into the experience. These dimension define the four realms of experience, which are entertainment, educational, escapist and esthetic (Figure 5).

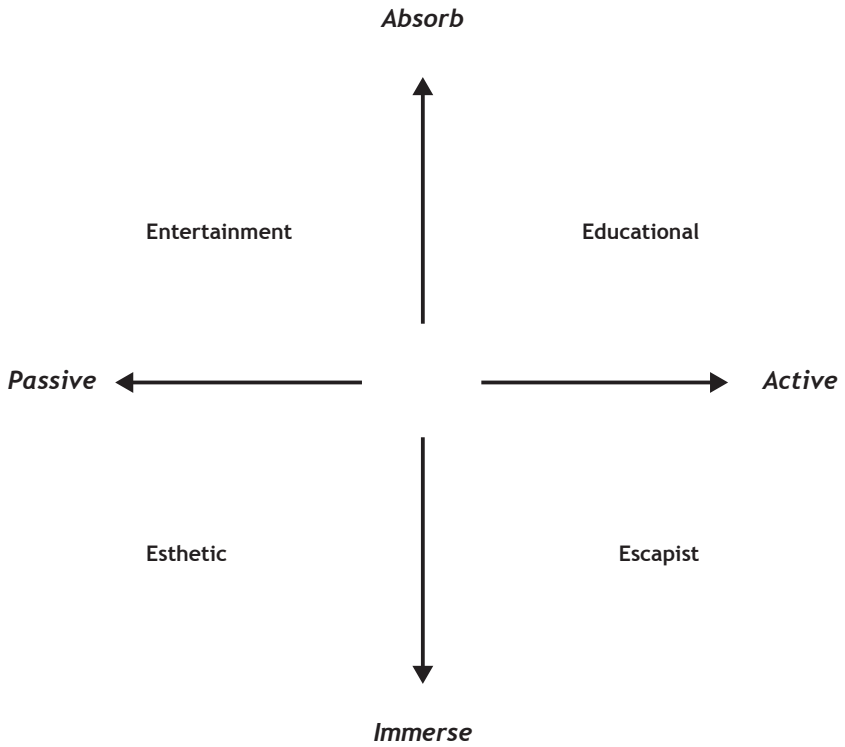

Figure 5: The four realms of experience (Pine II & Gilmore 2011).

According to Pine II and Gilmore (2011), firms staging their experiences can mix elements from the three other realms (Table 8), educational, esthetic and escapist, into the entertainment experience. Entertainment represents the passive form of experience where people primarily listen and enjoy passively. The educational experience already involves elements of active engagement. Escapist experiences involve much greater immersion than the former two. In the esthetic realm, people are immersed but have only little or no effect on the environment.

Eduscapist	Education + Escapist
Edusthetic	Education + Esthetic
Escathetic	Escapist + Esthetic
Entersthetic	Entertainment + Esthetic
Escatainment	Escapist + Entertainment

Table 8: The New forms of entertainment (Pine II & Gilmore 2011).

Pine II and Gilmore (2011, 68) argue that staging the experience may start with a well-defined theme. Well-orchestrated theming acts as an "underlying concept for every element in the experience." On the other hand, an incoherent theming creates no lasting memory as customers cannot organize their impressions around it. According to them, the best theming includes a theme and a motif, meaning a manifestation of the theme. The theme should be scripted as a story, which requires the guest's participation in order to become complete.

An industry expert in designing themed spaces, Scott Lukas (2013) writes that the bases of design are the big idea, story, experience and design. Theming can be seen as an approach to storytelling. According to him, the key idea in theming is to organize space around an idea, and "to build associations between the space and the guest." Theming can be built around the idea of *place and culture, brand*, *interest and lifestyle* and *mood and association* (Lukas 2013, 68). Themes (see Figure 6) can overlap and contain several subcategories. The common form of theming is to bring some past or present place alive as a theme. The second approach, branded theming, creates more associations between the brand and the guest and some chosen value that reflect the brand. In the third approach, a physical space, such as a bar, can be used for creating a certain mood. And in the fourth approach, connections are tied to "moods or abstract associations." (Lukas 2013, 69.)

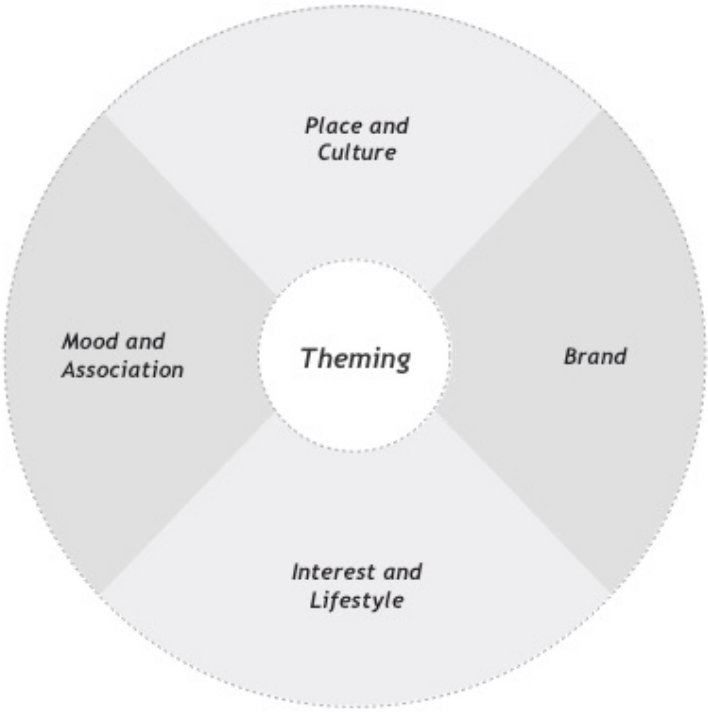

Figure 6: Types of theming (Lukas 2013).

According to Lukas (2013), associations are key. The associations born when the guest enters a space can be compared to another engaging act, e.g. reading an interesting book. In vivid associations, the reader starts filling in details that have been left out. The term is called "suspension of disbelief", meaning the audience is willing to go along with the story, even in situations that might strengthen the disbelief. Lukas (2013) writes that an immersive space needs to *evoke*. Individuals should discover by themselves what to do or how to feel.

The real forms of action are raised by evocation, the perception and feelings. Some factors, which can help in evoking are the *senses,* meaning sight, sound, smell, taste and touch; *history*, meaning that guests can feel they e.g., travel back in time; *belief,* meaning that the place connects with their beliefs; *awe*, meaning the feeling of something being bigger than yourself; *emotions*, meaning you can relate to multiple emotions; *curiosity and wonder*, meaning exploring and changing oneself; *diversity of space*, meaning there is much to the space and, finally, *reality;* which means the place feels authentic. (Lukas 2013, 106.)

Creating a successful theme requires following principles: The theme must be engaging to alter "a guest's sense of reality." Themes should "fully alter the sense of reality by affecting the experience of space, matter and time." The space, matter and time should be integrated into a realistic whole, in which the storytelling can be used as a vehicle. The theme should be strengthened by creating multiple places within a place. The theme should introduce on some level the firm staging the experience. (Pine II & Gilmore 2011, 73.)

Pine II and Gilmore (2011, 72) argue that "every experience has a theme, whether themed or not intentionally." A theme, creating a foundation for the experience, should be rendered with impressions, meaning what a customer is supposed to take out from the experience while leaving. These impressions can be defined by using a list by Schmitt and Simonson, which delineates elements such as time, space/city/country, technology, authenticity, sophistication and scale (Pine II & Gilmore 2011). The cues, coherent signals found in the environment, can trigger impressions in order to fulfill a theme. Anything not fulfilling the theme, e.g. negative cues, should be avoided and eliminated. Presenting too many clues can also confuse a guest of the experience.

3.3 User Involvement in New Service Development

Alam (2002) claims that the most important categories for user involvement are idea generation, service design, and service testing a pilot run. The other important categories consist of strategic planning, idea screening, business analysis, formation of a cross-functional team, service and process design, personnel training, test marketing and commercialization. The intensity of the user involvement may vary at different stages.

The user involvement (see Figure 7) can be described in four levels starting from "passive acquisition of input", for example customer coming up with a new service idea but not being involved in the production. Another level is "information and feedback on specific issues." This is when the service developer collects information and feedback on various stages of the process. The intensity is higher than in the first phase. It can also be "extensive consultation with users" where users are asked their input for planned processes and objectives in the form of detailed interviews, focus groups and group discussions. Finally, "representation" users become part of the development team. (Alam 2002.)

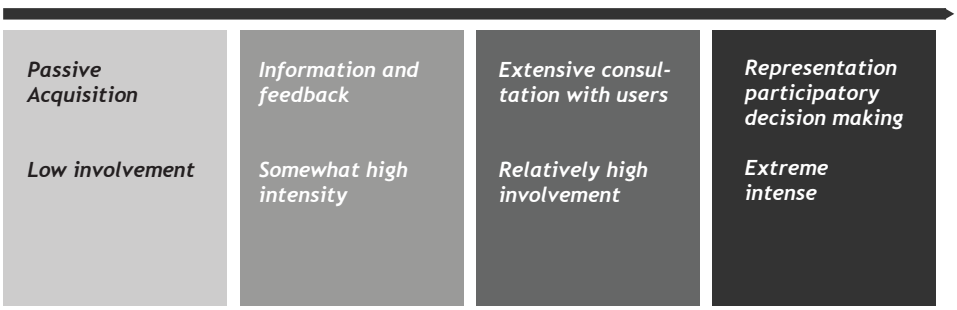

Figure 7: Different levels of user involvement (Alam 2002)

Alam (2002) defines modes of the user involvement into six categories such as face-to-face interviews, user visits and meetings, brainstorming, observations and feedback, phone, faxes

and e-mails and focus group discussions. User involvement in new service development can be beneficial in various ways. Firstly, it can result to a unique and differentiated service. Secondly, when the overall process can be stimulated, it can reduce cycle time. Thirdly, users can be educated about the new specifications while they are involved. Fourthly, it can help spreading the word and accelerate the acceptance in the markets, which can lead to improved public relations. Lastly, it can create long-term relationships between the producer and the user. Alam (2002.)

3.4 The Maker Experience

Viteli (2015) argues that when designing an experience design concept, one must have courage to expose him or herself to new. Without a personal experience, one cannot separate which event was good and which one did not work. According to her, the personal experience acts as a baseline for the design. The core of the experience design is not systematically to seek new, instead a designer should be able to recognize the elements that made the particular experience unique. Then one is able to see what other routes become available.

3.4.1 Happiness and Joy in Creating

Viteli (2015) claims that, as important as it is to try out the new, it is imperative to make the experience visible to oneself and to others, to dismantle the experience, tear it down with words, pictures or some other way. The great experience without aftermath is just a great experience, but one with reflections will take the designer further on a journey. She takes canoeing as an example. Without aftermath, one might not realize what caused the feeling of security—someone canoeing ahead of the person? Or what aspects created the feeling of excitement—the silence, or the awareness of being part something bigger? Or, e.g., what items might be interesting to study further—wanting to know more of the birds or vegetation seen on the journey, or even the notion that the person was so concentrated on reading the surface of the water that it actually took all attention during the entire journey?

Csikszentmihalyi (2002) argues that our perception of joy is dependent on the filtering and interpretation of our experiences. The personal liberation can be achieved by controlling one's own consciousness. Controlling the mind leads to controlling the quality of experience. The real battle happens against the psychic entropy, which means the disorder in consciousness. The quality of life improves when the person experiences the feeling of flow. However, not all pleasure brings happiness. Functions such as sleeping return the order in consciousness, but do not lead to psychological growth. When a person satisfies a need but also achieves unexpected goals, enjoyment occurs. These two sensations are different, enjoyment being a forward movement or, in other words, accomplishment. According to Csikszentmihalyi

(2002), a rewarding sense of enjoyment is achieved with combination of eight main ingredients and people usually mention at least one of them. Csikszentmihalyi (2002) writes that the emotion is experienced after compelting a task possible to complete. This is achieved by concentrating on doing. Concentrating is achieved by having set a clear goal. This leads to an instant feedback, when the awereness is moved away from everyday worries. People feel they have control over their actions. A stronger self-aweress is experienced after the event and there is no concern for the self during the action. And lastly a person experiences an altered duration of time. Csikszentmihalyi (2002, 61) further argues that people enjoy "the sense of exercising the control in difficult situation." The author uses the term autotelic experience, meaning an activity which is done because "doing itself is the reward."

3.4.2 The Hand-Mind Connection

In the tinkering experience, the ultimate tool for the deep engagement is the connection between the hand and the mind. For Aristoteles, the mind was the ultimate form of all forms and, in parallel, the hand was the tool of the tools, instrumentum instrumentorum. (Panelius et al. 2013, 337.) In Finland, crafts were added to schools' curriculum by Uno Cygnaeus. The original plan was to educate people for necessary technical skills required by the Finnish agricultural community. The phrase 'hands-on' originates from the 1960s and was widely spread during 1980s. Neurology has proven the deep connections between the mind and the hand, but scientists also claim that, e.g. in surgical operations, moving hands produces information for the brain that cannot be produced in any other way. The history of a surgeon holds a joined learning curve for both the mind and the hand (Panelius et al. 2013, 397). Research shows that e.g., playing piano two hours a day for five days already expands the corresponding area in the brain. Neurologists such as Kelly Lambert, who have studied depression, claim that making something provides enjoyment, especially when using the hands, due to the fact that areas dedicated to the motor skills and sensory perception are largely represented in our brains. (Panelius et al. 2013,403.)

Gauntlet (2011) concludes that making is connecting, and happiness is strongly associated to our connections to others and with the quality of the relationships we have. Instead of the standard definition of creativity, also everyday activities should be considered creative. A concept known as "everyday creativity" refers to a process which brings together at least one active human mind, and the material or digital world, in the activity of making something that is novel in a specific context and that evokes a feeling of joy. (Gauntlet 2011, 221.) In the future "people should be given opportunities to express creativity though tools, which do not seek to shape or determine the outcomes", they should be able to "share the fruits of their creativity simply and without unreasonable restrictions or gatekeepers" and "communi-

cation, exchange and collaboration should be enabled and encouraged." (Gauntlet 2011, 234.)

4 Service Design Methods for Developing the Conditions for the Tinkerlab Experience

The word 'experience' is ambivalent, e.g., in healthcare, the total experience with hours of waiting in the hospital might be terrible, but the 'outcome' after a well-performed operation might be excellent. According to Polaine et al. (2013) service design can help sorting out the problems of managing experiences and expectations. Service design works with the current and future expectations of people. Though positive experiences, services can be promoted. Through stories people tell, opportunities for innovation and improvement can be identified. According to Polaine et al. (2013) although designers cannot dictate what happens in customer's minds, the conditions for an experience can be designed.

Experiences can be defined into four categories *user experience*, *customer experience*, *service provider experience*, and *human experience*. User experience mostly concentrates on interactions between people and technology/tasks, and usually there is a tool involved, such as signage or an interface. Customer experience can be seen as a sum of task experiences involved. Service provider experience means exploring the service from "the other side" and human experience means exploring the emotional effects of the service. The management of customer experience more or less comprises managing delivery of the service and customers' expectations in relation to what is actually been delivered. In SDL, services are co-created with the customer, in some cases such as self-service check-in machines, user experience and customer experience might mean the same thing. Service design is a multi-directional approach, in which the service provider and the human experience play a big part. When customers choose their own paths and speed, designers can secure consistency. (Polaine et al. 2013, 132-138.)

According to Stickdorn there is no common definition for service design. However, there are core principles that define what service design is: (Stickdorn 2013.) Service design is user centered, meaning the service designer should gain authentic customer insights and understanding of individual experiences. It is co-creative by nature; designers should generate and facilitate environments where ideas from different stakeholders flow. Service design should be seen as sequences of interactions, where combined touchpoints and interactions create service moments, tangible items should be made tangible, e.g., backstage services, wich otherwise might stay unnoticed, can materialize as service evidence, i.e., physical artifacts, such as small gifts, that can increase the customer's appreciation. Lastly, it is holistic, meaning the designer should consider the entire environment by taking into consideration that the customer perceives experiences with all their senses; sight, sound, smell, touch and taste.

Polaine et al. (2013) writes that, in service design, time should be considered as an object of design. Time can be divided into *relationship time* and *frequency*. Relationship time means designing experiences to be relevant to people in different stages of their relationship with the service. This can materialize via service blueprint tools. Frequency means the frequency of communication between the customer and the service. This might vary between touch-points.

4.1 Lean Design Processes and the Build-Measure-Learn Loop

The Build Measure Learn loop concept originates from the Lean startup method by Eric Ries. According to Morgan et Liker (2006, 5) the core idea of Lean Startup are that we are all entrepreneurs and that it is natural for humans to come up with ideas. The Lean approach can be applied to companies of any size, but a new kind of management is required. The ultimate goal of startup is to create a sustainable business and the fundamental activity is a build-measure-learn loop; ideas should be turned into products, response from users should be measured and the results should lead to learning "whether to pivot or persevere." Moreover, learning should be validated and innovations should be accountable. Ries (2011) builds his thinking on top of the Toyota production system and has combined his entrepreneurial ideas with the revolutionary product-manufacturing method. The core of Lean product development and Lean manufacturing is "importance of appropriately integrating people, processes, tools and technology"

Tinkering is lean by its nature. The core idea of tinkering is to ideate, explore, learn and iterate. The build-measure-learn feedback loop (Figure 8), introduced originally for startups by Eric Ries, provides the fundamental base in which ideas are turned into products, customer responses are measured and results are analyzed as a ground for decision making. According to Ries (2011), the experiment itself is also the first product, which allows people to start with their campaigns; by the time the actual product is ready, it already has a customer base.

Nevanlinna (2016) trains and consults companies and individuals about Lean Service Creation (LSC). LSC is a method developed by Futurice Ltd, and is based on the Lean design concept. LSC starts with finding a problem worth solving and defining corresponding business goals and limitations. This continues by implementing a wide range of tools from immersion (which "helps you to know where you are and to build on top of the others' work") and research (segmentations, insights, ideations, concept and value proposition) to testing the product with fake advertisements and various prototypes and blueprinting the service.

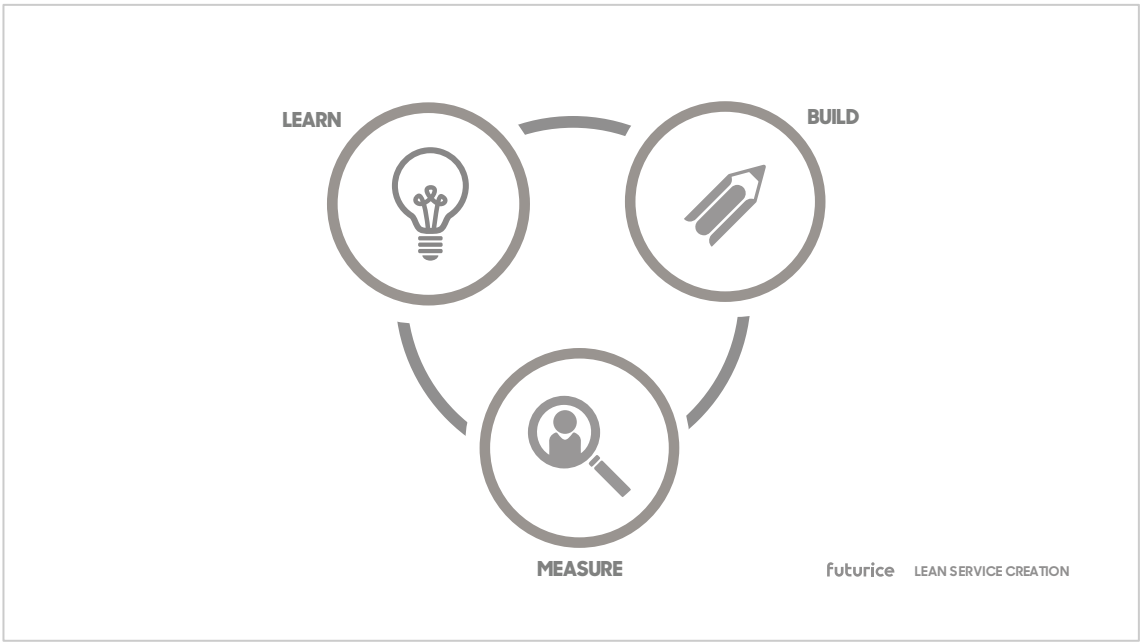

Figure 8: The build-measure-learn loop (Futurice 2016).

According to Ries (2011), the fastest way to get into the feedback loop is by building a *minimum viable product* (MVP). MVP is a prototype, which should contain only the features that contribute to the learning designers are seeking. All other features are considered waste. Prototypes can be built in many way; they can be low-fidelity or high-fidelity products. Ries (2011) argues that in order to know the quality, the customers should be known. However, in many cases we cannot yet know the customer, and therefore we cannot know which quality they prefer. Low quality MVPs can be used as a tool to explore what contributes to customers' value. With MVPs we put our assumptions to test and see how the customer reacts.

Nevanlinna (2016) explains that there is no difference between the Lean method for digital applications or physical constructions. Lean design principles apply to all design genres. Everything goes back to the core idea of understanding the customers and understanding what the problem worth solving is, and understanding the business structure. In architecture or attraction building, design never stops where the physical walls are. Nevalinna (2016) argues that by using Lean methods, science centers can create exhibitions that market themselves, are more attractive and interesting to visitors and which are built faster because something is happening all the time. Having a design process and a structure for what item phases after another, the focus is moved away from using a single tool to pursuing a holistic outcome.

Designers should come up with prototypes, put them into a use for one day and see if the public is interested in them. Nevanlinna (2016) proposes that the whole exhibition area should be treated as a case study, but also each individual attraction should be considered a case study. Running a Lean service creation method would help make the outcome to be more

coherent and also help clear out the message of each part of the show and how these messages interact with each other. Design never starts from an empty table, there are always ideas, thoughts and opinions, therefore, the Lean process can be adapted to the process on the way.

I have used Lean methods in the Tinkerlab case study. Themes and ideas were prototyped fast in the form of pop-up workshops, feedback was analyzed immediately and ideas were iterated for the next round.

4.2 Toolbox for Crafting the Tinkering Experience Concept

Tinkering is social prototyping. My toolbox for the ideation phase consisted of the following tools: participatory and applied contextual interviews and expert interviews, observations and participatory observations, a survey, creating insights and personas as well as various styles of experience prototyping, such as roleplaying, setting up a stage (e.g., simulation of a place), bodystorming (brainstorming while acting out the experience) and object storming (using materials for thinking out design alternatives).

I chose these tools because they were, in my opinion, suitable for the project phase. Other tools, such as coming up with different customer journeys and blueprinting the creative studio should be the next steps in the process, and I highly recommend Heureka to proceed creating those. Expanding the stakeholder map, including the network for content providers, should also be one of the next steps. The concept of the actual learning space should be created, user tested and validated, and a business model should be created for it. My chosen methods all contributed to collecting materials for the design brief, and are outlined in more detail below.

4.2.1 Interviews and Surveys

I have used surveys as a method for collecting ideas for new challenges and themes to be performed in Tinkerlab from Heureka's visitors. I chose to use a 'request for suggestion'-type of survey. The "Mitä sinä haluaisit kokeilla Heurekan ideaverstaassa"-, or "What would you like to tinker in Tinkerlab?"-survey is analyzed further in chapter 5. I also interviewed a family who participated in two pop-ups. First, I interviewed them as a group while we ideated new themes and challenges for Tinkerlab together. The second time I interviewed them in order to collect more insights and to collect feedback regarding the two pop-ups they attended.

According to Hanington and Martin (2012), there are two methods of survey research, interviews and questionnaires. Stakeholder interviews are focused on the information from a specific role. Key informant interviews concentrate on people with expert knowledge. For the Heureka case study, I used three different types of interview techniques, contextual inquiry (in pop-up workshops), naturalistic group interviews (with a family), one-on-one interviews with key informants (four industry experts) as well as an online survey method. These methods are analyzed in more detail in chapter 5.

I have used the structured interview with prepared questions for the key informant interviews and the unstructured interview method with the contextual inquiry in popup workshops. According to Hanington and Martin (2012), interviews can also be conducted individually, with couples or groups, and can be based around artifacts. I used a group interview as a method to interview, at a later stage, the same people who participated the first contextual inquiry in the popup workshop.

According to Curedale (2013, 232) contextual inquiry is an observation and an interview in context. It has four guiding principles ”1. Context, 2. Partnership with users, 3. Interpretation and 4. Focus on particular goals..” The method can uncover tacit knowledge and can help gather detailed and reliable information. According to Stickdorn (2013, 162-163), contextual interviews are conducted in the service environment or context relevant to the service being designed. In order to generate insights, the interviewer observes the participant(s) and may ask questions. Interviews are usually documented using film, audio or photography. Contextual interviews help gain understanding of the surrounding social and physical environmental factors.

According to Curedale (2013, 242), the naturalistic group interview is a method where participants know each other, and the conversation can therefore be more natural. The method can be used in cultures where people are less willing to share feelings. In my thesis, I used this method to interview children. They were from the same family, and were interviewed together with a parent. All three interviewees participated in the pop-up workshop at Heureka, and the interview was conducted a week later in their home.

One-on-one interview take place between the researcher and one participant in a face-to-face setting. It may be structured to a time slot with selected questions and themes. Key informant interviews are used to gain industry information. (Curedale 2013.) I interviewed an experience/adventure designer, two teachers (one arts and crafts teacher and one STEM teacher) and an exhibition designer who was specialized in Lean design methods. Interviews were all conducted at their working premises.

Curedale (2013, 243) lists challenges for the interviews; these are are keeping control, being prepared, being aware of the bias, being neutral, carefully selecting the location, recording everything and combining one-one-one interviews with group interviews. According to him, it is important to also understand the relationships interviewees have with the products and context; the researcher should understand “likes and dislikes.”

According to Hanington and Martin (2013, 172-173) surveys are a common method of collecting self-reported information from people. They are simple to create and manage, however, the types of wording should be carefully designed. Survey questions can be divided into various categories as listed in Table 9.

Survey question types	
Closed-forced choice	Open-broad
General-focused on the big picture	Specific-focused
Factual – with responses that can be verified	Hypothetical
Neutral	Leading
Comparative	
Judgemental	
Blaming	
Request for suggest new ideas	
Request for suggest questions researcher have overlooked	

Table 9: The Survey question types (Curedale 2013).

4.2.2 Observation and Participant Observation

According to Polaine et al. (2013, 54-56), participant observation helps gain rich, in-depth and accurate insights into how people use the product. Instead of what people say they are doing, this method helps in revealing information of the reality, or what people actually do. Latent needs can be exposed and a good understanding of the context is achieved. According to Curedale (2013), the indirect form of observation helps uncovering activities that might not otherwise be noticed. Curedale (2013) divides observation into several subcategories (see Table 10).

Covert	People not knowing that they have been observed
Direct	The researcher records and observes while something is happening
Indirect	The observer is unobstrusive
Non Participant	The researcher does not become part of the situation
Overt	The researcher participates in the observation
Structured	A particular type of behaviour is observed; the researcher may create an event for the purpose
Unstructured	The researcher wants to explore naturally occurring events

Table 10: The subcategories of observation (Curedale 2013).

Short observations are a good starting point to become familiar with the subject. Observations should be carried out in their natural environments. Participant observation can be either passive, just observation without interaction, or active, in which case questions can be asked. John Zeisel has discussed observation from “the vantage point of the observer.” Marginal participants blend into the environment as natural observers, such as the audience in a soccer game who observe the audience behaviour. Full participants immerse themselves as a complete members of a group, subculture or culture. An example of a full participant is someone becoming a waitress to observe restaurant behaviours. (Hanington and Martin 2012.)

Curedale (2013) lists down the possible challenges with observation. First, it does not explain the cause of behaviour. Second, if the participant finds the observer obtrusive, they might alter their behaviour. Third, analyzing observations might take time. Fourth, objectivity, researcher might look where they expect to find information leading to subjective interpretation on the research topic.

In casual or semi-structured observations, baseline information is collected through immersion. Although the primary focus is on observation, the designer may have a guiding set of questions. In structured, systematic observations, the designer utilizes forms of coding, such as checklists and events, and artifacts and behaviours are recorded in a structured format. (Hanington et al. 2012.)

I used participatory observation as a method to collect insights from Heureka visitors. I observed how they were using tools and materials, and how they behaved in the tinkering situation. I complemented observations with short interviews asking visitors why they did something and how they experienced the themes and challenges. Based on observations and insights, user segments were created. I used age-based segmentation due to the fact that themes and challenges are closely tied to motor- and cognitive skills. Gelman (2014) writes that what differentiates designing for children from designing for adults is that adults' skills remain pretty stable while kids' skills change fast. Another factor is that adults usually have a goal in mind, but kids instead concentrate on the journey. When designing for kids, it is good to have an understanding of their basic development. When thinking of what design conventions to follow, it is good to have an understanding of the characteristics of a specific age.

According to Gelman (2014), kids learn and communicate through play. Some of the key differences between adults and kids come in the areas of challenge, feedback, trust and change. Challenge and conflicts delight kids, whereas adults do not necessary enjoy this. Adults like to get feedback when they do something wrong, but kids love feedback whenever they do something. Kids are not able to understand actions ahead of time, which makes them more trusting than adults. Finally, kids change fast. According to Gelman (2014), what is similar between kids and adults are the needs of consistency, purpose, surprise and lagniappe, meaning a little something extra to delight the customers.

4.2.3 Experience Prototyping and Staging Services

"A Prototype is worth a thousand words." Design prototypes can be defined based on fidelity. Low-fidelity prototypes are more common to software and interface design, whereas high-fidelity products are used when the feedback is collected in the areas on esthetics, forms and interaction. (Hanington & Martin 2012, 138.)

Service experiences can be simulated with service prototypes. In comparison with written or visual descriptions, service experiences can create deeper understanding of the service being designed. According to Stickdorn (2013, 192-193), methods can vary from informal role-play to a fullscale recreations. Learning-by-doing mentality should be carried out the entire user experience. According to Polaine et al. (2013, 140), large amounts of money can be saved

when organizations spend time on prototyping their service as early as possible. While the product prototype is something people can hold in their hands, the service prototype is an experience of interacting with multiple touch points that also takes into consideration how the experience unfolds over time and context. When many prototypes are passively viewed, prototyping experiences foster active participation while building interactions with products, systems, services and the space (Hanington et al. 2013.)

Some examples of what experience prototyping can be used for include: (Hanington and Martin 2013.)

- Exploring ideas and evaluation
- Low-fidelity prototypes are involved in iterative design development and feedback is gained based on realistic situations
- They can act as a communication tool to persuade key audiences to active engagement
- In service design, as a method for testing and exploring the system's physical touch points across time and place

Services can be staged by acting out scenarios and prototypes with design teams, staff and customers. A playful and safe space should be created to ensure the full immersion of the participants. According to Stickdorn (2013, 194-195), service staging can enhance the design process by bringing "kinaesthetic learning and emotions" into the service. For example, when designing services into new buildings, parts of the design could be created on-site together with people participating the staged experience.

4.2.4 The Levels of Experience Prototyping

Polaine et al. (2013) divides experience prototyping into the four levels: discussion, participation, simulation and pilot. In the discussion phase, a series of mockups that simulate the journey are discussed with users in the form of an interview. The method is inexpensive and similar to user insight interviews. In discussion, the most obvious problems and issues can be revealed. In participation, similar prototyping is carried out in the actual service environment. The aim is to study how the elements of time and location affect how touch points work together. Simulation requires more preparations and a controlled environment. It is a combination of first two methods, but in more detail. A simulation may last days or weeks and explores the element of time. Pilot can be seen something that actually is delivered to users already. Pilot prototypes are usually a beta service. The aim is to learn how the service works with large amounts of users over time. In cases where the budget restricts prototyping, a mix of different elements from all levels can create an effective prototype for testing. (Polaine et al. 2013,140-143.)

In the case of Tinkerlab, experiences were prototyped in two levels. First, the ideas were prototyped with visitors by introducing the pop-up workshops in order to learn their behaviors and to form insights. Second, experiences were prototyped with Heureka employees by staging the service into the meeting room and then acting out the experiences and brainstorming and analyzing the feedback as a team.

4.2.5 Segmentation and Personas

Alan Cooper, credited for the concept of personas describes them as "an archetypal character that is meant to represent a group of users in a role who share common goals, attitudes and behaviours when interacting with a particular product or service. Personas are user models that are presented as specific individual humans. They are not actual people, but are synthesized directly from observations of real people." (Curedale 2013, 138.)

Curedale (2013) writes that personas help create empathy and should to be created based on real user data. Personas (see Figure 9) are a good tool for analyzing insights, but if the data used is inaccurate this can results in a false understanding of end users. Data can be collected via observations, interviews and by using ethnography. Customers are segmented and personas are given a name and appearance. When creating personas, stereotypes should be avoided. Personas can be used in building customer journeys.

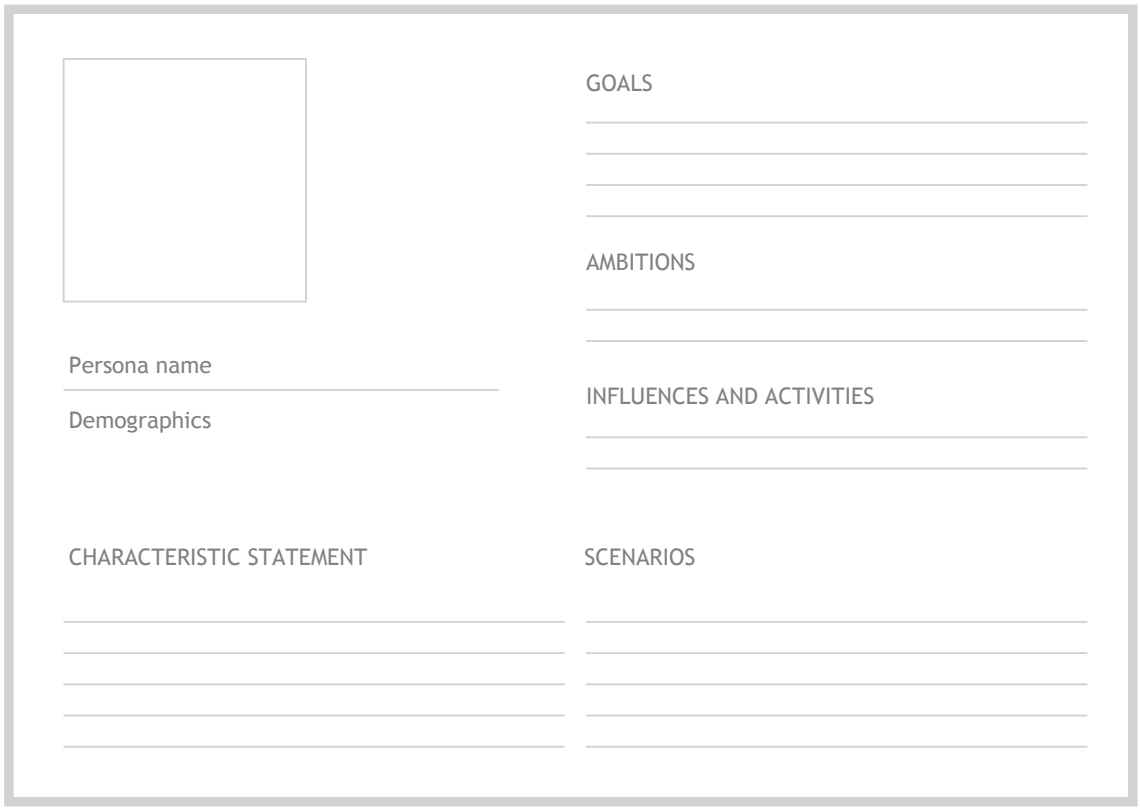

Figure 9: An example of a persona card (Curedale 2013,137).

4.2.6 Role Playing

In role-playing, designers take on the role of the user and emulate the behaviours they might exhibit in the actual scenario. This is a low-investment and low-cost method. However, setting up a role play that is credibly connected to the real world might take some time. Also, the members of the team have to be willing to play along. A role play as such does not require more than people in a room. However, when exploring more complex services, it might be more relevant to create a simulation or conduct bodystorming. Role playing is difficult to document by the members involved. Consequently, it is recommended that other team members record the session. Finally, role play should build upon realistic user scenarios and behaviors. (Hanington et al. 2012.)

4.2.7 Bodystorming

The bodystorming method, credited to Interval Research is an informative performance, which combines role playing and simulations in order to evoke ideas. According to Hanington and Martin (2012, 20), it "situates brainstorming in physical experiences." In bodystorming, "designers immerse themselves into user situation" and move though space- and context dependent simulations with low fidelity prototypes while paying attention to interactions, decisions and emotionals aspects. Ethnographic data acts as a base for setting up design questions

and the solutions are brainstormed on-site. The method can be used when activities are unfamiliar or unaccessible to the designers. Threats to the benefits of this method are considerable preparation costs and noticeable training costs. However, bodystormed experiences might later on be better remembered and utilized. (Oulasvirta et al 2002.)

According to Curedale (2013, 151), bodystorming can be used for prototyping experiences. The environment is first set up with proper artifacts and then tested physically with people playing out scenarios. The method is used for finding possibilities and problems and helps ideation by exploring context. The method is used following way. First, the team is selected, the location for the actual design is defined, locations are visited and people and their interactions with artifacts are observed in the environment. The prototype of the space is then developed, and participants and scenarios are defined in more detail. Finally, the scenarios are bodystormed and the event is filmed and analyzed for insights. The method can be challenging if team members find it difficult to act out. (Curedale 2013,151.)

4.2.8 Object Storming

Object storming, invented by Faickney Osborn in 1953, is a technique similar to brainstorming that uses found objects for inspiration. The method can be used for generating concepts. It helps build team cohesion, enables everyone to participate and can make problem solving fun as a group activity. (Curedale 2013.) The method can be used e.g., by giving each workshop participants two objects and by asking them to come up with ten ideas.

4.2.9 C-box and Canvas

Invented by Marc Tassoul from Delft 2009, the C-box (ssee Figure 10) is a perceptual map used for organizing large amounts of ideas in a comparative way. It can supplement brainstorming and can be used to recognize the most feasible ideas. As a democratic tool, it allows everyone to contribute. The method is used in the following way. The design problem is defined, a team is formed, a canvas is prepared, concepts are brainstormed (one idea per one post-it note), each idea is presented and taken into the canvas, the group decides if the idea is feasible, not feasible, conventional or innovative and, finally, each post-it is positioned based on the group’s decision. (Curedale 2012, 295- 296.)

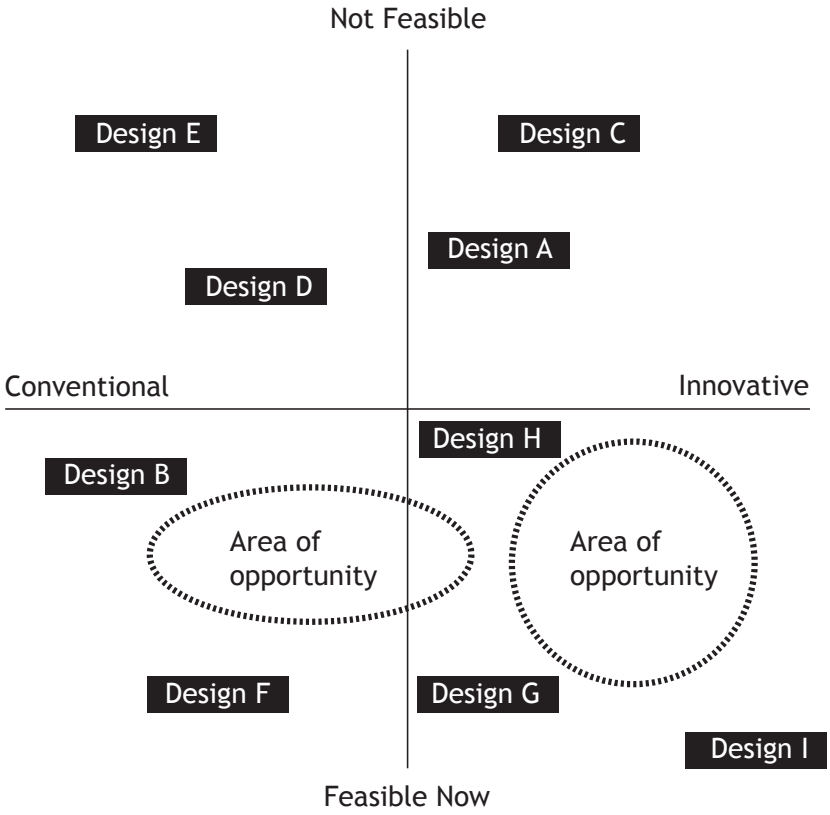

Figure 10: Overview of C-box invented by Tassoul (Curedale 2012).

For the Heureka case study, I chose the C-box for analyzing online survey results. I altered the original design a little and prepared and printed an A1 canvas (shown in Figure 11) for the Tinkerlab Ideaverstas team workshop. I placed the area of opportunity in the middle since, when thinking about new attraction challenges, they might fall under the category of not feasible. But when the idea itself is good, this should not limit the progress; instead it should just list the possible barriers, which could then be studied further in order to see if the challenges could be overcome.

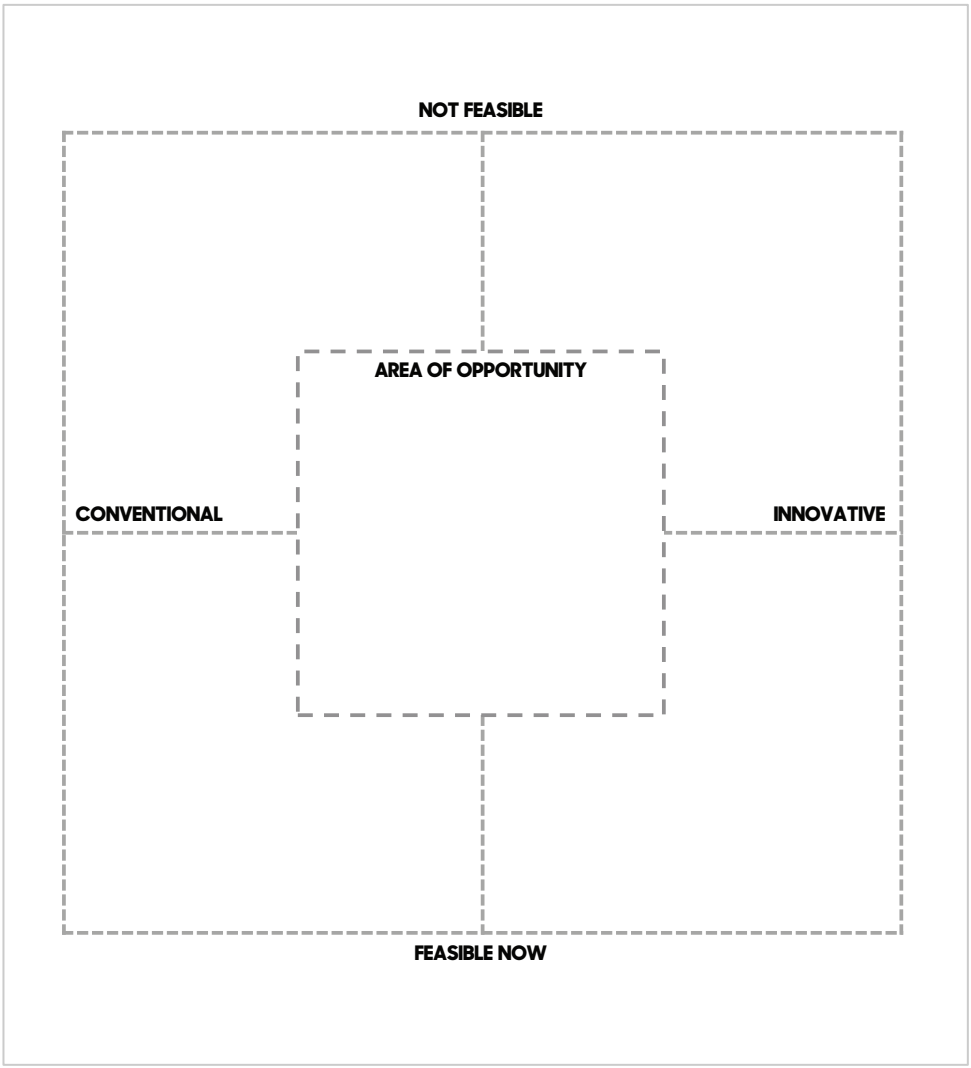

Figure 11: The modified C-box used for the Heureka workshop.

Canvases are popular tools in service design. They also form the main structure in the Lean service creation method, where there are altogether 16 canvases. (Sarvas et al. 2016.) In the Tinkerlab case study, canvases were printed and used as a tool for collecting ideas and organizing data. When printed in A1 size, canvases area great tool for a group work as they allow a large amount of people the possibility to write down ideas and comments simultaneously.

Although some canvases were used in the Heureka case study, I mostly documented observations in the form of written and illustrated reports, which were then shared via email. In future situations, I would recommend using a so-called war room, in which all observations and findings would be documented on the walls on an open space accessible to all project members.

5 The Heureka Ideaverstas Case Study

An important question is how to prototype experiences using service design. I met with Heureka's experience director Myllykoski for the first time in October 2015. At this time, we discussed several upcoming exhibitions, and I made project proposals for three of them. Next, my project proposals were evaluated at Heureka. I met again with Myllykoski later in October and, as I am a maker myself, we picked Tinkerlab as the primary case study for my Master's thesis. From the beginning, we strongly agreed that the project should happen in co-operation with Heureka's visitors and employers.

The complete project schedule (listed in Table 11) consisted of several meetings, telcos and email conversations (purple); written and visual project proposals and other material deliverables (blue); bechmarking and readings (green); pop-ups (orange); internal workshops (yellow) and analyses prepared for Heureka (grey). It was decided with Heureka that I participate in the workshops as an instructor. This would position me well to interact with all visitors and employees at Heureka while being treated as one of the regular employees and not as a researcher. I would start my research by participating and co-running prototyping events together with the producer of Tinkerlab Rauno Bergman before December 2015.

Type	Time & Place	Subject	Outcomes
Meeting	October 7th 2015 Heureka	First meeting to discuss potential thesis project	Introduction to thesis and material for creating a proposal
Proposal to Heureka	.pdf by email	Project proposal	Project proposal
Meeting	October 2015 Heureka	Second meeting to discuss potential thesis projects	Case study chosen; more materials for the selected topic
Revised document to Heureka	.pdf by email	Project proposal	Project proposal
Meeting	October 28th 2015 Heureka	Kick-off with project team	Get to know people and agree to next steps
Bechmarking and readings	Online and at home	Pre-study provided by Heureka (11 documents) Bechmarks and books provided by Heureka Netnography	Knowledge
1st Pop-up	November 8th 2015 Heureka	First prototyping session	Insights
Comparing analysis	Online	Comparing notes and findings	Grouped findings
Analysis to Heureka	Report	Analysis of the prototyping event and insights	Insights are shared with all members of project team
Planning	Telco and online	Planning the next pop-up	Content for pop-up
2nd Pop-up	December 5th 2015 Heureka	Second prototyping session	Insights
Comparing analysis	Online	Comparing notes and findings	Grouped findings
Analysis to Heureka	Report	Analysis of the prototyping event and insights	Insights are shared with all members of project team
Planning the survey	Telco and online	Survey content planning	Survey content
Survey	Heureka website	Ideas of what visitors would like to do in Heureka	Ideas
Meeting	January 25th 2016 Heureka	Planning the content of employer workshop	Planning meeting
Internal workshop	February 15th 2016 Heureka	Workshop with employees	Insights and practical questions answered
Visual report to Heureka	Report	Visual report of the employee's workshop and insights	Grouped findings
Planning	Telco & online	Planning the next pop-up	Content for pop-up
3rd Pop-up	March 10th 2016 Heureka	Third prototyping session	Insights
Comparing analysis	Online	Comparing notes and findings	Grouped findings
Analysis to Heureka	Report	Analysis of the prototyping event and insights	Insights are shared with all members of project team

Planning	Telco and online	Planning the next pop-up	Content for pop-up
4th Pop-up	March 26th 2016 Heureka	Fourth prototyping session	Insights
Comparing analysis	Online	Comparing notes and findings	Grouped findings
Analysis to Heureka	Report	Analysis of the prototyping event and insights	Insights are shared with all members of project team
Planning	Telco and online	Planning the next pop-up	Content for pop-up
5th	April 2nd 2016 Heureka	Fifth prototyping session	Insights
Meeting	Telco & online	Planning the content of employers workshop	Content for workshop
Internal workshop	April 8th 2016 Pågkas, Tikkurila	Workshop with employees	Ideas and analyzed themes/challenges; insights for template work
Visual report to Heureka	Report	Visual report of the emmployee's workshop and insights	Grouped findings
Templates round 1	.pdf by email	Template proposal	Template proposal
Feedback	Online	Feedback for templates	Suggestions
Templates round 2	.pdf by email	Revised template proposal	Revised template proposal
Feedback	Online	Feedback for templates	Approved

Table 11: An overview of project content and deliverables.

The project started in October 2015 and it was agreed to continue until the April 2016. However, the project as such will continue until the launch of the Creative Space in 2017 (see timeline in Figure 12).

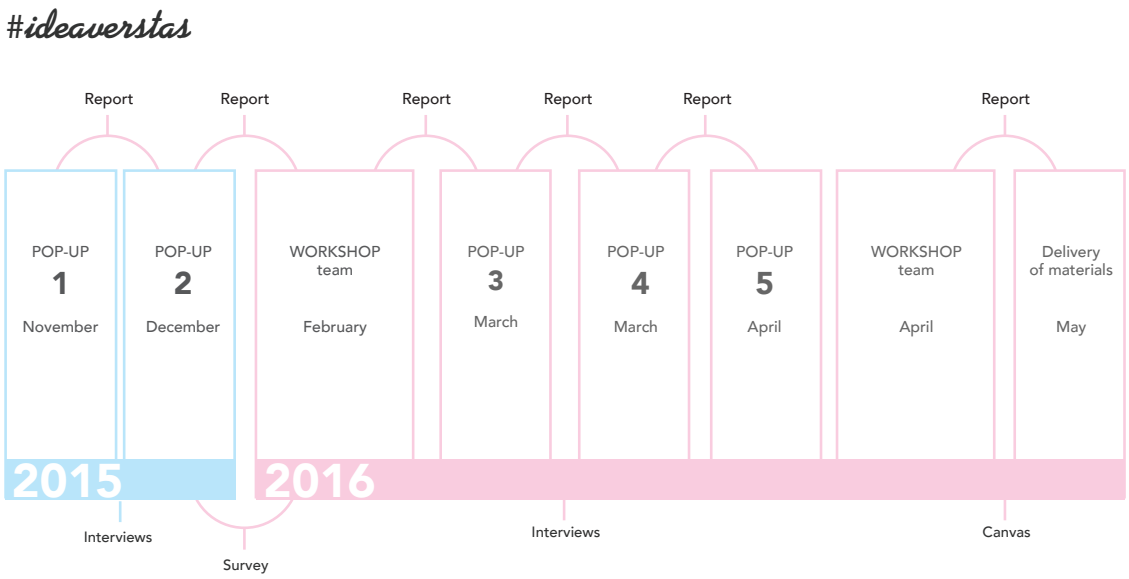

Figure 12: Visual representation of the project timeline.

This case follows the common structure of qualitative research, and this academic work can be divided into two parts. In *round 1*, characterized by working with data during the prototyping events (Figure 13) and *round 2*, characterized by interpreting all data after the prototyping ended (Figure 14).

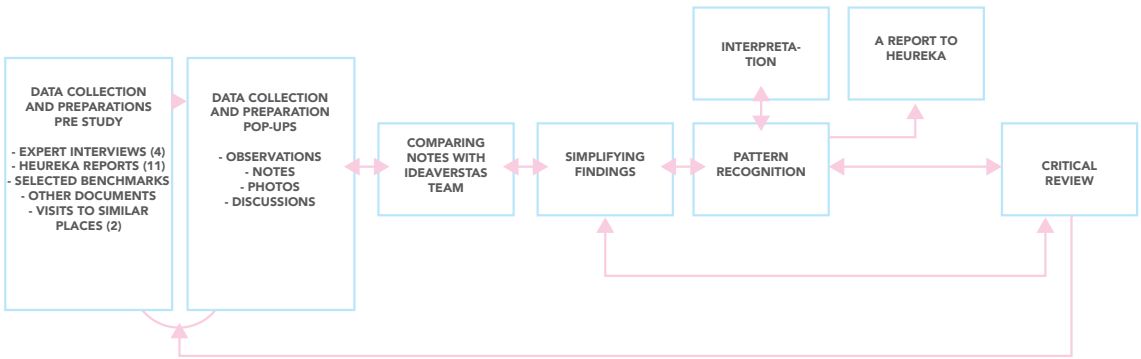

Figure 13: Data analysis for Heureka in Round 1.

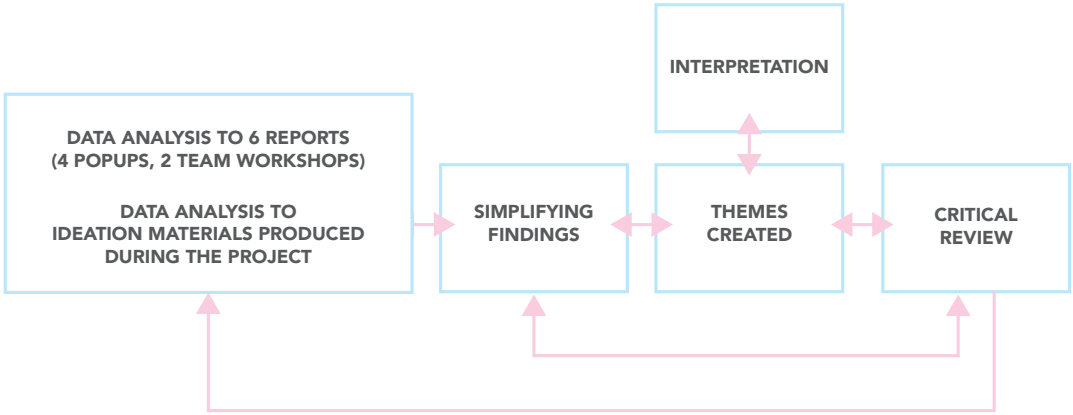

Figure 14: Data analysis for Heureka in Round 2.

In round 1, the data was collected during the project work with Heureka and in the form of interviews and visits to other maker spaces. An overview of this is provided in Table 12.

Type	Time and Place	Outcomes
Interview 1	Viteli 2015, Espoo	Knowledge
Interview 2	Florencio 2015, Espoo	Knowledge
Visit to Aalto Fablab	Helsinki 2015	Hands on knowledge
Interview 3	Anonymous, 2016 Helsinki	Knowledge
Group interview	Family of three	Ideas and knowledge
Visit to Sello Maker's Space	Espoo 2016	Hands on knowledge
Interview 4	Nevanlinna 2016 Helsinki	Knowledge
Visitor interview	Family of three	Feedback

Table 11: Additional project work.

After every pop-up event, findings were compared with Heureka and simplified in order to distil patterns and insights. Next, a report was written to Heureka and shared with the complete Ideaverstas team. Based on this report, the next steps and action points were discussed and agreed. During the project work, in order to gain practical knowledge of the space and to benchmark how other maker spaces look like, I made a visit other maker spaces, the Aalto Fablab (2016) and Sellon paja (2016). Moreover, I familiarized myself with material kits regarding Tinkering (see Figure 15).

Figure 15: The unboxing of a Electric Motor's tinkering kit.

Materials were analyzed and common design themes from all events were collected, simplified and critically evaluated. The ideas from ideation were analyzed based on their attributes and service requirements. The findings were not quantified, instead they were interpreted and clustered based on the *framework for tinkering* presented in chapter 2, *theories presented in* chapter 3 and *Lean Design Process* presented in chapter 4. The combined themes form a base for the results of this project presented in chapter 6. The selection of final themes and challenges for the creative studio is not within the scope of this thesis.

A typical report to Heureka would a 3–6 page summary of the prototyping event describing details of what happened, when it happened, what the theme of the event was, what challenge visitors were supposed to perfom, who were participating, how many people visited and whether there was anything special in the behavior they exhibited. The following pages list the findings regarding people, materials, activities and space. The report would be accompanied by a zip. file containing pictures of participants (those who had given a permission to take a photo) and pictures of the final products made in the session. The visual report from the employee workshops was a longer document, 20–60 pages in length, and accompanied by a package with photos, post-its and, in the case of bodystorming, video footage of the event.

5.1 Lean Service Creation and Design Problems at Tinkerlab

Not only the top three tools can make the experience design happen. It takes the complete set of tools to build an experience. Below, I have listed tools and methods using LSC (Sarvas et al. 2016) as a structure. The tools, which are outside the scope of this thesis, have been marked in grey and the tools, which have been added based on the Heureka case study are marked in blue.

I have divided the listing into three tables:

- The initial activities (Table 13)
- A thesis phase (Table 14)
- The post-thesis activities (Table 15).

In these tables, the column on the left describes the service creation phase. What are we defining, whether it is a business goal or something else and what the company should do as homework. In a typical LSC project team, members from various disciplines work together with each task. In case Heureka, some of the phases were already covered, or they were not part of the timeframe in which I was involved. The second column from the left lists the relevant tools for the particular phase. These tools can be either printed canvases or templates, or activities as in the case of bechmarking the other, similar labs by visiting them. The third column contains the key questions that, according to LSC, should be asked while proceeding with the project. The fourth column contains the answers each question as they pertain to the Tinkerlab case study. Since Tinkerlab is a part of a bigger attraction area, I have used the title Case Heureka.

5.1.1 The Initial Activities

The initial activities consist of defining the business problem. This includes developing a new creative space and collecting inspiration and immersive materials from third parties by benchmarking, conducting research online and visiting similar services elsewhere.

Phase	Tools	Design problem	Case Heureka
Business problem, goals and limita-tions	Canvas	What is the business goal of the company? What is the goal of the project? What needs to be taken into account? What restricts us? How do the company know they have succee-ded?	To create a new creative space at the Heureka premises Tinkering and makers space to be opened in 2017 in the pre-defined area inside the renovated Heureka Limited space and resources, science center environment and facilities Visitors come and perform activities in creative studio and spread the word in various medias; public talk
Inspirati-on and immersi-on	Benchmar-king, net-nography, visits to similar services	Homework to be done before deep diving into the design process to place the service in the context Who are the competitors from the customer point of view? How about the competi-tors within the business domain? How could the business be disrupted? What inspiring services and products are there in the world? - What is the public de-bate around the topic?	Pre-study about the makers spaces and tinkering areas around the world Pre-study about the inspiring themes and challenges existing around the topic Getting to know STEM concepts and edutainment concepts Listing popular edutainment attrac-tions

Table 12: The Initial activities.

5.1.2 Thesis Phase

Due to the timeframe and my limited participation, my thesis focused on segmentation, in-sights, ideation and prototyping. These are studied from various angles, and the value-proposition is discussed as part of the maker experience. In Typical LSC, the ideation process can be anything from ideating with post-its to using complex methods. The actual ideation methods as such are not listed or discribed in the LSC canvas set nor the book, which only lists down ideation as a part of the process and gives it a place in structure. Therefore the methods I have chosen are my own and the Lean Attraction Canvas is created specifically for Heureka's purposes.

Phase	Tools	Design problem	Case Heureka
Segmen-tation	Personas, Age groups, Segments	What is common to all user segments? What is unique to each user segment? What is the user's problem worth solving?	They come to Tinkerlab to learn by doing The motor and cognitive skills limited to age group Enjoyable learning experiences with DIY product takeaways Personas as such are not relevant in this phase of the project
Insights	Participatory Observation, Interviews	How does the world look like from the user's perspective? What does the user need, think and feel? Is there anything that surprises us?	Participatory researh; what is tinkering and how does it manifestate in the user experience?
Ideation	Survey, Interviews, Brainstorming, Bodystorming, Objectstorming, Lean attraction design canvas	Create ideas and solutions for the business problem and the customer's problems worth solving	This section is combined with the prototyping section and together they form a wheel called Lean attraction design.
Concept and value proposition	Customer jobs gains and gain creators, pains and pain relievers	What are the things the users want to get done? Would like to get done? Have to get done?	Visitors should be able to learn about science while feeling entertained and enjoying the experience Visitors tinker around themes and challenges A concrete result in the form of learning and product takeaways.
Concept proposal Prototy-ping and experi-menting	Service prototype; this can be the MVP or a fake add Service simulation of the space with low-fidelity and high-fidelity artifacs Role play, bodystorming, objectstorming	Does the service idea resonate with the user? Will the users understand what the service is about? Are there any design problems? How does the service look like? How does the service work? What is the first thing the users will see from the service? Will your customers pay anything for the service?	Service prototype in the form of atinkering pop-up workshop, tested with Heureka visitors Service simulation of the space with low- and high-fidelity artifacts, bodystorming with Heureka employees Design problems found and categorized into themes

Table 14: Thesis phase

5.1.3 Post-Thesis Activities

In Table 15, I have listed the next steps that should follow the prototyping. The last question in previous table, whether the customers are willing to pay for the service should also be studied in more detail in the next phase, e.g., by determining how much are visitors willing to pay for additional material costs or for taking their design home, or establishing the dynamics between the entrance ticket price and the activities in Tinkerlab. Also, the business model for partnerships and cooperations should be studied in more detail in the next phases of the project. Finally, the metrics for success should be developed further.

The project should not stop at the opening of creative studio in 2017. Instead it should be a constant learning loop, with iterations based on customer feedback. Channels to collect feedback and customer satisfaction, as well as a marketing plan, should be planned and created with suitable resourcing in mind.

Phase	Tools	Design problem	Case Heureka
Blue-print	Customer journey and blueprint	What are the interconnections between all parts of the journey? Activities? Front office touch points and activies Backstage touchpoints and activities External processes?	Next step to be de-fined; outside the scope of thesis
Custo-mer enga-gement	Define activities, resources and part-ners	Where are the customers? How do they hear about the service? How do they use the service for the first time How do we make them come back? How can we make them promote the service? Is there anything that prevents/enables the use? Key activities, resources and partners	Next step to be de-fined; outside the scope of thesis
Business model and market size		Who pays how much and to whom? Revenue model? Price perception? Sales plan Target markets Cost structure Key elements of earning before income and taxes.	Next step to be de-fined; outside the scope of thesis
Concept	The con-cept pro-posal	How does the final service flow look like from one touchpoint to another? How does the interaction flow work?	Next step to be de-fined; outside the scope of thesis
Measu-ring impact	Metrics	How do we know we have succeeded? The value proposition metric? Service metrics? Business metrics?	Next step to be de-fined; outside the scope of thesis

Table 13: The Post-thesis activities

5.2 Visitor Segmentation

In five different pop-ups there were altogether 300–400 visitors. This is an estimation based on the observations of the staff members of each session. Visitors came mostly from Finland, Russia, Estonia and Sweden. Instructions were given in Finnish, English and Swedish. Within Finland, people had typically travelled from within a range of a 2-hour car drive, such as from Tampere or Lahti. Some people had come with a group, such as a group of scouts. Most of the

visitors went to see the planetarium or Rottakoripallo. For many visitors, the Heureka feed on Facebook or Heureka's website was a primary source of information about the events. The Father's day, Christmas decoration and Easter pop-ups were all advertised on Facebook, and many visitors on these days mentioned that they saw the ads.

In each pop-up, I photographed a majority of final products and their makers. Based on the observations, I divided visitors into five different groups shown in Table 16. For people over 14, I chose the term guardian, since, in many cases, children were accompanied by their siblings, kindergarten teachers, elementary school teachers, guardians or parents, sometimes with grandparents.

Ages	**Age group**	**Observations**
0-3	Infants and toddlers	They move together with an adult. They are too small to perform a task on their own and are not capable of tinkering.
4-6	Pre-schoolers	They can already act alone, but their movements are still clumsy. They start gaining physical strength and are able to use simple tools such as scissors. Should not be left unattended.
7-10	Elementary	Are able to perform more complex tasks and follow rules. They learn tools at school and have some kind of understanding of how to use them. Need help with more demanding tools.
11-13	Pre-teens	Active, know the tools and possess advanced skills in many area. Can act alone and use tools without supervision.
14 +	Guardians	Themes and challenges should be interesting enough to guardians to accompany their children, or there should be a place for adults to sit and watch while their children tinker. However, the tasks should engage the entire party participating the event.

Table 16: Visitor segmentation in the Heureka case study.

During the Father's day event, children were mostly accompanied with their fathers, in all other sessions, guardians varied from sisters to scout team leaders. This case study demonstrated that the skill levels varied a lot between different age groups and between boys and

girls. Various nationalities were represented. It was observed that small children were unable to understand more complex tasks.

5.3 Building Prototypes

According to SDL, the key factors are the individuals who are active and creative and should be involved in value-creation (Lush & Vargo 2014). The value happens in interactions, making the actor and the experience inseparable. Prototyping experiences can be divided into two different categories. First, experiments were made with science center visitors. Heureka visitors contributed to idea generation, idea screening, service and process design and service testing. Second, experiments were made with Heureka employees in a form of bodystorming and analyzing ideas and challenges.

5.3.1 Experimenting with Tinkerers

Five pop-up sessions were planned and held during the period between November 2015 and April 2016. These five events were:

- Father's day tinkering session; November 8, 2015 (see Figure 16)
- Christmas decoration tinkering; December 5, 2015
- Strawbees and object storming; March 10, 2016
- Easter-themed tinkering; March 26, 2016 (see Figure 18)
- Daycare tinkering for Päiväkoti Pilke theme day at Heureka; April 2, 2016

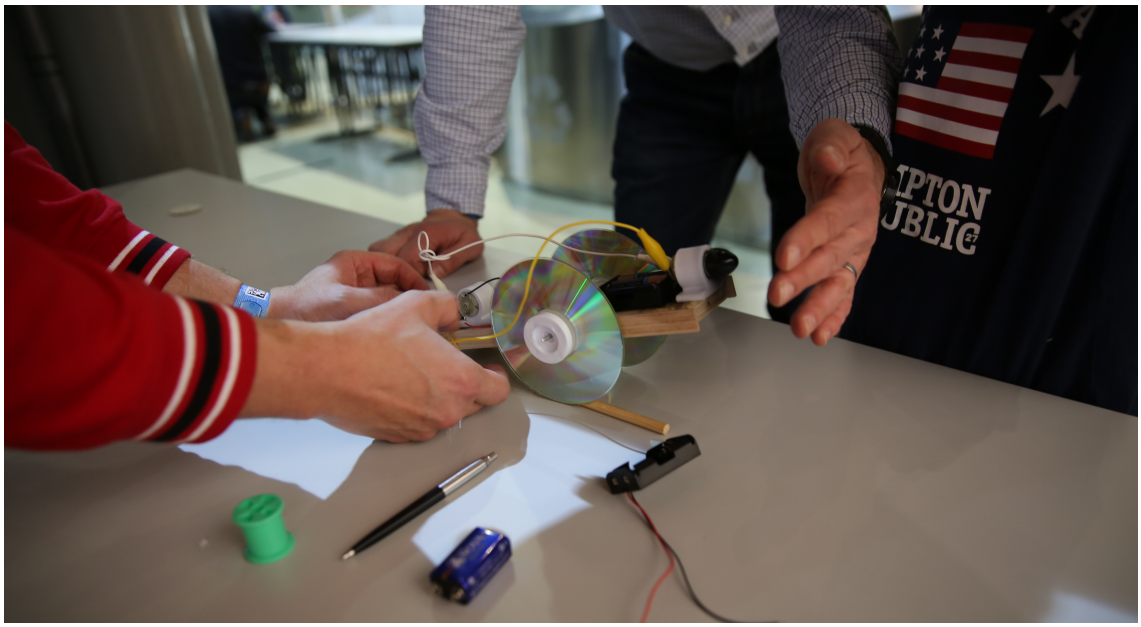

Figure 16: Visitors building cars (November 8th, 2015).

The purpose of the experience prototyping was to simulate service experience in a real environment and to collect feedback on areas of themes and challenges, design, forms and interactions from visitors and staff members. The goal was to explore ideas and evaluate them, to use the prototype as a communication tool, to engage audiences, to collect feedback and to test and explore the physical touch point (the Heureka exhibition area) across time and place. The typical structure of each prototyping session is presented in Table 17.

Team would carry tools and materials from backstage at the second floor to the Heureka exhibition area at the first floor
Team would set up the stage
2-3 persons (myself included) would run a three-hour workshop for visitors
Visitors would participated non-stop, the theme and the challenge would be explained, instructions would be given when needed, visitors would start tinkering, final products would be filmed.
I would made observations, ask questions to visitors, film the workshops for research and marketing purposes and film the final products (and makers, if they had given permission)
The team would dismantle the area and carry all materials and tools back to the backstage stage The team and I collected would collect our findings and jointly write the analysis of the session
The analysis would be delivered to Heureka team

Table 17: The Structure of typical prototyping session.

The pop-up was usually built close to Heureka's ticketing service and entrance and required a ticket to enter (Figure 17).

Figure 17: Setting up of the prototyping area (April 2nd, 2016).

The goal of the observations:

- To gain rich, in-depth and accurate insight into how visitors behave in the tinkering session
- To, instead of asking how they use the tools, to observe how they actually perform the tasks and what possible challenges they might have
- To determine what age groups come to the session and whether there were differences in how they perform the tasks.
- To determine if the visitors found the provided themes and challenges interesting?
- To observe the attraction area; and establish how the general setup worked in Heureka space

Experience prototyping helped us to gain information on various topics. The findings are listed in the following tables:

- Testing ideas (Table 18)
- Design problems (Table 19)
- Communication (Table 20)
- Time and place (Table 21)
- Materials and tools (Table 22)

- Prototypes made the idea tangible in a quick, easy and cheap fashion
- Visitors were interested in the themes and challenges
- The idea of tinkering in a science centre was well received and welcomed by visitors and staff members
- Prototypes encouraged exploration
- Visitors came up with new ways to use given materials
- Visitors came up with development ideas for the themes and challenges

Table 18: Main findings from testing ideas using experience prototyping.

Prototyping revealed design problems (Table 19). The team identified several problematic areas, which would only have been possible to see in a real-life environment with actual visitors. These problems were observed in all five pop-ups, and the findings were collected and simplified into eight bullet points. The biggest problems were related to logistics in physical safety, e.g, cleaning the space and materials and tools. The latter set of problems related to people, e.g., how to ensure proper guidance for visitors, determining the level of guidance needed and determining what the role of social media.

- How to manage safety while using tools and equipments?
- How to ensure the place is cleaned up regularly without disturbing the tinkering?
- How to handle material storage and placement?
- How to handle special requirements such as running water to wash hands, or keeping the visitors' clothes clean
- How to ensure a proper level of guidance?
- How to ensure the entire family can enjoy the challenges?
- What is the level of instruction needed?
- Physical examples and visual cues: how to help people to start a project in rush hours?
- Social sharing and caring: can people take products with them? Should they be photographed? How could social media help in community building and content sharing?

Table 19: Design problems identified using experience prototyping.

Prototyping increased understanding the project (Table 20). Prototyping also helped the Ideverstas team to communicate the idea further. The feedback was not forced, but was a natural result of experimenting and learning by doing. By observing customer behaviour, asking questions, making short interviews and combining these with the feedback, valuable insights into visitors' behaviour was gained.

Domain	Observations
Increased understanding	- "This is tinkering!"; increased understanding between visitors and staff members - A tool for pitching the idea. Increased understanding between science center staff members; "this is what putting up a tinkering area requires from us in practise" - Increased empathy and understanding of the customer journey before, during and after the Heureka visit
Instant feedback	- The visitors gave their thoughts and feedback on the tools, materials, themes and challenges while making things - Staff members gave feedback of how to improve the look and feel of the pop-up area
Engagement	- Visitors had read on Facebook about the popups and they came because of the event info - Visitors were asking when is the next event is and how they learn about new events
Happiness and enjoyment	- Visitors loved tinkering; many came to thank instructors after tinkering and told them how much they had enjoyed it - Visitors asked about the methods and if they could come up with some similar projects in their work lives

Table 14: Insights into communication gained using experience prototyping.

With regards to communication, an important aspect was that it increased understanding. Knowledge of tinkering was shared between teams, staff members and visitors. The central location of the pop-up area (next to ticketing) enabled science center staff members to see it from various other attractions, and it was easy for visitors to come and ask questions to the team and to try out things for themselves. Another important aspect of communication was that it provided instant feedback. this instant feedback was not only related to the customers but also to the tools themselves, which are a crucial element for making the experience work. The team learned what types of machines lasted long, what types did not, what kind of problems might develop in the future (e.g., all batteries running out from drills at the same time) and how these could be avoided (e.g., people not using drills for two hours, was a result of batteries dying out, not a result of a reduced interest).

Figure 18: A family engaged in tinkering (March 26th, 2016).

Prototyping engaged people. The staff wanted to improve the space and gave a lot of feedback and ideas of how the pop-up could work better. Prototyping produced happiness and enjoyment. In all pop-ups, many visitors came to thank instructors (myself included) after tinkering, and explained how much they had enjoyed making things. Some of them also asked about the methods and wanted to know if they could do something similar at their own workplaces, such as teachers in a nurseries or elementary schools.

Prototyping enhanced marketing. Visitors had seen ads on Facebook and also wanted to post pictures of themselves making things to social media. One example comes from the Strawbees

pop-up, where visitors were making hats from Strawbees and wanted to post pictures of themselves wearing those. In all pop-ups, visitors explained to me that they had heard about the tinkering in social media and wanted to come again.

Prototyping revealed challenges regarding timing and the physical place (Table 21). One example relats to the planetarium program and the popular attraction Rottakoripallo that, when the show started, emptied the tinkering area. However, visitors wanted to come back and continue their work after the shows, which forged us to store unfinished designs for the duration of the shows.

- Visitors want to do many things during their visit - Timing of the instructed sessions between other attractions in the same science center - Attraction space is challenging for a creative studio, should it look like an attraction area or like a tinkering area?

Table 21: Insights into time and place gained using experience prototyping.

In all pop-ups, visitors used materials in their own innovative ways (Figure 19), which also made some of the materials traditionally considered ‘trash’ part of their designs. An example of this is that packaging waste was recycled for building automatas (a small mechanical construction) in the Easter pop-up. Visitors also built things that were outside the scope of the actual theme and challenge, e.g., visitors building cardboard-box houses for Easter birds instead of building automatas, which was the original task. Some visitors even built a small bathroom and toilet for the birds. One visitor built a fridge, where little birds were waiting to be cooked on the pan.

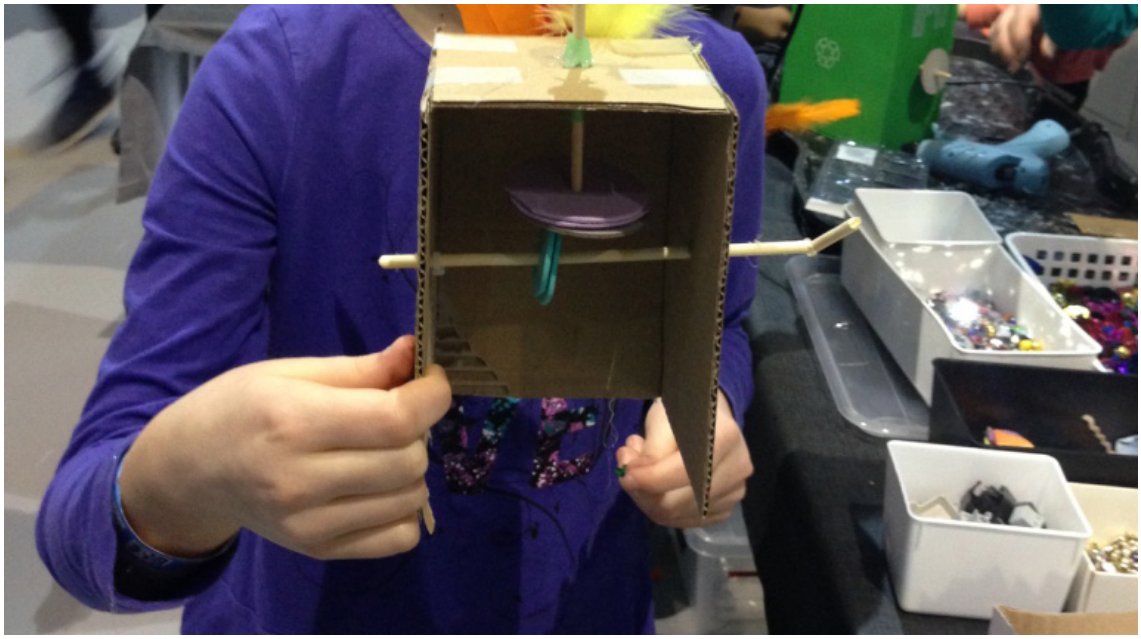

Figure 19: A visitor demonstrates an example of innovative material use during the building of an automata (March 26th, 2016).

Prototyping helped the team to estimate material consumptions for future purposes and also guided the discussion regarding possible partners for recycled materials (Table 22).

- Creative use of trash
- Identifying partners for dealing with and handling trash would benefit both parties in tinkering environment
- Material consumption can be estimated for future purposes and storage requirements can be calculated based on the characteristics of the pop-ups and the amount of participating visitors

Table 15: Experience prototyping revealed insights into materials used for tinkering.

A number of insights were gained into aspects related to trash and cleaning. The team spent an hour cleaning the space after each session. Another hour was spent putting back and organizing materials on the shelves. During the event, the team was also continuously cleaning trash. There were many discussiong regarding logistics and the arrangement of the space, which is always open and not not always monitored by an instructor. Moreover, the materials took a lot of space in a way not considered “beautiful” from a design perspective (e.g. the cardboards used for automata took a lot of physical floor space [see Figure 20]). This evoked comments on how the storage should be handled in the real location.

Figure 20: Left-over materials and trash from tinkering sessions triggered dicsussions about how such problems could be avoided in the future.

Insights where also gained into how aspects of tool use could be improved in the future (Table 23). Some tools broke during the sessions, while others were hard to use or required users to be instructed and observed. Some of the tools ran out of the batteries during the sessions and it became obvious there should be some kind of a system developed around the tools.

Tools	- How to take care of the tools? - How many tools per amount of people are needed? - How to store tools safely? - How to instruct visitors using the tools? - What tools are needed but don't yet exist.

Table 16: Insights into tools and tool use gained using experience prototyping.

Based on observations in five experience prototyping sessions, the following list of design themes was compiled and presented to Heureka team (Table 24) and is discussed in more detail below.

1. Safety comes first—Focus on tools and how they are handled
2. Makers make mess and somebody needs to clean it up—focus on logistics of cleaning
3. Material and their consumption: focus on how they are organized, served and recycled
4. Skill levels between boys and girls: focus on equal education for both genders
5. Skill levels between small children and adults: focus on designing enough tasks to entertain the whole family
6. Product samples and visual cues: focus on making the tinkering inviting and easy to start with

Table 17: Experience prototyping revealed a number of key design themes, which were presented to the Heureka team.

1. Safety issues. While tinkering, children used various tools such as hot glue and drills, scissors and saws. However, the skill levels, as observed in the session, varied a lot. The availability, usage and placement of the tools and also guidance on how to use them are of crucial importance the service when working with little children. The upcoming place needs to be safe to use and safe to leave the children with.

The mess. Tinkering creates lots of mess. A place that is open all day for 350 days a year has strict requirements with regards to cleaning. Plans for storage and collection of trash need to be designed properly. Trash is also visible, and an effeort should be made to not clutter and keep the space inviting. The place should be designed keeping visual cues in mind. What is the first thing that people will see when they come to the place? Is the place attractive to them? How is the mess cleaned or hidden in design?

***Tinkering is about material*s**. Each session requires a lot of it. In only three hours, people consumed piles of material, depending on what the challenge was about. Some materials were easy to use, but not interesting enough to work alone. These materials, such as Strawbees, need to be accomplished with inspiring challenges. Some of the challenges take floor space. It should be taken into account if extra floor space is needed, such as a racing cars area, which in this case study took a floor space of 2×6 meters, was located inside our pop-up, was too close to the tinkering area and disturbed other visitors.

Skill levels between boys and girls. Based on observations, little girls have weaker skills in handling tools, such as a drill, than little boys. Girls also lack courage of using them. Instructors should be present and recognize these situations. Girls should be actively encouraged to try out new tools themselves, otherwise they may end up gluing glitter to objects. Many girls went directly to the glitter and glue station and were often accompanied with their moms. Boys and dads, conversely, started building physically more complex objects right away. However, science centers should be a place that supports both genders equally in their search for exploring the world. Girls who came to popup were really eager to build things, but they often said they don't know how to do things, or that they had never used a tool. Boys instead usually had tried out tools at school and they knew basics of how to use them.

Skill levels between small children and adults. Children of all ages between three-year olds to preteens visited the tinkering area. Mostly, they were accompanied by an adult. Sometimes there were groups of children with a guardian who was unable to help all the children he/she was accompanying. Therefore, the place should also have something simple and easy for little children, and the challenges should be modifiable for different age groups.

The Product samples and visual cues. When the team had placed a model somewhere visible where people could see and touch it, it became an invitation for starting the project. This would lead to less confusion about what to do and make instructions easier to understand. These invitations were e.g, the ready-made automata in the Easter pop-up and a dollhouse, which had furniture built by previous visitors. When there were no visual invitations or instructions, such as in the first pop-up (where people were to build cars), visitors needed more help from the instructor as it unclear to for them how to start or what to build. This leads visitors to ask more instructions from the team.

According to Pine II and Gilmore (2011) the key issue is how to engage customers. In the case of Tinkerab Ideaverstas, user participation was done through immersion, by actively making things and becoming part of the attraction itself. In contradiction to Pine II and Gilmore´s four realms of experience, I would claim that educational experience can be immersive and escapist at the same time. Tinkerlab is mixing elements from education and escapist realms, and can therefore be placed in the category of new forms of entertainment called Eduscapist.

In chapter 3 I listed the positive sides of tinkering, such as the fact that all kids want to take pride in doing something themselves and with their own hands. This was highlighted strongly in the pop-ups. The majority of the participants wanted to show me their creations, actively discussed with me what they made and wanted to have their creations filmed.

This case study proves that the themes and challenges worked as they were. However, with a proper theming of the space, the experience could be taken further and into more immersive levels. Pine II and Gilmore (2011) argue that every experience has a theme. As a theme, tinkering can be placed around the idea of *interest and lifestyle* (Lukas 2013). As tinkering is part of the bigger makers movement, it already is a cultural phenomenon in itself. However, Heureka can take the final experience to the next level by, e.g., branding or theming the actual physical place.

5.3.2 Experimenting with the Ideaverstas Team

In order to gain more understanding of the complete project, namely how Tinkerlab Ideaverstas as a concept would work in practice and to engage the whole design team in the project, the producer of Tinkerlab Rauno Bergman and I set up a simulation of the planned space and its proposed attractions in February 2016. The goal of the workshop was to discuss difficult materials, such as water and wind, and the attraction ideas collected so far while also unifying internal teams and gain more understanding into what action points should be performed next.

In the morning of February 15, we packed all materials and tools for the workshop. I had a video camera and set up a corner for filming the event.

The agenda for the day was as follows:

- Setting up the stage (see Figure 21)
- Introduction
- Bodystorming the Ideaverstas experience with all stakeholders invited
- Feedback and analysis of the exercise
- Survey results analysis and picking up winners
- Cleaning up the space
- Wrap-up with Ideaverstas team

Figure 21: Setting up the stage for the workshop (February 16th, 2016).

The place was divided into different areas, each with a table representing an attraction in the upcoming Ideaverstas. All areas were equipped with low-fidelity artifacts representing the ideas of themes and challenges. The projector was reserved for showing instructions. I had prepared a document with instructions for the day tha I provided to participants. The walls were covered with canvases for collecting feedback. Each participant was given a pile of post-it notes and pencils to write down observations. We instructed participants to always leave feedback next to the item they were considering. After bodystorming, we went as group through all spots and read all comments together (Figure 22). The team discussed the findings and decided how to proceed with each one.

Figure 22: The team bodystroming the experience during the workshop (February 16th, 2016).

The workshop was scheduled for three hours. The workshop invitation was sent to eight members. We had the whole participant group joining at the beginning, and then our core team of five the rest of the time. During the bodystorming, participants left comments on several topics. Based on the comments, I divided post-it feedback into the following two categories:

1. ***Findings regarding attractions:*** *General comments, comments regarding the water attraction, soap bubbles, building blocks, wind tube and build a car attraction (for a complete list, see Table 25).*
2. ***Findings regarding tools and materials:*** *General comments about the trash, tools, soft and hard materials, interactions and instructions (for a complete list, see Table 26).*

General	- Increased common understanding of the project - Increased common understanding how much physical material is needed in order to build one challenge - Increased common understanding of how materials work and what kind of requirements for tools and space they demand.
Water	- Seasonal - Has esthetic value - Can teach visitors about buoyancy and scientific phenomenons - Could be used for exploring the idea of why things float - Could be arranged outside the science center - Difficult to keep clean - Challenge of recycling water - Hygienic challenges - Requires more maintenance than other attractions - How to change the water? - Slippery floor and material requirements for surrounding areas - Challenges to be explored further in a smaller team
Soap bubbles	- To be explored further in a smaller team
Building blocks	- Requires custom building blocks - Wood material works well - Needs a story and a plot - Needs lots of materials - Blocks should be of reasonable size - Misuse of the blocks needs to be studied - Everybody can participate - It ss fun for adults as well - This could have a communal goal - More phenomena, such as chain reactions, could be introduced

Wind tube	- Needs margins and floor space for the machine - Needs a timer or should be timed - Needs a frame or a “barrel” - The noise generated by the machine should be controlled - Needs more study on what materials are suitable for flying
Build a car	- Needs a model/sample - Uniform quality in materials - Needs enough materials for different models and try outs - Should be combined with a racing challenge - Visitors should be able to take their creations with them - Easy to understand - Different tracks could be created - Tracks can be used as a visual element in interior design of the creative space

Table 25: The analysis of feedback from workshop participants revealed a number of findings regarding attractions.

Trash	Tray for trash to be collected and emptied later Trash bins needed
Tools	Safety with tools Design that helps visitors with getting tools and returning them in place
Hard Materials	Should be cheap enough, so that the visitors can take their creations home
Soft Materials	Sewing machine needed Stapler needed
Interactions	A product built in one attraction can be continued in another
Instructions	Easy instructions – a sign: start from here

Table 18: The analysis of feedback from workshop participants revealed findings regarding tools and materials.

As a method bodystorming requires a certain amount of time, resources and a level of engagement from the company. Furthermore, team should be informed and educated about the

method beforehand. In our workshop, instead of paying attention to design problems, some participants started to fix the fan, because it did not work properly. In this case, however, the fan was a prototype that was only supposed to indicate that there was going to be a wind machine, and was not intended to be in functioning condition. This could have been avoided with more careful planning and prior information about the task.

Figure 23: Cleaning up the workshop space (February 16th, 2016).

Overall, the workshop provided valuable information regarding the next steps while giving all of the stakeholders a chance to try out tinkering and have a personal experience with the subject being studied. Cleaning up of the space took an hour (Figure 23).

5.4 Crafting Ideas

During the project, ideas were collected both from visitors and Heureka employees. From visitors, ideas were collected in the form of survey, in discussions during the pop-ups and in a group interview. I also interviewed a family in a form of a group interview. From the Heureka employees, ideas were collected in two internal workshops.

5.4.1 Ideating with Tinkerers

For the group interview, I invited a family with two children to two separate pop-up sessions, Father's day tinkering and Easter tinkering. Between the two sessions, I interviewed them at their home and we had an ideation workshop to discover what they would like to tinker. Ideas from ideation are collected in Table 27. The father of the family was also interviewed after the second workshop (see Appendix 2 for the original interview in Finnish).

Experimental instruments, build your own instrument and remix your own music
Build your own lamp
Denim workshop for hipsters—how to dilute trouser legs
Remote controlled items such as drones
How to build a small computer
Open-source workshops
Tesla workshop, because they are so cool
Scent workshop to explore different kind of scents
Molecular gastronomy workshop
How to build your own robot
Code school
No lightning workshops, they are so last season

Table 19: Ideas and suggestions obtained through a brainstorming activity with a family during an ideation workshop (January 18th, 2016).

For the visitors, the team ran a survey in Finnish called “Mitä sinä haluaisit kokeilla Heurekan Ideaverstaassa?”, or “What would you like to create in Heureka’s Tinkerlab.” The survey ran from the end of December, 2015 until the 31th of January, 2016 on Heureka’s website. The goal of the survey was to collect ideas from Heureka fans and visitors online and see what kind of activities they would like to do in Tinkerlab. Returns were directed to team ‘Ideaverstas’ emails. The survey resulted 10 worthy answers containing 14 proposals (see Table 28).

”What would you like to make at Ideaverstas Tinkerlab?” Survey	
01	How to separate which fruit or vegetable is healthier/better than the other one? Which one of the carrots is better?
02	3D printing
03	Future home and living
04	Internet of things
05	How to build a windmill
06	Different kinds of natural phenomena
07	Space and antigravity
08	Recycling and everyday ecology
09	Galei grill could be used for groups, if possible
10	Game design of board games, group games and video games
11	Lighthouse and the world of sea
12	To build a spaceship
13	Recycling the leftover materials from carpenters. With binding and glue they can be used for building architectural shapes, bridges, houses etc. inspirational machines. ”I used to work as an art school teacher and I have experimented with materials. I would love to come with my grandchildren to tinkering lab.”
14	Counterweight catapult

Table 20: Results from the ”What would you like to make at Ideaverstas Tinkerlab”-survey.

The survey results were analyzed in a workshop with a canvas that I had prepared based on the idea of a four axis C-box, and by categorizing ideas as feasible, not feasible, conventional, innovative and those out of the canvas, leaving the area of opportunity in the middle. The wall outside the canvas was used for ideas, which were not directly within the score of Ideaverstas. I acted as a facilitator and wrote down all ideas into the post-its. Each idea was handled separately and placed on the canvas based on a short discussion with the team. After placing all ideas to the canvas, everybody marked their favorites with three dots, and the final winners were calculated based on the votes (Figure 24).

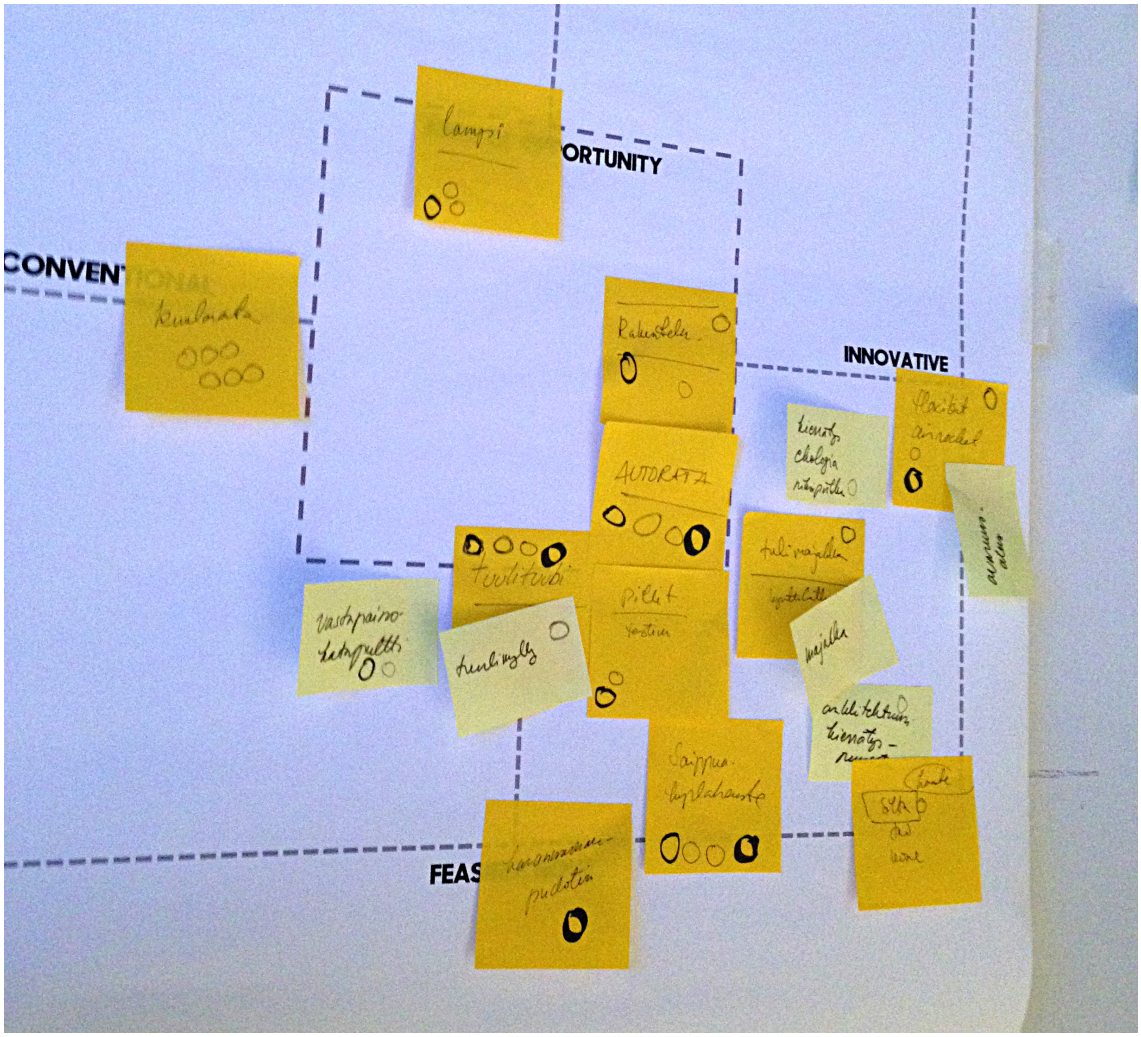

Figure 24: The survey results analyzed with the canvas.

The survey had pros and coins. It produced valuable ideas for the themes and challenges, and it also gave the team information about what the customers would like to do. However, the survey did not reach all potential customers who might have been interested in tinkering. Another problem was that people answering were most likely adults, when the target audience is children. In comparison, I interviewed two children who gave more feedback and invented fifteen ideas in half an hour. The third problem with the survey was that there is was much noise online, these types of surveys can be hardly seen if not promoted and advertized as a campaign. Lastly when analyzing the survey results, we noticed that not everybody had understood what tinkering means and some people were using the form just to send some other feedback to the group. Ideation with tinkerers resulted in 12 ideas for themes and challenges from the family interview and 14 ideas from the online survey. All ideas were analyzed with the Ideaverstas team and added to the pool of possible themes and challenges. At the end of the workshop team ideated togerther a Tinkerlab statement (Figure 25).

Tinkerlab (Ideaverstas) is

Innostaja! Fun! crafts, problemsolving, aesthetic art
Trials and error, experimenting, developing, bounding ideas

Network orchestrator! Doing together! Visibility to third parties.
Part of the special interest hobby groups

Chance for creativity, open 360 days a year, a unique opportunity for tinkerers,
You can make things you cannot make at home

Response for demand

Figure 25: The Ideaverstas statement.

5.4.2 Ideating with Heureka team

In April of 2016, the bigger group of stakeholders was invited to co-create ideas and innovate the concept further. The place for the event was chosen outside the science center premises in idyllic manson of Påkas. A total of 10 participants gathered at Påkas, Vantaa Tikkurila for an afternoon workshop with themes and challenges. I participated as one of the three facilitators to the event and also introduced some of my ideas for the content. Each participant was asked to bring 1–6 ideas to the workshop. The purpose of the workshop was to go through all ideas and then analyze for each of them and place them in ranking order.

Together, the participants brought in 34 new proposals (data not shown). For my proposals, I had used the materials from my own benchmarking during the period between January and April of 2016. For the collected inspirational ideas, I chose the ones with the most potential to be developed further by combining unexpected object and themes. First, the team went through presentations of all ideas (Figure 26). Next, ideas were written down on paper. The papers were then mixed and handed over to small teams of 2-4 persons. Each team analyzed a group of challenges creating a SWOT-analysis for each idea. The ideas were ranked and discussed together. All ideas contributed to the total mass of themes and ideas.

Figure 26: The team analyzing ideas at Påkas 8th of April 2016.

The strength of the workshop was the multidisciplinary team, which brought in various ideas from several fields of design, development of new perspectives on the subject and building on top of each others' ideas. Having people from design, technology and different fields of science joining together resulted in the ability to combine elements in a new and interesting way and come up with unique themes and challenges, such as advanced origami, where paper folding is combined with industrial design and electronics. Another benefit of having a multidiscipline team is to spot possible problems with different materials and techniques while coming up with solutions to design problems.

During the workshop, I realized there were no existing canvas for ideating a challenge or listing all elements of one. Different methods such as the C-box, dot voting and SWOT were used, and they all work when analyzing the main attributes of a challenge. But ideating an attraction also requires ideating the practicalities, i.e., how something works and how it is going to be built. Additionally, the ideation requires and understanding of the visitors' skill levels, which can depend on age and prior skills obtained through school or hobbies. Lastly, the process of building a Tinkerlab benefits from a Lean approach instead of linear thinking.

For this project I produced two design canvases, one for ideating and one for a tinkering challenge (see Figure 27). There were some restrictions in the project. First, the canvases should be easy and quick to fill. Second, all Heureka employees should have easy access to them. Third, there was no budget, which framed out all digital app designs and online executions. With these restrictions in mind, I created .pdf files that can be edited online or printed out and filled with pen.

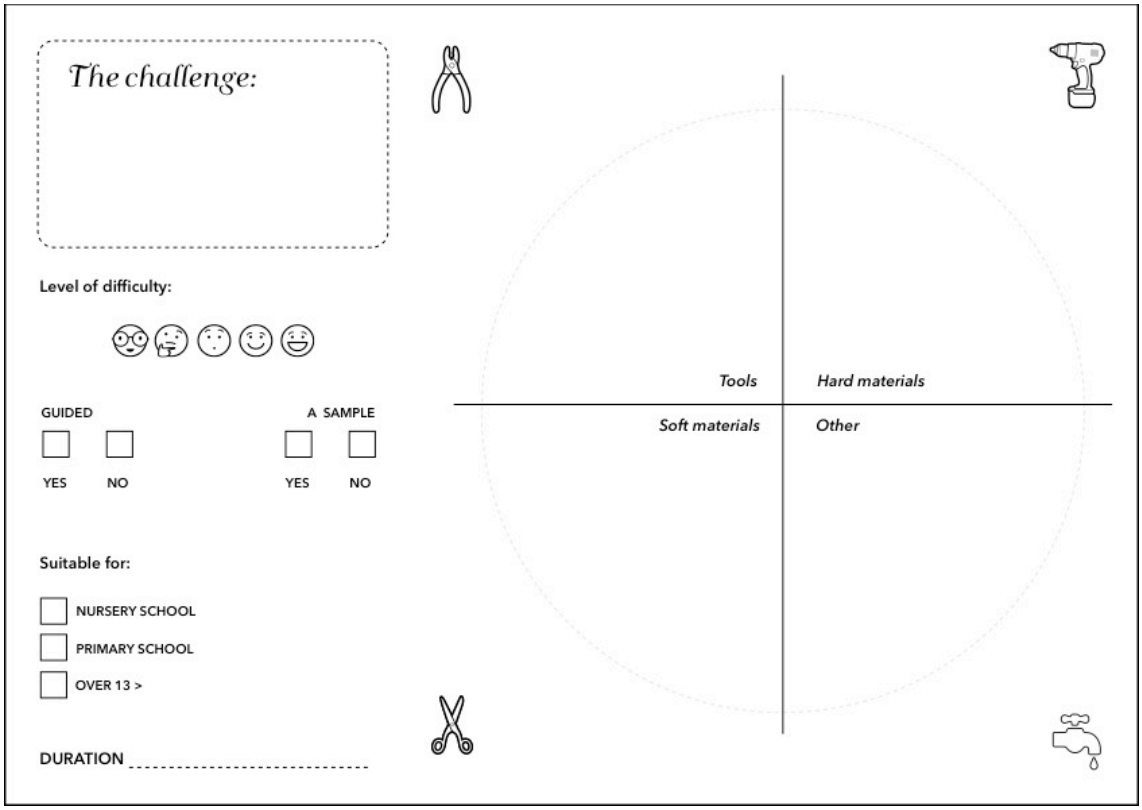

Figure 27: Ideation canvas.

With the ideation canvas, a member of the workshop can list the most important items, which define the nature of the challenge. These items are:

- The level of difficulty
- Who is the challenge meant for
- What main tools and materials are needed

The "other" field is reserved for extra items, such as listing any challenges or special requirements, such as a need for extra floor space or additional resources. With this canvas, quite detailed challenges can be ideated while at the same time keeping information on a general level.

Feedback from Heureka for the canvas was that it works in the context of ideation. However, the canvas was considered quite light; therefore, a more complex one would benefit the setting up of the actual challenge. Based on the feedback I started listing items that should be considered in the process (Table 29). Based on this list, I created a second canvas that was more complex in nature.

The name of the challenge	Who is it suitable for?	Creative invitation or a visual cue	Phenomenological background
Length of the session	Level of difficultiness	Guided or not?	Sample needed or not?
Hard materials	Soft materials	Pliable materials	Connectors
Tools: Hot station	Tools: Cold station	Treasure box	Recycling
Clutter and mess	Clients clothes	Hand wash	Washing tools
Special requirements	Water and wind	Electricity	The amount of trash

Table 21: Content for canvases.

With the second canvas, team members could list the following items on the first page (see Figure 28)

- The level of difficulty, represented by the little smileys
- A description of what happens in the challenge
- What age group the challenge meant for
- Whether the challenge is guided or can be performed without guidance
- Whether the challenge needs a sample product or can be carried out freestyle
- The length of the session
- Sample images of the product being made
- Special requirements for the area

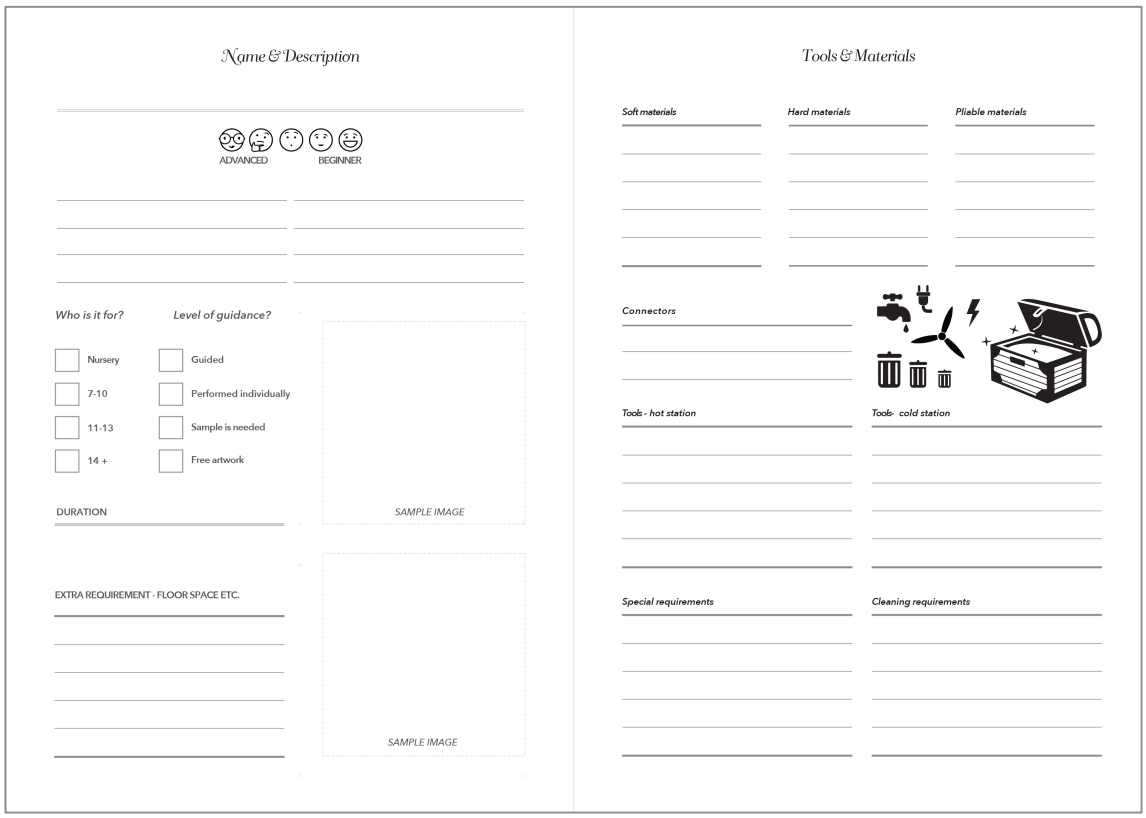

Figure 28: The challenge canvas.

On page 2 of the canvas, team members could make a list of the tools and materials to be used:

- Hard materials needed
- Soft materials needed
- Pliable materials needed
- Connectors
- The amount of trash produced, requirements such as electricity or water
- Treasure box – meaning extra materials to be used in the designs
- Tools; hot station
- Tools; cold station
- Special requirements
- Cleaning requirements

The third page is reserved for writing down work instructions. The original canvases (see Appendix 4 and 5) were created in Finnish and have been translated for the purpose of this thesis. The feedback from Heureka was that they considered the second canvas useful and hoped to get it in the format of editable titles.

5.5 The Lean Attraction Design canvas

According to Ries (2011), the service experiment itself is already the first product, and by the time the actual product is ready, it already has a customer base. This idea has been used throughout in the Tinkerlab Ideaverstas case study. With each pop-up session, anything from tens to a hundred visitors were engaged in the world of tinkering inside the Heureka premises. In each session, we went through the build-measure loop within a theme and a challenge. We built a prototype, tested it, measured the results and iterated the idea. This process has been illustrated in a form of a Lean attraction design wheel (Figure 29). The same process could be adapted to any other attraction design work. In the middle is the central focus point (hub), the internal team, who analyzed findings and made decisions for the next round.

Ries (2011) writes that the feedback loop begins with building an MVP containing only the most important features. In this case, the pop-ups acted as MVPs, but also the first prototype of the total space, built for employee workshop, acted as one. In the pop-ups we explored who the customers were, got to know them in person, explored what attributes the customers valued and how the challenges worked in real-life situations. In internal prototyping we explored, together with specialists, how these attributes could be executed in terms of production. While our pop-up was always built around a single idea, the internal bodystorming workshop explored the complete design area with different attraction spots, which the pop-ups were parts of.

Nevanlinna (2016) argues that Lean methods can produce designs that are built faster and are more attractive to users. In the case of Tinkerlab Ideaverstas, the prototyping was a fast and simple way to test different ideas for themes and challenges. It also provided the team info about which ones already work and which ones needed more ideation. This information will provide valuable guidance for setting up the actual Tinkering studio, for estimating materials and tool consumption and for estimating the level of guidance and instruction needed.

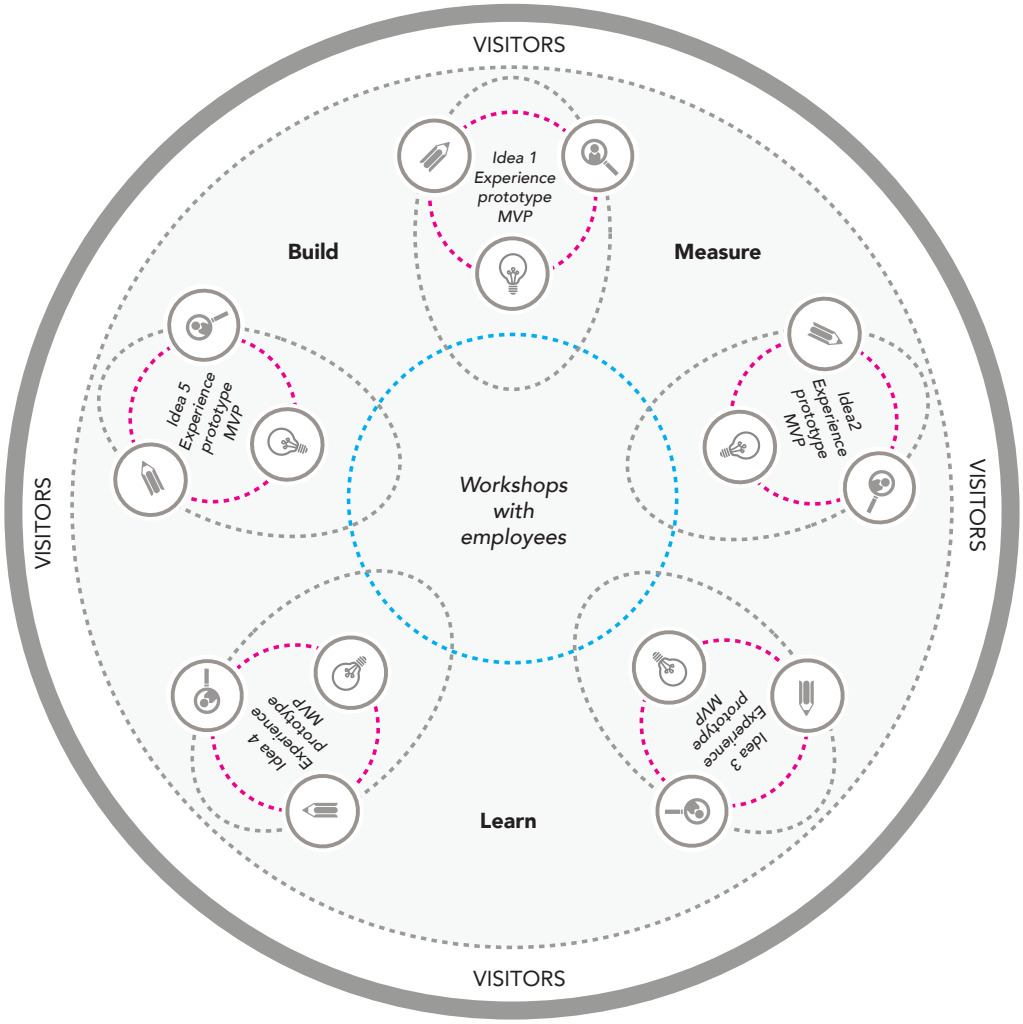

Figure 29: The Lean attraction design process for Tinkerlab.

In Lean attraction design (Figure 29), the overall process is a loop. In the middle sits the core, which is the multidiscipline core team. The outer circle represents the audience visiting the exhibition. The core team is responsible for the main process and performing tasks such as making design decisions, evaluating ideas, analyzing feedback received from prototyping and deciding the next steps. The MVP, or prototype, is the pop-up workshop held with visitors, this acts as a tool for observation, research, testing simulations and learning. The research gives input to the next round of ideation.

The build-measure-learn loop is held for all prototyping sessions, and prototypes are created for all main attraction ideas. The whole wheel should be spinning all the time. Figure 29 has five pedals, representing our five pop-up workshops. However, there could be as many as would be needed. The MVP in each pedal represents the minimum setup, which is built for prototyping the experience.

For listing concrete actions, the attraction design wheel canvas was created (Figure 30). In this A1-sized canvas there are places for defining the core people (hub), defining the content of current MVP under testing, learnings from the test and improving ideas for the next round. This canvas should be filled in after a prototyping exercise and before preparing for the next round.

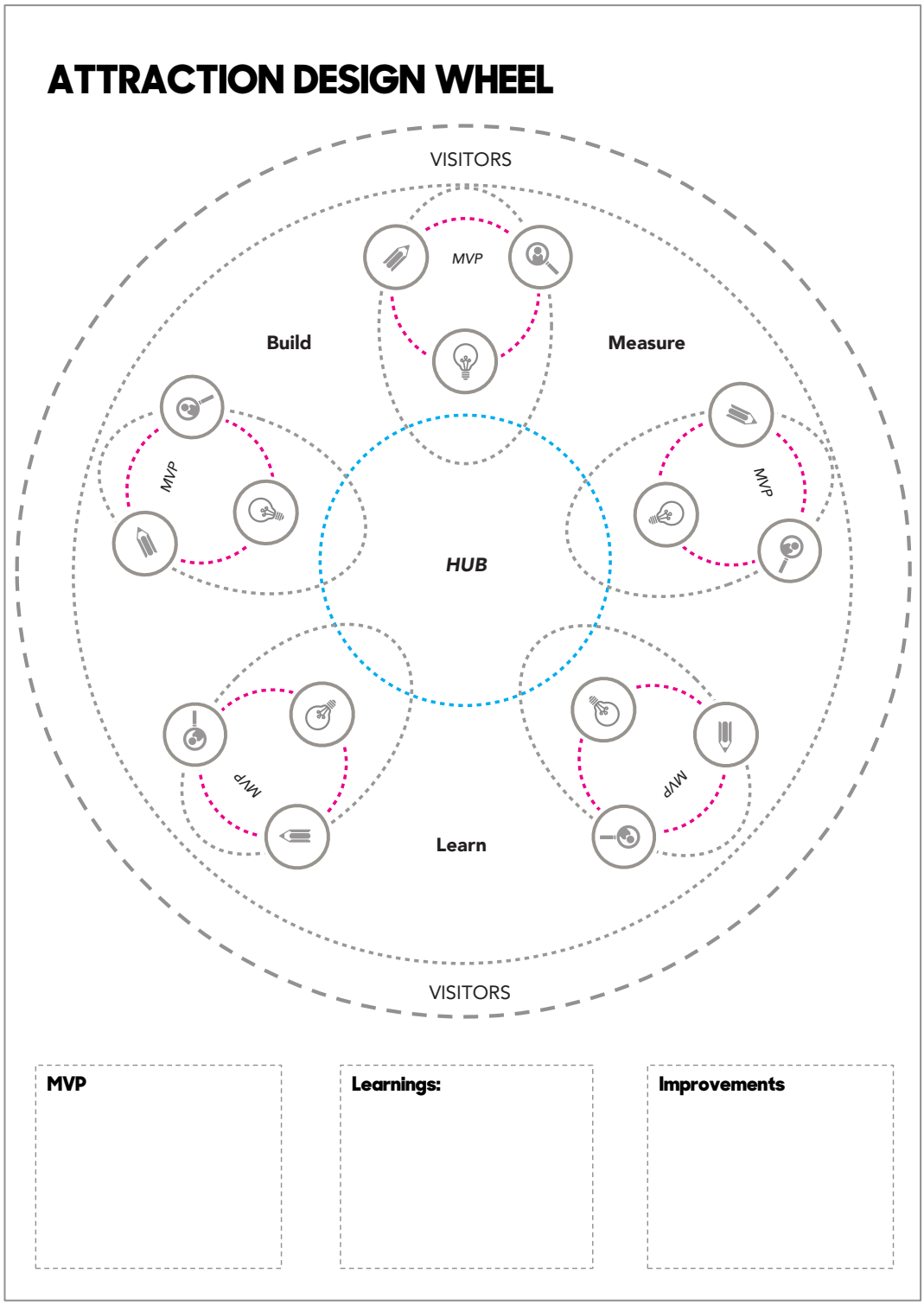

Figure 30: The attraction design wheel.

6 Conclusions

The objective of this thesis was to study how to prototype experiences using service design tools at Tinkerlab Heureka. The hypothesis was that the visitors no longer are passive, and instead would like to actively participate in creating their experience. Heureka is building a new creative studio, which draws inspiration from the emerging, so-called makers movement and the tinkering phenomenon. The focus area of this thesis was the Tinkerlab, which represents approximately one seventh of the exhibition space in Heureka. Heureka was interested in adopting new design processes, which made it easy to introduce the employees to new tools. Business co-operation was also seamless, and the project was carried out in good spirit and in relaxed and inspiring atmosphere.

6.1.1 What is Tinkering and What do Tinkerers Do?

To reach the goals, four questions were examined. The first question was *what is tinkering and what tinkerers do?* Wilkinson & Petrich (2015) write that it is more about the perspective than a vocation. Tinkering is active learning by doing. Tinkerers build things or they tear existing things apart. They modify, change, transform items from one design to another and create their own unique designs. The ultimate goal of tinkering is to learn about scientific phenomena while enjoying the process. The process is more important than the outcome. The process itself *is* the outcome.

Tinkering is part of the edutainment genre, where the content entertaining and educational at the same time. According to Pine II and Gilmore (2011), companies should engage customers with active participation and environmental relationship. In SDL, actors are active and creative resources that should be involved collaboratively in design process.

6.1.2 Space Requirements in Heureka

The second question examined was *is setting up a tinkering space different from setting up any other Heureka attraction?* A creative space has specific requirements of a science center environment. The current environment is a clean and clinically styled attraction area without close access to facilities such as water or trash recycling. Further, current employees only run short shows, which are scheduled a couple of times a day. The creative studio, conversely, will opened continuously during Heureka's opening hours. The logistics of the space should therefore be carefully designed. Tools and materials play a big role, as does the recycling of materials and trash. There is also a need for instructions, instructors and the development of inviting themes and challenges.

Different age groups have different skills, but the experienced must be designed in such a way that the whole family or visitor group will enjoy the experience. From the experience with pop-ups, the following key characteristics of tinker spaces were identified *a safe place to tinker*, *easy access to materials and tools*, *easy to keep clean*, *enough challenges for skilled and beginners* and *a visually inviting space—easy to get started*. Consequently, these characteristics should be the primary design drivers for the space.

6.1.3 Visitor- and Employee Involvement

How can we involve visitors and employees in the design process? This was the third question that was examined. Alam (2002) claims that engaging visitors into service development can result in unique experiences, help businesses design things faster, educate visitors on a subject and be introduced early to public markets. In the case of Heureka, witnessing hundreds of visitors making their own interpretations of the given challenge and coming up with different product variations demonstrated to me that each experience is different and results in a unique product that showcases something about the maker's personality, such as a story, decorative style or a new purpose for the product being made.

The visitors and employees were highly involved in the design process. Working with visitors and employees produced new information for the content itself (Table 30).

60 new ideas for themes and challenges	- Family ideation 12 ideas - Survey 14 ideas - Staff workshop 34 ideas

Table 30: Ideation with visitors and employees.

Combining all ideation workshops, 60 new ideas, such as 'how to build your own Tesla coil' or 'lighthouse' were produced for the project.

6.1.4 Use of Tools and Methods in the Design Process

The fourth question was *how can* service *design tools and lean methods be used in the design process?* The Lean approach and service design tools can act as guiding tools to go through all necessary steps in order to create a holistic service. Lean methods can also help in co-creating the ideas and testing and iterating ideas fast. A Lean attraction is faster to build and already marketed and tested with its real audience. In Tinkerlab, the pop-ups' active visitors co-created their own exhibition experience with the tools provided by the science center in a

section of its premises, which were themed and arranged especially for the event. Table 31 shows my selection of the top three service design tools for in the case of Heureka. I chose these tools specifically due to the quality of the information obtained by using them. In the comment field I have listed the outcomes of what was learned during the prototyping phase.

Phase	Tool	Comments
Experimenting	Service Prototype	Fast way of cheaply and easily testing an idea with users Can reveal design problems Communicates the idea with various stakeholders Can reveal problems related to time and place Can reveal problem related to materials and tools
Segmentation	Age groups	Important for edutainment services Designers need to understand what the visitor is able to perform skill- and motor wise. Should not be mixed with personas or market segments Is crosscultural Is gender equal
Insight	Participatory Observation	In experience design, the designer should be able to separate the characteristic elements of the experience. This results either from observing participants or participating and exposing oneself in order to gain accurate insights from the subject matter Produces valuable information for design brief about the idea, functions and materials and tools involved

Table 22: The top 3 tools.

The experiences were prototyped with both visitors and Heureka employees. With visitors, themes and challenges were tested in pop-up workshops, which acted as MVPs to a single theme and a challenge. With employees, the complete concept with various attractions was tested, and themes and challenges analyzed on an industry level. These two different types of prototyping produced two types of knowledge related to assets and logistics (Table 32).

Prototyping method	Type of knowledge generated
Science Center visitors	- Whether the content is interesting - Practicalities regarding interactions and consumption of the content - Requirements regarding space, materials and tools from the visitors' point of view
Heureka employees	- Shared understanding of the content - Practicalities regarding setting up the content for the visitor - Practicalities regarding setting up the space, materials and tools from the provider's point of view

Table 23: The types of information collected from prototyping phase

This project resulted in the creation of innovative, new tools (see Table 33). Three brand-new canvases were created for Heureka. The first one was a light version, which can help designers to ideate a tinkering theme and a challenge. The second canvas, comprising three pages, is meant to help out with setting up the actual tinkering area inside the science center's premises. Heureka has reacted positively to the canvasses and consider them useful for future ideation and setting up the stages. The third canvas introduces the attraction loop and is meant for future projects. The new process model called Lean attraction design was created for prototyping. At the moment it is focused on prototyping but in the future it should be incorporated into the longer list of service design tools and methods.

New design canvases	- A canvas for ideating themes and challenges - A canvas for setting up a tinkering area for the challenge - Lean attraction design canvas
New design process	- Lean attraction design process was created

Table 24: New tools developed during the course of this project.

The complete creative studio, scheduled to open its doors in 2017, will encourage visitors to make things and experience joy and happiness in the process. According to Csikszentmihalyi (2002,67), enjoyment occurs when a need is satisfied *and* when an unexpected goal is achieved. A sense of flow is a result of an autotelic experience, in other words, happiness is

achieved in activities when “doing itself is the reward.”

The Lean design process is suitable for attraction design in physical locations. It makes the production faster, enables ideas and problems to be tested in early phases before building the expensive construction and engages the audience into the design while acting as a marketing tool by showcasing audience while designing. However, Lean methods require full commitment from the company. The management should ensure there is enough time and resources available and make sure employees are trained in the method beforehand. Lean design processes, in my experience, can be applied to various disciplines, if not to all. When creating a service, the content changes, but the questions that need to be asked remain the same. The lean service creation and fast experimenting can help speed up the production cycle in complex projects.

6.1.5 Looking Forward

Doorley (2014) writes “tinkering is all about process.” When finding a solution, more questions may arise and ideas may get refined. While some of the experiments might be flops, the process is more important than any results. “The process of being curious about something, asking questions and exploring various solutions are all part of the fun learning.” The experience can be considered a success when the process is being performed without a “predetermined outcome” (Doorley 2014).

The new canvases help design new themes and challenges and also help in setting up themed challenges on location. The process wheel helps in keeping track of the prototype, takeaways from the sessions and changes required for the next round. Canvases can be reused in any similar events where people make things. This includes other tinkering or edutainment-related activities in schools or hobby clubs or in any other makers space or tinkering lab, or in your local community if you are planning events. The Lean attraction design canvas can be used for most prototyping work, since it helps with tracking the iterative nature of prototyping. The central hub can be replaced with a team or a person responsible for the project and the prototype itself can be in any form. The canvas is focused on the process, not the content or form of the prototype itself.

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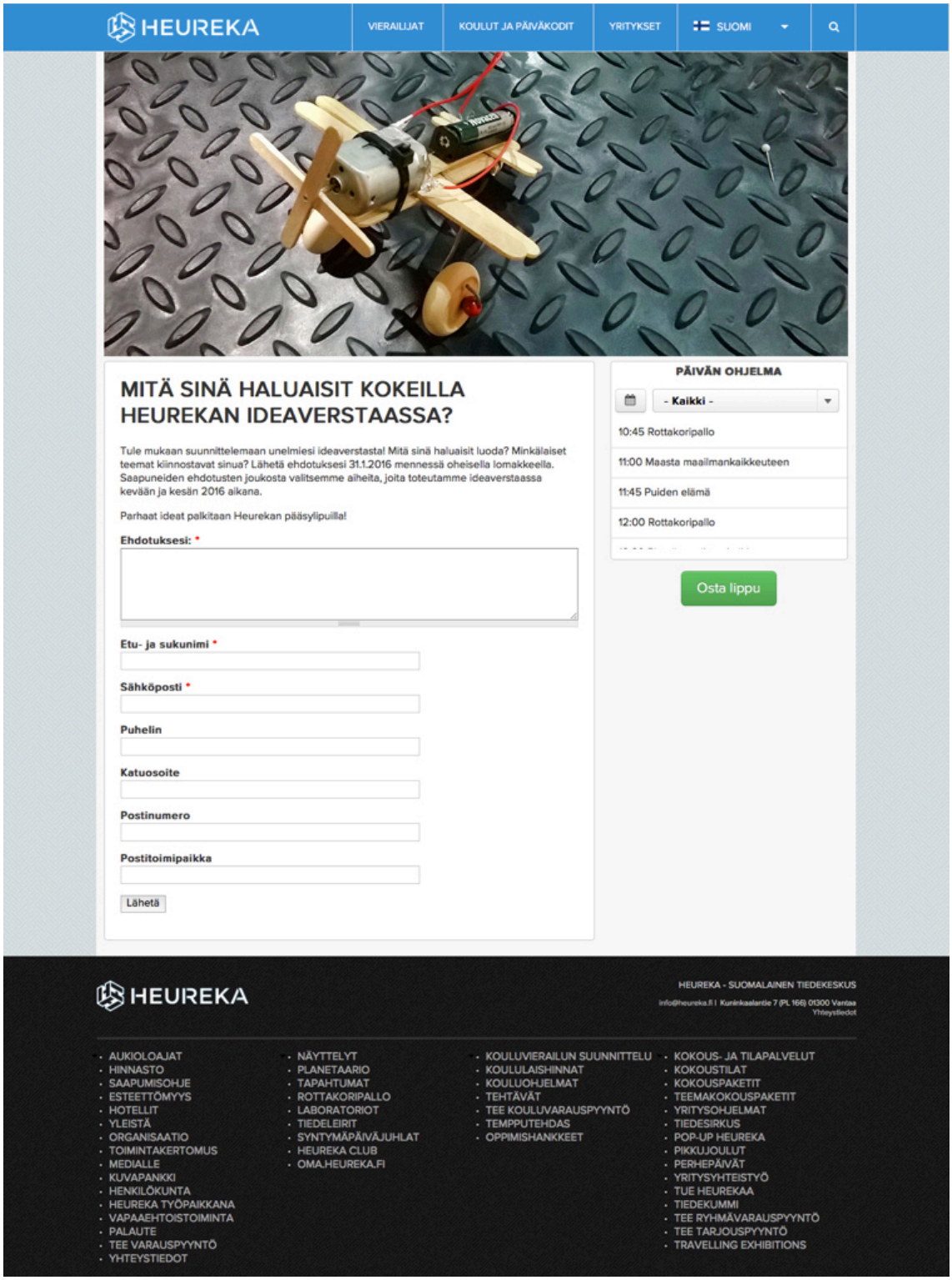
8 Tables

9 Figures

Appendices

Appendix 1: Heureka survey, original form in Finnish.



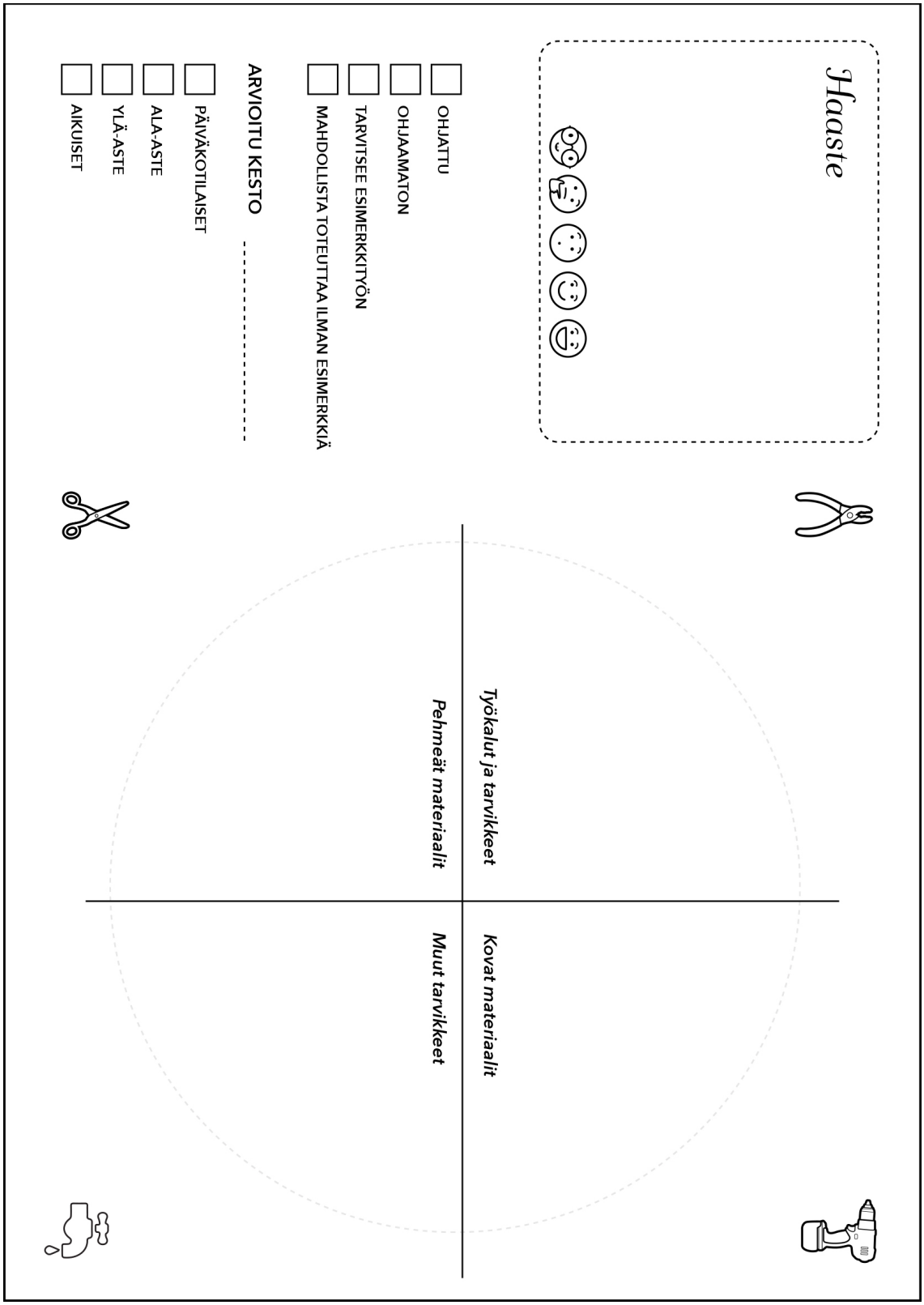
Appendix 2: Original family interview in Finnish.

Oliko tiedekeskuksen ympäristö sinusta sopiva värkkäykseen? - Oli, tosin aula-alue oli hieman levoton.
Olisitko kaivannut ympäristöltä jotain lisää? - Selkeät isot numeroidut opaskyltit, mistä pisteestä aloitetaan ja minne siitä jatketaan.
Miltä työkalujen käyttö tuntui? Oliko työkaluja tarpeeksi ja olivatko ne toimivia? - Ihan ok. Kesti hetki ennen kuin löytyi oikea työkalu oikeaan tarkoitukseen.
Oliko työkaluja tarpeeksi ja olivatko ne toimivia? - Ihan hyvät työkalut oli ja niitä oli riittävästi.
Koitko työkalujen käytön (lasten kanssa) turvalliseksi? - Tuntui ihan turvalliselta, mutta vanhempien piti jonkun verta huomata katsoa lapsien perään. Kuumaliiman kanssa tuli ehkä vähän sotkua.
Oliko materiaaleja saatavilla tarpeeksi? - Materiaaleja oli tarpeeksi, mutta olivat jonkin verran samoja pajasta toiseen.
Oliko opastuksen määrä sopiva? - Opastusta oli, mutta se ei ollut hirmu organisoitua.
Koitko että värkkäyssessio opetti teille jotain uutta sähköstä (valon kiinnittäminen palloon) tai automatan rakentamisesta (mekanismi)? - Lapsille ehkä jotain uutta jäi siitä mieleen. Kyllä siitä varmasti jotain oppi.
Oliko haasteiden vaikeusaste sopiva? (jouluaskartelu, automata) - Vaikeusaste tuntui sopivalta, etenkin kun pajassa värkkäiltiin enempi vähempi mitä halusi ja pystyi saamaan aikaan.
Koitteko värkkäyksen aikana mitään seuraavista asioista: **Onnistumisen iloa tekemisestä?** - Jonkin verran, mutta myös tietty askartelutaidottomuus tuli esiin. **Keskityitkö tekemiseen?** - Kyllä. Välillä ehkä tila vaikeutti keskittymistä. **Ajankulun hämärtyminen?** Ei juurikaan
Kumpi oli sinulle tärkeämpää tekeminen?/ valmis työ? - Ehkä tekeminen, mutta oli tietty kiva että pajasta jäi johonkin vuodenaikaan liittyvä esine kotiin.
Minkälainen muisto sinulle/perheellenne jäi värkkäyspajasta? - Ihan hyvä - tulipa tehtyä jotain askartelun tapaista pitkästä aikaa.
Tulisitko uudelleen jos Heureka tarjoaisi tällaista palvelua pysyvästi? - Kyllä varmaan. Tosin ei ehkä pelkkää pajaa varten Tikkurilaan tulisi lähdettyä, mutta saattaisi vaikuttaa päätökseen lähteä.

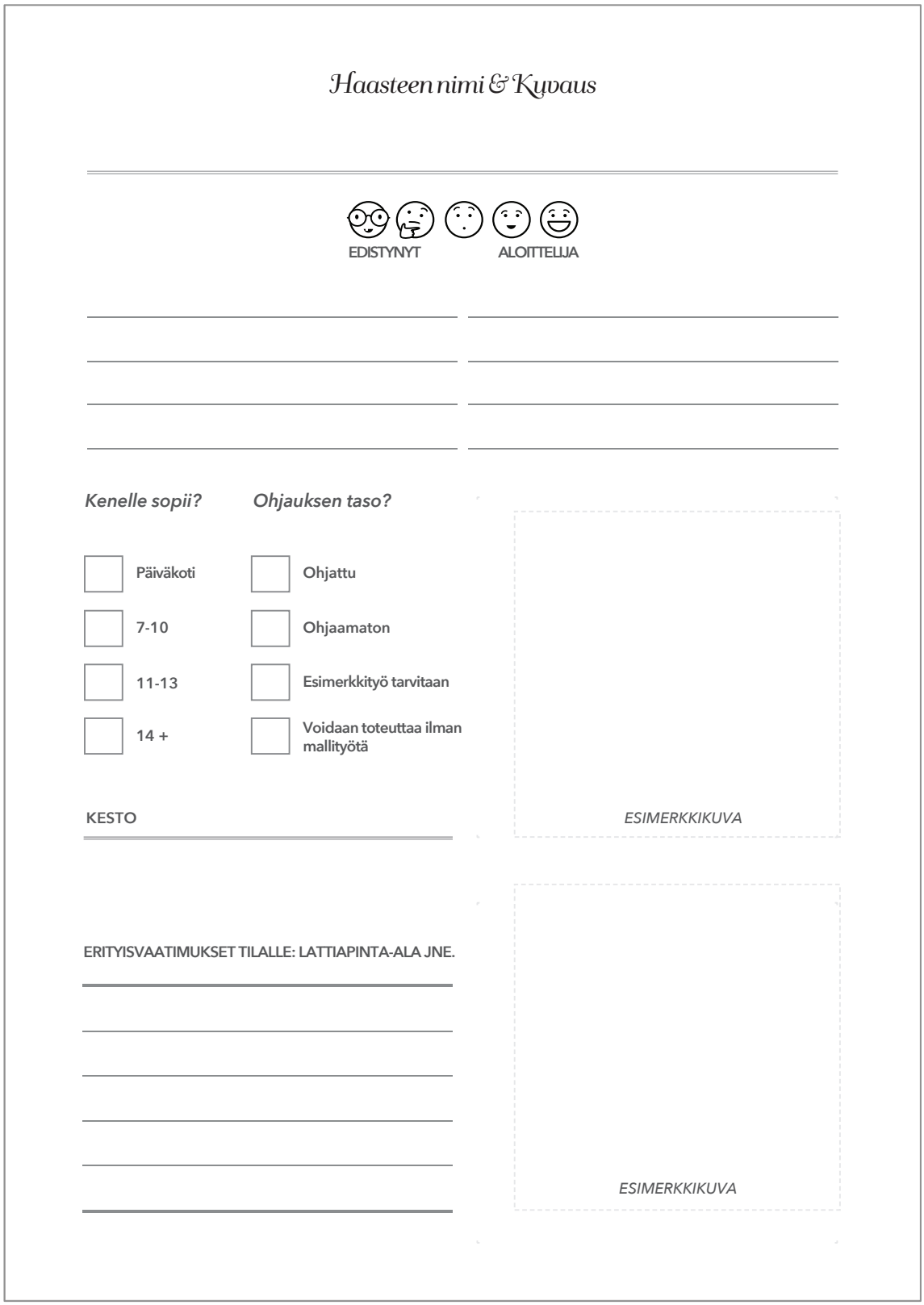
Appendix 3: Original family ideation workshop held in Finnish.

Kokeellinen soitinpaja, jossa voisi rakentaa synan ja remiksata omaa musiikkia
Ehkä joku paja, jossa voisi tehdä muovista lampunnäköisiä juttuja
Hipstereille farkkupaja jossa voi ohentaa lahkeita
Kauko-ohjattavat jutut ja dronet
Pienen tietokoneen rakentaminen
Open source työpajat
Tesla-pajat koska ne on hienoja
Haisupaja – erilaisten hajujen tutkiminen
Molekyylimakupaja
Robottien rakentaminen
Koodikoulu
Ei valomaalauspajoja, koska ne on niin vanha juttu

Appendix 4: Original canvas for ideation in Finnish.



Appendix 5: Original canvas for challenges in Finnish, page 1.



Appendix 6: Original canvas for challenges in Finnish, page 2.

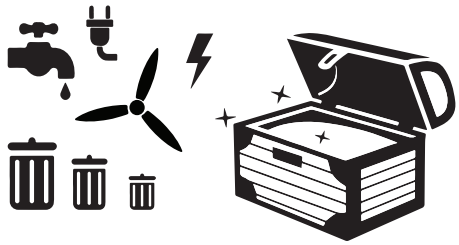
Materiaalit ja työkalut

Pehmeät materiaalit

Kovat materiaalit

Taipuisat materiaalit

Yhdistävät materiaalit (liimat jne)



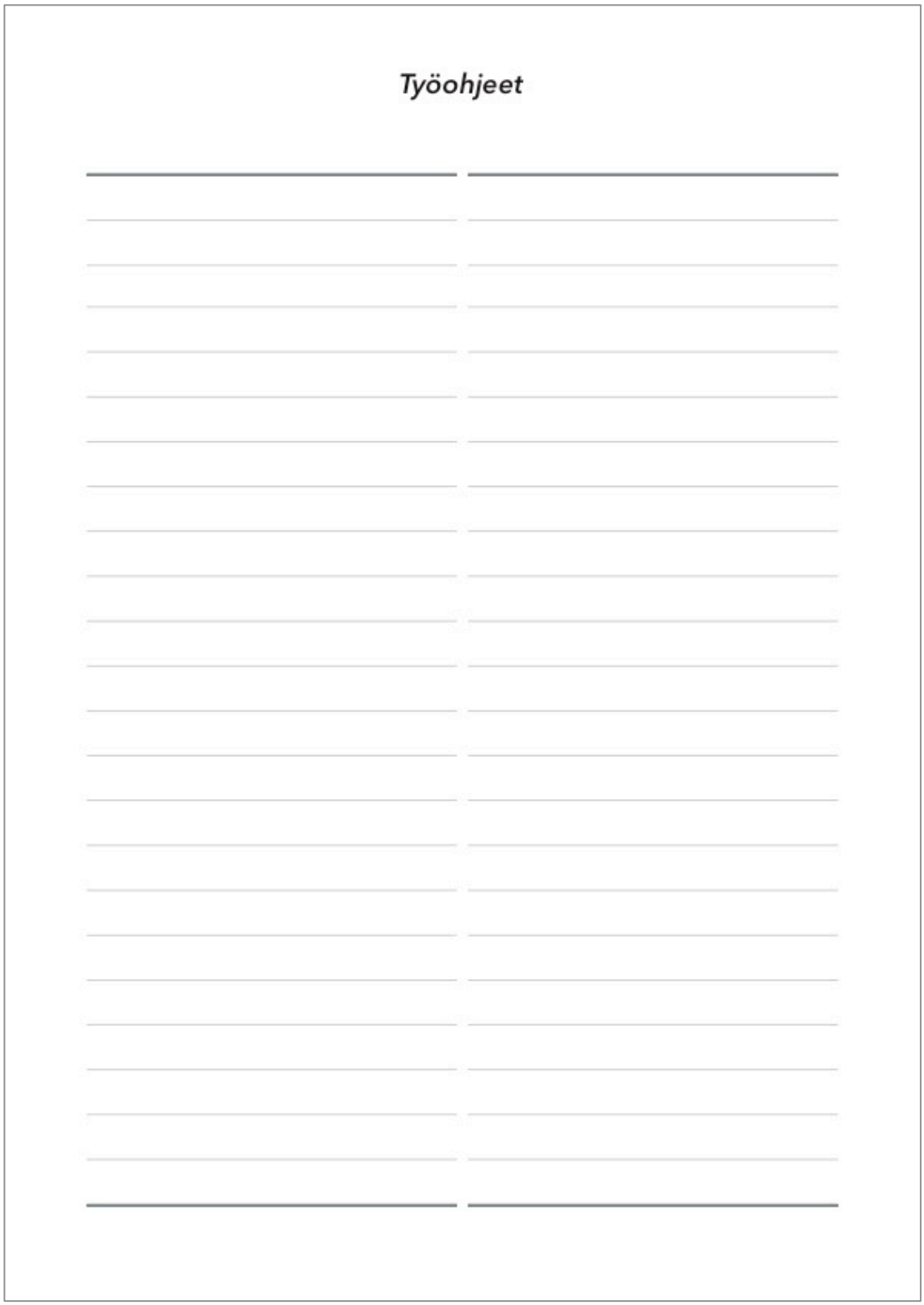
Työkalut - kylmäasema

Työkalut- kuuma-asema

Erityisvaatimukset

Siivous- ja pesutarpeet

Appendix 7: Original canvas for challenges in Finnish, page 3.



Appendix 8: Cover letter for the Heureka report in Finnish.

8.11.2015
Isänpäivän ideaverstas

Annina Antinranta
& Rauno Bergman

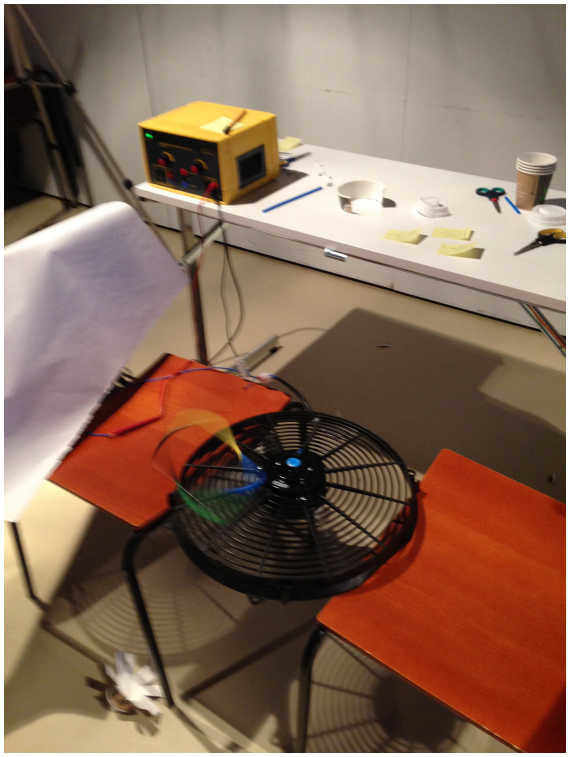
Isänpäivänä 8.11.2015 Heurekassa järjestettiin värkkäyspaja klo 13-16, teemana tällä kertaa olivat autot. Haasteena oli saada kulkemaan auto 5 metrin matkan verran.

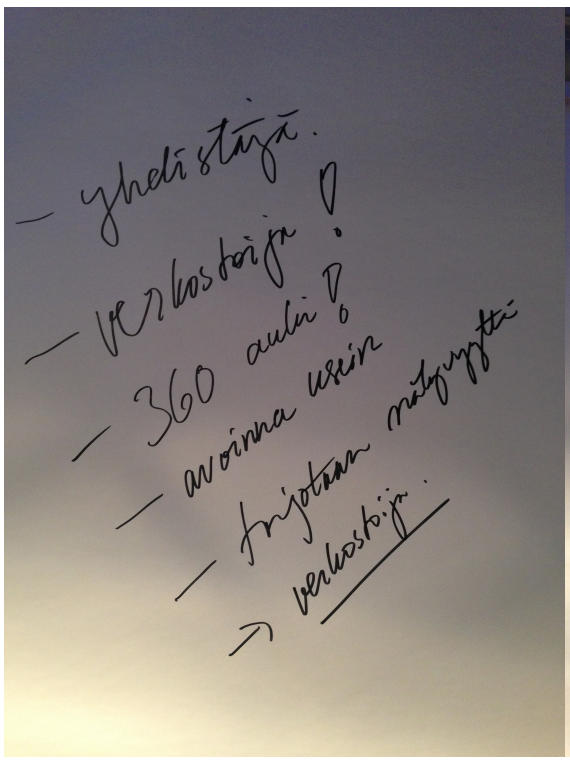
Kävijät tulivat kolmessa erässä ajoittuen planetaarion näytösten väleihin yhteensä n. 100 henkilöä. Samaan aikaan kerrallaan pöytien äärellä värkkäili n. 30 lasta ja aikuista. Edustettuina olivat erityisesti isät lastensa kanssa (sekä tyttöjä että poikia) mutta myös muutamat äidit osallistuivat rakenteluun. Monet tulivat ensin rakentelemaan, menivät sitten planetaarioon (muutamat jättivät keskeneräisen työn odottamaan ja jatkoivat palatessaan näytöksestä). Varsinaisten planetaarionäytösten ajaksi värkkäilypiste selkeästi hiljeni, kuitenkin niin että paikalla oli koko ajan vähintään 5 ihmistä.

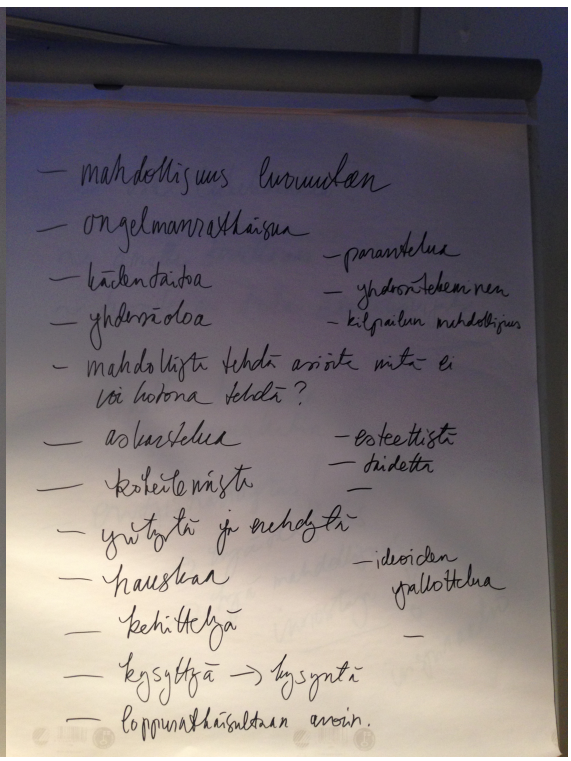
Kyselykierros ensimmäisinä paikalle saapuneiden värkkääjien keskuudessa paljasti että rakennusohjeita ei tarvittu. Viideltä perheeltä kysyttäessä kukaan ei kaivannut ohjeita rakentamiseen vaan kaikki kommentoivat että on paljon kivempaa kun voi tehdä ihan mitä vaan. Näissä kaikissa perheissä kuitenkin selkeästi isät osasivat rakentaa ja aloittivat rakentamisen lasten seuratessa perässä. Myöhemmin paikalle saapuneiden kesken sen sijaan oli perheitä jotka ensin arpoivat erilaisten laatikoiden kohdalla mistä aloittaa. Näin ollen suosittelisin että jotkut yksinkertaiset perusohjeet voisivat olla esim materiaalilaatikoiden luona, mutta että niitä ei välttämättä tarvitsisi erikseen korostaa. (esim joku 1 sivun juliste, jossa olisi 4-6 kuvan perusohje)

HEUREKA

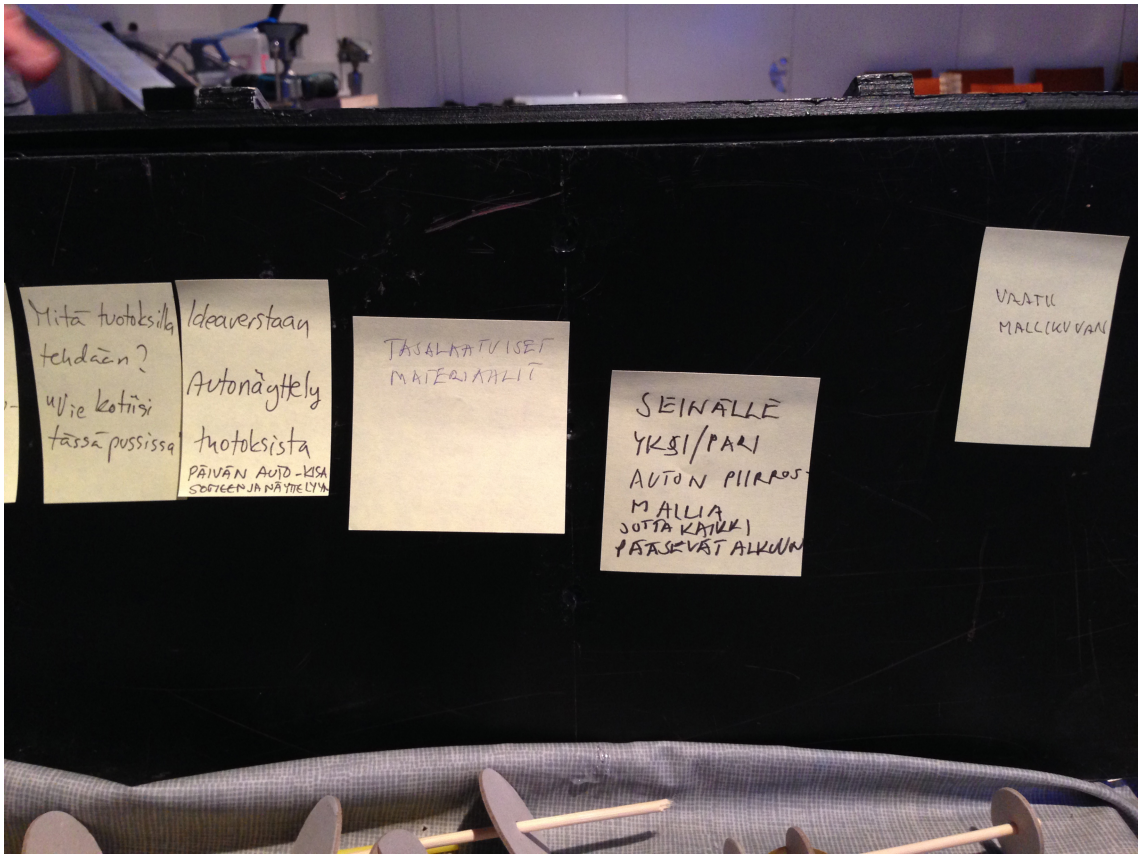
Appendix 9: Bodystorming workshop, February 15th, 2016.

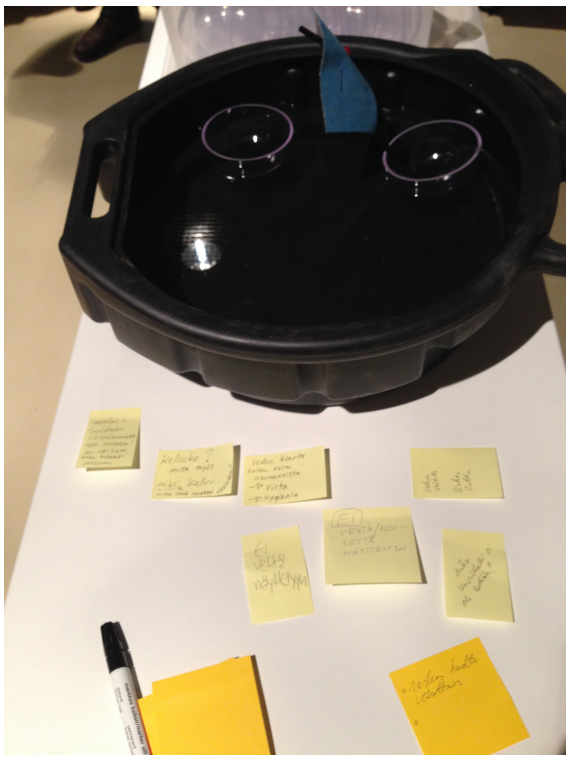


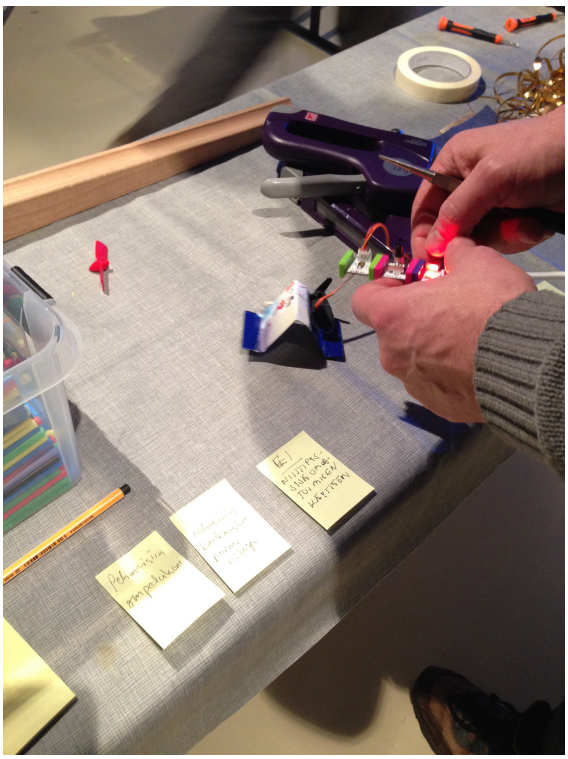




Appendix 10: Bodystorming workshop, February 15, 2016.







Appendix 11: Workshop at Påkas April 8, 2016.