

# CHALMERS



## Development of a user-centred gaming headset

*Master of Science Thesis*

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Gothenburg, Sweden, 2012

Report No. 1

## **Abstract**

FUNC, is a company from the United States of American (USA) which manufactures and produces gaming mouse pads. The products are high-end products and aims at professional computer users. The company stand outs from the competitors by the aim at an older target group, with main users in the age of 25-45 years old.

The project's goal is to design and conceptualize a headset with a focus on the user and good usability. The project begins with the fundamentals and the positioning of the company, to get a base to build the headset on. Research, about whom will use the product, which competitors there are and which requirement to consider, is performed. To understand the competition and who the competitors are, a research about the competitors is performed. By different methods several requirements are set and a research about the specification is executed.

The development process breaks down the headset into functions and aesthetics to get a better control over the whole headset. Several evaluations are performed to narrow down the ideas and concepts. The project ends up in one final concept, a headset.

The new headset from FUNC express FUNC's heritage by its shapes, functions and colours. By new innovative solutions on ordinary problems such as headband and cord; the headset differentiate from the competitors on the market today. The project results in a good foundation for forthcoming products.

MASTER'S THESIS

# Development of a user-centred gaming headset

Master's Thesis in Industrial Design Engineering

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Göteborg, Sweden 2010

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# **1 Introduction**

## **1.1 Background**

The gaming industry and its accessories is growing and becoming older day by day. With nearly thirty years in the loop, the generation of people that started it all is no longer as young as one can imagine when thinking about computer games. With an older target group comes more demands, such as good usability, other areas of use, sound quality, comfort due to long sessions etc. that no one has answered up to this date. Most of the markets headset companies is still focusing on a very young target group and are almost forgetting the creators of the lifestyle itself. It is here by time that this trend comes to an end.

FUNC is a company from USA which manufactures and produces gaming mouse pads. The products have advanced technology and strive to maximize the user's performance. FUNC makes high-end products and aims at users that are professional computer users. The company aims at an older target group than the competitors, the main users is in the age of 25-45 years old, are experienced in computers and have computer gaming as a hobby, time killer or as a lifestyle. FUNC is therefore investigating the opportunity to develop a headset within this target group, by not only meeting the demands of an older target group but also sending a tribute to the architects of an era that isn't dead by far.

The focus will be on investigating the market and user when it comes to headsets aimed for the computer gaming industry. On these conclusions a concept will be built and designed accordingly to the specifications from FUNC. It will also be very important to be able to distinguish the whereabouts and origin of the products, the research will therefore try to extract the heritage from USA regarding shape is.

## **1.2 Aim, purpose and goal**

The purpose of this master thesis is to design and conceptualize a headset with better usability than headsets on today's market. The project's goal is to develop a concept of a gaming headset for the company FUNC. The aim of the project is to develop a gaming headset that satisfies the user. The headset shall be a well thought-out product that the user can be more than pleased with. The aim for the headset is to be durable and have intuitive solutions with a focus on the user. The project also strives to take the users' senses, i.e. visual, touch and hearing, into consideration in the development of the product, if possible. FUNC has stated that they want a praiseworthy and high-end product.

## **1.3 Delimitations**

The project has several delimitations to consider. FUNC hasn't been involved in a design project with ergonomic aspects before and because of this it is important to simplify the methods and solutions. The communication is of importance and it is important to find easy ways and methods to use as communication tools.

The company has strong roots from USA, which have had a strong impact on its products, and it is important that these roots are kept. FUNC have on their own tried to establish what signifies design from USA, but without wider research. In the project it is important to research design from USA and understand what's significant for the design.

FUNC is a relatively small company with restrictions; such as limitations on cost etc. FUNC has requested that the headsets are Circumaural/full-size headphones. This because, the full-size headsets bring best sound quality and are the most comfortable when they are used for a longer time period. No other headsets types are going to be researched.

## 2 Project overview & procedure

The aim of the project is to develop a concept of a gaming headset for the company FUNC. The project will start with a research about the company, its previous products and its target group. The market analysis is made to get a background and an overview of how the market is today and to be able to understand more about headsets, the company and its competitors.

The next phase, the research, investigates FUNC and its products, and is a foundation to build on the new product on. After this phase the gaming headset can be developed but before the actual development of the product, a deep and overall research is performed. The research analyses the user, understands the competitors and sets the requirements for the headset. Thereafter the development is performed. The development process will be divided into two parts; functions and aesthetics, to get a better control over the whole headset and its features. From the development comes several concepts, these are evaluated and developed further. Several evaluations will be performed to narrow the ideas and concepts. The project will result in one final concept based on the requirement specification.

The last step in the project is to tie together the product with its company. The project line gives an overview of the project, see Figure 1. The project line.

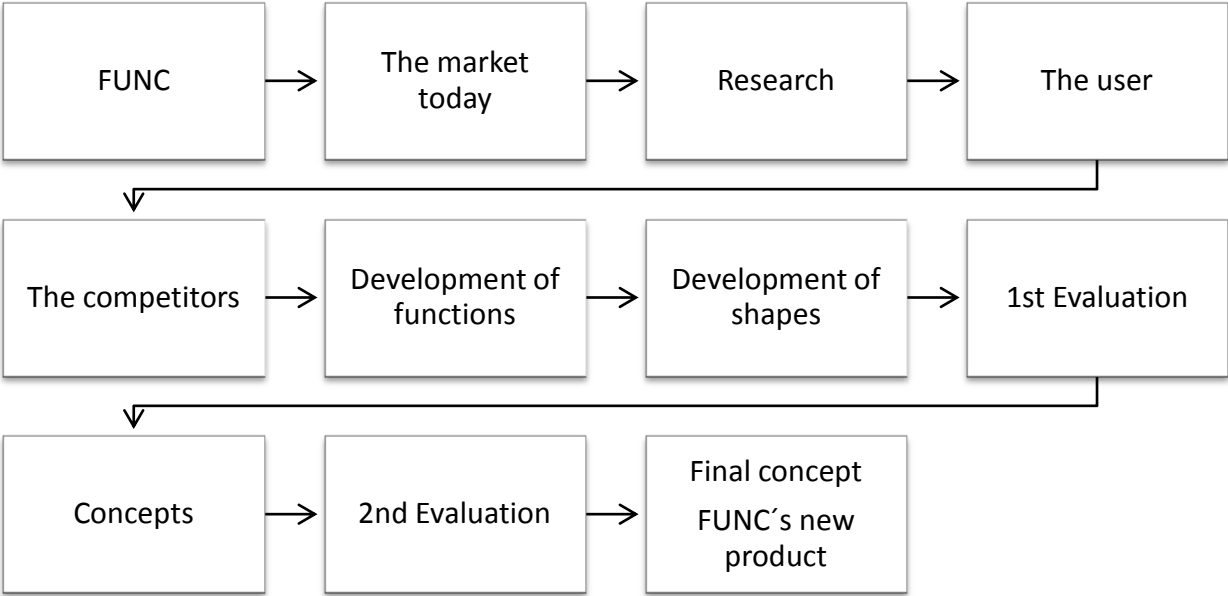


Figure 1. The project line

### 3 About the company

#### 3.1 FUNC

FUNC is a company from USA that was formed in 1999 which develops advanced gaming equipment. FUNC was a small company and was, according to Tommy Leeman at FUNC, first on the market with gaming mouse pads. The company designed and manufactured mouse pads with double-sided surfaces; the mouse pads had two sides and each side had different levels of surface roughness. FUNC wanted to design and manufacture high-end accessories for professional computer users.

FUNC's double-sided mouse pads have won several of awards over the years and they also have patent for their double-sided mouse pads. When FUNC were at the top, they wanted the users to be able to have their own personal style and be able to customize the products by e.g. chose the level of surface texture, size and design.

FUNC were big within the gaming industry and were known for their new thinking technology, materials and textures in mouse pads. They were first on the market to maximize the mice's performance by chosen materials and textures. FUNC tried to satisfy their customers by customizing of the mouse pads, for example the users could print their own prints on the mouse pad. The customization of the mouse pads lead in the end to bankruptcy. But the company is still known for their technical and smart solutions and many computer gamers still uses their mouse pads from FUNC, see Figure 2. FUNC mouse pads.



Figure 2. FUNC mouse pads

To bring back the glory to the creators of gaming equipment FUNC have reached down and analysed its past. They want to re-establish their market position by focusing on an older target group which no one does currently. By doing this, they think that they have a good opportunity to come back as an innovative a strong gaming company.

#### 3.2 Target group

The users are essential for the product and a distinct target group makes it easier to develop a product towards the right users. FUNC has existed since 1999 and was then a well-known company on the market and were one of the first companies to develop products for the gaming industry. The users then, were in the age of 15-35.

The company has from 2011 shifted their target group to the age of 25-45 to not lose their target group. The company as well as the users has grown up. The users in the gaming industry are mainly men but also women are going to be taken into consideration when designing the product.

## 4 Theory

### 4.1 Definition of a headset

A headset is a headphone with a microphone attached, often placed on an arm on the headset side, regularly on the left side, the microphone can also be placed on the cord. A headphone consists of two loudspeakers that are placed on both sides of the ears.

There are many different kinds of headsets, and gaming headsets are just a small part. Headsets can have very different expressions and they can look very different from each other. Generally three categories can be distinguished:

- Communication headsets, such as mobile headsets and telephone headsets that often only have one headphone and microphone. These headsets are often very cheap and audio quality and comfort is not high prioritized.
- Studio headsets are focused on a much higher level of communication such as airplane headsets, these headsets are focused on the absolute best audio quality and comfort. Cost doesn't come in first hand when looking at this category.
- Gaming headsets on the other hand is a mix between these two groups, comfort and audio quality is fairly high but the price is much lower. The audio quality is also a relative factor since they often are optimised for gaming sounds and speech. Therefore it may sound very odd comparing to a high definition audio headset.

### 4.2 The four pleasures

Patrick Jordan has found that there are four different kinds of benefits or pleasures to take into consideration, when designing a product. The benefits are for the users; to ease the use of products. The benefits also help to understand the characteristics of the users and to make the product of good usability. The four pleasures are based on the users' needs and wishes, to get an understanding of the user and its characteristics.

#### 4.2.1.1 *Physio-Pleasure*

The first pleasure is the Physio-pleasure, this pleasure is connected to the body and the senses. The senses; touch, smell, taste and feeling, are associated with the pleasure. This means that the senses that the users experience with the product, if the product feel a certain way or if it smells like a new product, the user can perceive a positive experience. It is important to design with the users physical characteristics taken into consideration and to have the different senses in mind, to make a good overall experience of the product (Jordan et al, 1999).

#### 4.2.1.2 *Socio-pleasure*

Socio-pleasure is associated with relationships between people and products. Relationship is a broad concept and it is related with any kind of interactions between two or more people; for example by having a conversation between friends. Jordan also means that the pleasure can be a status for a person, like its standpoint or achievement. The socio-pleasure can be seen in a social interaction in several ways; e.g. when people gather around a coffee maker; to have a conversation. A product can show a status, like an engagement ring, which attracts comments from people in the surroundings. A product can reflect the users' status and social lifestyle; then the product has a high level of socio-pleasure, which the user gains from the product (Jordan et al, 1999).

#### ***4.2.1.3 Psycho-pleasure***

This pleasure is associated the mind and the states of the mind. The pleasure is related with the doing and completing of tasks (Jordan et al, 1999). The pleasure is based on usability and relates to how effective, efficient and satisfying a task can be completed. If the product has a high usability, it also has high psycho-pleasure. The relationship to a product has to do with the user's image and circumstance, this is an influence that is important to take into consideration; an attribute can seem nice when the user is calm, but the same attribute can be annoying when the user is in a hurry or stressed. People have different levels of cognitive capability and people also differ in experiences and attitudes to products. Therefore it's important to design with this in mind and to try to minimize the load for the users, for example, it is easier for younger people to handle new technology than for older people. To ease the use of products and to strive to a high usability in products is therefore important (Jordan et al, 1999).

#### ***4.2.1.4 Ideo-pleasure***

The Ideo-pleasure is linked to the user's value; i.e. the product's embodied value should match the user's value. The values are both moral and aesthetic related. A product is supposed to complement and harmonize with the users values, and the user has to feel that the product correspond to its aesthetic value by e.g. the attractiveness of the product, but also with the moral values such as the environmental responsibility that the product has. The products don't have to have a function, it can also be a product of art and form (Jordan et al, 1999).

Different cultures have different values, depending on which part of the world that the product is designed in, it will look different and the values of morality and aesthetics will differ. Another aspect is that the users have different values, in different decades but also in different age groups. A product can make a user to feel different, like a sports car can help the user to feel younger (Jordan et al, 1999).

## **5 Market analysis**

To get a good view when designing a new product it is necessary to analyse the market and its users. It is important to understand the competitors and their strong and weak sides. This, to know about the competition and understand the competitors; how they stand out on the market. By researching the competitors, one can get a more characteristic approach when designing a new product. It is also important to investigate the competitors' product and what they offer the customers in forms of added value.

### **5.1 The user**

More and more people are becoming interested in playing computer games, and the gaming industry is growing bigger. The people, who are playing computer games, can spend hours per day for their hobby. The hobby of playing computer games can be a lifestyle, a pastime or a way to socialize with friends. The gaming headset is a tool used to communicate with other players, friends and to be able to listen to music or the surroundings in the computer game.

The user is a central role in this project and it is important that the headset fits the user and feels comfortable. The typical user for the new headset is between 25 and 45 years old, often male but also women shall be able to use it. Gaming headsets are often used by experienced users, who often play several hours per week. The user uses the headset for several hours per sessions; everything from one hour to eight hours at a time. Because of the long-time use, demands are created for good durability along the life cycle of the headset.

### **5.2 Evaluated headsets**

The main competitors' headsets were analysed in this part of the project according to the analysis in chapter 5.3 Marketing positioning. To understand the headsets appearances and functions the headsets are described below.

Some headsets could not be acquired due to that their cost exceeded the budget for this master thesis.

#### **5.2.1 Steelseries Siberia v2**

Siberia V2 is a headset from SteelSeries, see Figure 3. SteelSeries Siberia V2, that is a well-known headset which has relatively high sales figures. The headset has a microphone that has slide in/out function, a cord divided into two parts, and a headband that adapts to each user without settings needed. A remote on the cord adjust the volume. The headset is angled and can be rotated to suit the user's head shape and the user's ears. It has a remote placed on the cord. The headset costs about 600 SEK for purchase.



Figure 3. SteelSeries Siberia V2

### 5.2.2 Razer: Carcharias

Razer Carcharias is a simple headset with classic design, see Figure 4. Razer Carcharias. It has a microphone that folds down and a headband which is adjusted by pull down the earmuffs on each side. The headset has a remote that is placed on the cord. Headset costs about 600 SEK in the store.



Figure 4. Razer Carcharias

### 5.2.3 Corsair HS1

Corsair HS1 headset is Corsair's first production headset, see Figure 5. Corsair HS1. Headset costs about 600 SEK in the store. The headset has a microphone that folds down and a headband that is adjusted for each user. Earmuffs can be twisted to suit the users. On the cord is a remote to adjust the volume and that lights up when the headset is in use.



Figure 5. Corsair HS1



#### 5.2.4 Sennheiser HD 595

Sennheiser is a well-known company in the headphones and sound business, and their products are often of high quality, see Figure 6. Sennheiser HD595. It is an expensive headset and costs about 1700 SEK in the store. This headset is only headphones and there is no microphone to evaluate. The headband needs to be adjusted for each user. The headset is a small and it fits almost all users, although this headset can be angled to suit the user.



Figure 6. Sennheiser HD595

### 5.3 Market positioning

#### 5.3.1 Method

There are many companies in the gaming industry and it is impossible to analyse them all in this project. Therefore, a wide research was made; both on the companies themselves but also on their products. Several of these brands are presented in the positioning chart.

#### 5.3.2 Procedure

A selection of the most well-known companies on the market was made, but also their products were taken into consideration in the selection.

#### 5.3.3 Result

The goal with the headset is to position it, in price, somewhere in between Roccat/Saitek and the more high-end computer companies such as Razer, Qpad, Mionix, Logitech and Steelseries. The company shall lie near Corsair in their pricing but they shall have better products, almost as good as the Qpad, Razer, Logitech, SteelSeries and Mionix group, see Figure 7. Market positioning.

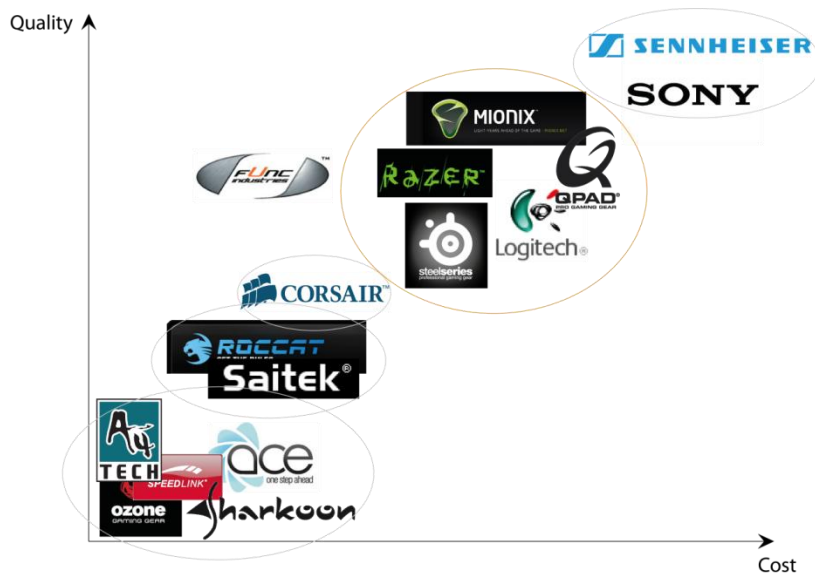


Figure 7. Market positioning

The chart made it easy to get a feeling how to set prices and position the company in contrast to its competitors. To get a good sense about what company that emanates quality without getting hands on every of their products, a thorough research through watching and reading reviews on different well-known in the business websites that carries out reviews on these sorts of products were done.

## 6 Research

### 6.1 Analysis of FUNC

FUNC has designed mouse pads which are only flat surfaces. By laying out coloured lines on specific features found in each of the products one can easily determine if the selected products have correlating shapes. By using these shapes in the upcoming design of the headset one can easily achieve a greater correlation between the products and therefore make it easier for the user to connect the products to the same company.

The shapes, in 2D, have a good correlation between each other which signifies long sweeping lines, see Figure 8. Shape analysis. The form has followed the function and energy has been spent on the technology and not the appearance of the product.

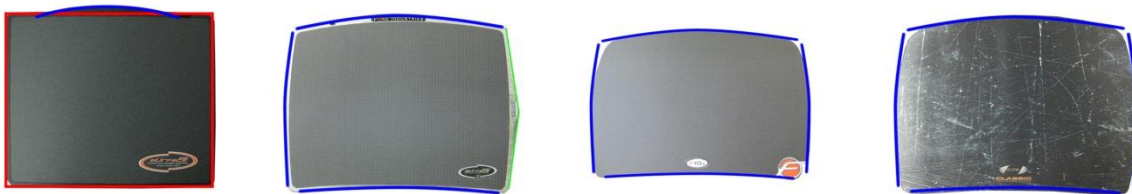


Figure 8. Shape analysis

It is important to keep the details from the former FUNC, to get recognition from the former users. One important aspect is the colours; the colours were significant for FUNC and are a distinct feature that the users remember the company by. The colours of FUNC has been a combination of dominant black, silver and a brushed aluminium surface combined with a complementing orange, see Figure 9. FUNC logotype. The logotype has been a visual element on all the former mouse pads, although in different shapes from time to time.



Figure 9. FUNC logotype

### 6.2 Exploration of shapes from USA

Due to a request from FUNC a small analysis of shapes from USA was carried out together with FUNC, this since the roots of the company is located in America and they wanted to capture as much of the national identity as possible when designing the new headset.

Shapes that could be distinguished were geometrical forms, large details and radiuses, oversized, heavy and solid shapes. A large portion of functionalism could also be found.

## 6.3 Image board

### 6.3.1 Theory

An image board is a collection of images; it is used as a communication tool between the design team members. By creating an image board, it is easier for the design team to understand the project's goal and an awareness of the project. By the image board the members of the project have the same view on the project and the product can be realized with the right goals, more easily (Baxter, 1995).

### 6.3.2 Method

Images that emanates wanted attributes and properties is collected by the designer, these images are then incorporated in a collage to express how the designer want the product to be experienced by the user.

### 6.3.3 Procedure

To be able to collect the right images; is it important the project team have the same goal. When talking to FUNC, the project group understood that they didn't have the same goal for the headset. FUNC were asked to collect their own images of what they wanted the headset to express and then the project group collected them. Thereafter the project group could pick other images with the same feeling kept in the pictures; data from the exploration of shapes from USA were also used during this procedure, see 6.2 Exploration of shapes from USA.

### 6.3.4 Result

The image board became a collage of three symbolic images. A shape that feels integrated and flowing but that on the same time doesn't feel too heavy and almost have a hovering look, see Figure 10. Image board. The image of the carbon fibre feels innovative and confident. The image of the lake emanates a calm and reliable feeling, the feelings expressed by the image board is balanced, calm and hovering. It gives a feeling of reliability and confidence. These properties are of importance for the company and its forthcoming products.



Figure 10. Image board

## 6.4 Core values

Core values are words representing the company's philosophy and vision. The core values exist of two to three words. The words shall convey a message; that permeates through the company (Karjalainen, 2007). A strong company image can more easily be implemented by core values, these values are the philosophy of all actions that is made by the company. The core values differentiate the company on the market and bring uniqueness to the company (Karjalainen, 2007).

Due to the fact the FUNC did not have any core values stated within the company, these core values had to be set to act as support for this particular project.

As a first step, a collection of pictures was carried out by the project group together with the company; to understand the company's vision. The company had problems to put words on what they wanted and their feeling and since images express more than single words, this method made it easier to understand the vision. Similarities with the method image board could be drawn, see Appendix A – Inspirational images, this was an easy way to communicate with the company. Several meetings and image gatherings towards a new look of FUNC took place. FUNC was formed in the United States of America and an additional urge from FUNC, were also to emphasize the "roots from USA" in the philosophy of the company.

The core philosophy is to create well-designed solutions to affordable prices. This philosophy also aims to elucidate the whole product chain, from the drawing-table to the end of the product's life cycle. The products will be well-thought-out and have a thought behind its features and functions. Features should not be added in case if they do not add any value to the customer and be accessible in an easy way. The word well-thought-out describes this philosophy and became one of the core values.

The company image of FUNC will be to be a company with a lot of self-confidence, a company that has grown up with its customers, and really knows what the first generation of gamers wants. When using products of FUNC the consumer will feel more mature or less young, they will feel that it is the company that has grown, and therefore they will feel more satisfied with the products, as it is a product for them. The core value that can be derived from this is self-confidence. Self-confidence also describes that the user shall feel more self-confidence when using the products of FUNC.

The company already has a strong relationship with the market and its customers, this since they were one of the first companies that focused on gaming accessories. With this relation in mind the consumers will feel that the company is a reliable and a company of decent quality since it has been on the market for a long time and knows what its customers want. The aim is that the customer shall be comfortable by buying products of FUNC, that the products will be of decent performance and have a good reliability. The third core value, reliability.

The three core values, self-confidence, well-thought-out and reliability, creates a foundation to stand on when developing the headset. The product will have an aim for a more mature and thoughtful target group than its competitors.

## **7 The fictive user**

The user is the most important aspect to take into consideration; it's the user who will use the headset and if the user isn't happy the product isn't going to be appreciated or bought. To be able to understand the user, their needs and demands, a research according to these points was carried out. The research involved personas – a fictive user, the four pleasures – a method that puts the user's satisfaction in focus, and a combination of these two methods.

### **7.1 Personas**

#### **7.1.1 Theory**

A persona is a well-known method used by, among others, designers to understand the target group (Norman, 2004). Persona is a typical user, which is based on real persons. Personas are used as a communication tool and can communicate between e.g. designers and the company.

#### **7.1.2 Method**

A product is used and experienced by several different kinds of users; each with their own personalities, experiences and background. To be able to understand the different kinds of user's personas was used. By personas a common language is used, when the design team and company is talking about the design and target group (Norman, 2004). Personas can help the designer to maintain focus, and to see the target groups need and what to omit. The personas shall be realistic but not real. Even if the persona isn't real, will it feel real, to be able to ask questions about what the persona will think about the product. Norman means that "personas makes it easier to be human-centred". Personas can help to create a well-thought-out design, and by this method can help to evaluate concepts and ideas in a later stage of the project.

#### **7.1.3 Procedure**

To get as real personas as possible, the project group took information from real people. This data was later on defined into image boards of each of the personas. This since the design team though it was easier to apprehend the data of each persona when using images.

#### **7.1.4 Result**

The personas are based on real persons but have stereotypical characteristics, this to penetrate different views of the target group. The personas are three men and one woman, the woman is important to include when many women plays computer games nowadays and it becomes more common in the younger age groups. The male personas cover the age range but they also have i.e. different personalities and family situations. By the different personalities the personas have different views and requirements on the products and the product's features. The personas are used during the whole project to support the design team but also later when evaluating the final concept, see Figure 11-14.

## Persona Stefan – 37 years old

- Stefan has played computer games since the beginning of computer gaming
- He is economical aware and buys products that he wants and that is of good quality
- He has a career as a head of a department on a industry company
- He cannot stand a day without his iPad and iPhone
- Clothes – MQ and Brothers
- Stefan is a healthy man and he is careful with his food and workout every single day.
- He has recently, six months ago, separated from his wife and has now starting to put his life together again. They have two kids that are now living with their mother most of the time.
- Stefan is now living in an apartment rather close to the inner-city
- He spends a lot of time with his family and friends and he take walks with them when he has time. He has also raised his former interest of playing computer games, now that he has the time again and together with his brother like the old/golden days. He plays Battlefield 3, and he/they can play up to three hours per day, the weeks when he doesn't take care of the children.
- He has been able to buy things that he want and recently he bought a Audi



Figure 11. Persona Stefan

Persona Victor – 33 years old

- He plays computer games to shut off the reality
- Victor lives together with his girlfriend Sara and they have a 2 year old child, Elin, together
- Sara is as an accounting clerk. Victor dislike that his girlfriend has a career and he has not. He however likes to spend their money when their salary comes.
- Victor and Sara lives in a medium-size city, in a row-house with their own little garden. They recently moved in and are starting to get their things into place.
- Works as a shop assistant
- He dislikes his work and he thinks that the customers asks stupid questions \*sigh\*
- Victor do not work out much, he thinks that it is enough with that one time a week when he moves the lawn
- He buys praiseworthy products.
- Victor has a temper in which he has a tendency to break things, this especially shows when he plays computer games – more than ones has he broke his key board on the middle. Therefore, Victor appreciates to own products that don't break.
- Sometimes it feels like he's stuck in the role of a parent, but hasn't really grown up yet. This makes him feel a bit uncomfortable.
- Victor plays computer games at least 1-2 hours per day
- Victor and Sara do not own a car, and goes by train when they are going anywhere
- When things brake he exchanges them into new ones.
- When he plays computer games, he mostly plays the call of duty series or games with less teamwork



Figure 12. Persona Victor



Persona Fredrik - 27 years old

- Lives in an apartment with two rooms and a kitchen
- Has his resident in the suburbs of the city
- Lives with his pet, the lizard Hugo
- Works on an airport in shifts where he fuels airplanes, he thinks that the work is fun and alternating, but at the same time he thinks that it is difficult to wake up in the middle of the night to drive to the airport. But after several cups of coffee at home and at work, he is alert again.
- In his core creation time he spends on computer games and some week he plays about 8-12 hours per day and some week it is just 2-4 hours/day, depending on which week he is free and when he works.
- Music – listen mostly on metal and rock
- To stay fit is important and he goes to the gym at least a couple times a week and because of his varying schedule sometime he is in the gym at night
- Fredrik uses his Volvo v40 to get to his work, the gym and so on.
- When he buys cloths he goes to Jack and Jones, JC and Carlings.
- His family consists of his mother and father, and his two siblings. Fredrik is the middle child and has always been an outcast in the family at the same time the family is close and he knows that he always lean back on them
- Fredrik is economic and he only spends his money on stuff that he feel is important for him, such as computer games and gaming accessories



Figure 13. Persona Fredrik

Persona Maria – 25 years old

- Maria began to play computer games, when her boyfriend tricked her to try MMO. Now she mostly plays WoW. She plays with her boyfriend and this is their way of hanging out.
- They live in a two room apartment in the suburbs of the city together with their cat Onyxia
- Maria has an android cell phone, which is a product that she cannot function without. Top of the wish list is the Ipad, and she hopes to get it as a birthday present in a couple of months
- Maria works out at Friskis & Svettis at least twice a week
- She works as a shop assistant in a food store.
- She likes interior design and is often seen in different furniture store
- Maria shops her clothes in stores like Sisters and JC store
- Maria and her boyfriend don't own a car, and goes by bus to get anywhere
- Her requirements of her products is that they shall work and function without hassle.

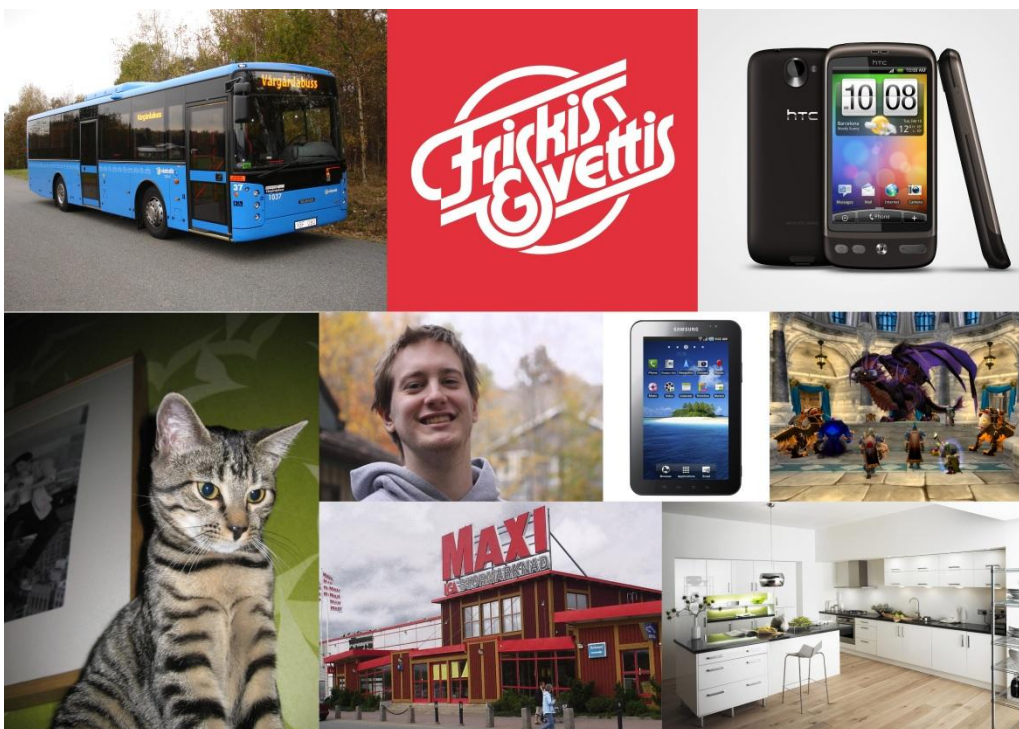
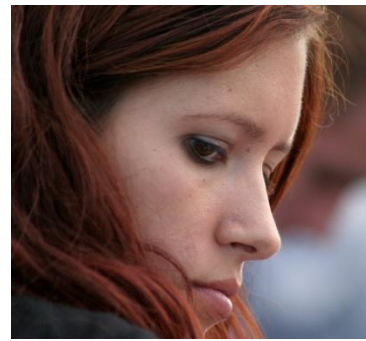


Figure 14. Persona Maria

## **7.2 The combination of personas and the four pleasures**

### **7.2.1 Theory**

Personas make it easier to understand the target group and to communicate with the design team and company (Norman, 2004). The four pleasures is a framework to understand the aspects of pleasure which will be fulfilled to create a good product. The personas and Jordan's four pleasures (see chapter 4.1) are two different methods are used in different areas. Jessica Dagman (personal contact 2011-01-14) has combined these two methods and by this created a method that goes deeper into the target group. The personas become more analysed and the project group gets a deeper understanding about the target group.

### **7.2.2 Method**

The combination method analyses how each persona perceives products, with the four pleasures as a focus. How a persona respond to the four pleasures will be answered, this by asking questions about how this persona think about a specific product. The product has to be specified to get the right analysis; what requirements the persona have for this product with the four pleasures as a basis.

- The Physio-Product Characters: question how the persona will answer to the product's feature; that the persona wants the product to have, that will be perceived with the sensory organs.
- The Socio-Product Characters: is associated with how the persona will convey the status in the society and the persona's interest
- The Phycho-Product Characters: is connected with the mental and emotional features that the persona wants the product to have
- The Ideo-Product Characters: brings up the persona's taste, value and aspiration, what the persona wants the product to eminate, in e.g. colour and aesthetics

### **7.2.3 Procedure**

The four personas were analysed and the pleasures were taken into consideration during the method. By gaining insight what the personas thought or would have thought of requirement gave a foreground that the design team could rely onto during the project, see Appendix B – Combination of persona and the four pleasures).

### **7.2.4 Result**

The method resulted in a deeper understanding of the target group. The method analysed each persona and each pleasure. The method arise several requirements; even requirements that weren't obvious. The method was subjective but gave anyway a deeper understanding and wider view about the target group, see Figure 15. Result from the combination between personas and the four pleasures.

The method showed that the senses were of importance; tactile, visual, audio. But also the feeling of the product in combination of good feedback is of importance. It is important the product doesn't stand out but rather fits into the home environment; it shall be aesthetical appealing. The product shall be easy to understand and work without problems. It shall be a product that has high usability and be easy to use; just plug and play. The material is of importance when designing a gaming product and the headset must be comfortable and have a good grip and feeling. It is important that

the headset support some customization. These mentioned aspects from the personas become requirements in the requirement specification, see Figure 15. Result from the combination between personas and the four pleasures.

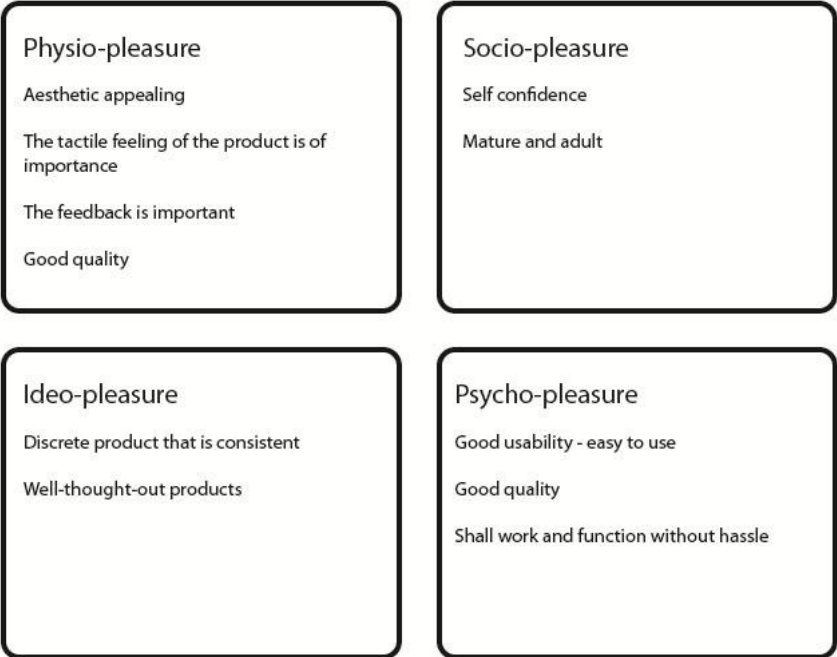


Figure 15. Result from the combination between personas and the four pleasures

### 7.3 Discussion

The chapter had the user and the target group in focus. The personas were good to use to get a wider view on the target group and whom, the users of gaming products really are. By the method one get a relationship to the target group; it is easier to understand the user. By the combination of personas and the four pleasures, the personas were worked further with. Personas are based on real persons but the method are not objective, but rather is influenced on the design teams own thoughts and views and can because of this be little bit stereotype. The design team has tried to avoid stereotype personas insofar as possible.

## **8 Analysis of the features on the competitors headsets**

By analyse the competitors in the focus group, interviews and observation of users, the competitors weak and strong sides were arise. By knowing the weak sides same mistakes can be avoided and the strong sides interpret what is good and what features the users wants. Both an analysis of each of the competitor's headsets and three user based methods such as; observation of users, focus groups and group interviews was conducted.

### **8.1 Focus groups**

#### **8.1.1 Theory**

Focus groups is a method that gathers information by having a group of people discussing a certain matter led by a passive moderator who gives certain topics.

#### **8.1.2 Method**

Focus groups is a group discussion with 6-10 interviewees. The focus group is fairly moderated by one single person, a facilitator, but also a assistant can attend to take notes. Certain topics are discussed and the attendees experiences are of importance and influence the result. To get spontaneity; the structure of the focus group shall not be to strict (Bohgard, 2008). To start a discussion real products, photos or images can be used (Bohgard, 2008).

#### **8.1.3 Procedure**

A focus group was carried out to get further knowledge about the competitors and their products, but also to get an understanding about the users demand and wishes for their headsets. The focus group were carried out with five experienced users that were within the target group. These users were selected due to the fact that they play computer games, some less and some more than the average person. The users age was scattered from 25 to 45 years old. There were on moderator that lead the discussion and one assistant to take notes.

The focus group started with a survey that were sent out three days earlier to each of the attendees, this to get them to start to think about their own headset and why they had bought it in the first place.

The meeting accessed the brands, SteelSeries, Razer, Corsair and Sennheiser. The meeting were divided in two parts, one individual and one discussion session, this to both get an individual and global view of the products, see Table 1. Schedule for the focus groups.

The meeting started with an individual scoring of the five headsets, each attendee got a scoring table to fill in and rate the headsets in a scale from one to six, were six was the greatest. After that two small exercises were brought up were the attendees were instructed to rank each of the headsets in both quality and functionality.

Thereafter, the attendees had a discussion about anything that had in mind and wanted to add. Last but not least questions about the general use and thoughts about headsets were asked.

Table 1. Schedule for the focus groups

Expected time:	Action:
15min	Part one: Individual 1. Pass around the products 2. Score the products 3. Coffee and cake
15min	Part two: Discussion 1. Test/use all of them!
10min	2. Exercises - Quality - Function
30min	3. Discuss the products
15min	4. Questions

## 8.2 Interviews

### 8.2.1 Theory

Interviews are used to get information and knowledge of the user, its experiences, views etc. (Bohgard, 2008). Interviews are a more intensive method than the focus group. The aim for the group interviews was to get an insight in the users mind.

### 8.2.2 Method

There are different kinds of interviews, structured, unstructured and semi-structured interviews, depending of the aim with the interview which kind of interview is established. In a structured interview open questions are asked, by this is it easier to lead the interview in a wanted direction and to get the information that is of interest. By a structured interview the interviewer can ask more on interesting aspects that can arise during the interview. The interview can be performed with 3-6 persons (Bohgard, 2008).

### 8.2.3 Procedure

Group interviews were carried out with experienced users that varied in age. There were two group interviews made, with two interviewees in each group; to be able to have deep discussions about the competitors' headsets and their packages. The interviewees were in different ages and the first interview had interviewees in the age of 25-30 and the second were in the age of 35-45. These interviews aim was to get deeper understanding about headsets and why users buy a certain headset. The group interviews had the same basis as the focus groups but went deeper into each question. The same brands as in the focus groups were analysed. The survey was also taken from the focus group.

The interviews started with the survey, where the interviews understated which products they use. Then an analysis and discussion was made. The first aspect to discuss was the packages of the product, this to get an understanding about how important the package is; to convey the same message as the product, but also to realize what the customer looks for when buying a product in the store. One other aspect is the headset, each headset was analysed and questions about e.g. perception were raised. The interviews ended with questions about headsets, what customers want and look for when they buy headsets. By the interviews the users were able to discuss headset

between each other; and the project group could get an understanding about how users use and perceive the headsets on the market today.

### **8.3 Observation of user**

To understand what the users want with their headsets a observation of the user had to be made.

#### **8.3.1 Theory**

Observations are used to study the user when a product is in use. Observations can be used to over a longer time frame capture all the actions the users does when using the product, both when he or she is aware or unaware of the actions he or she perform.

#### **8.3.2 Method**

An observation study how a user is in a given situation. By an observation a one can observe how a user uses a product and how assignments are solved by the user. One can discover how problems occur and one can get an understanding of the user's pursuance. The observation can be direct or indirect; if the observation is direct, the observer can participate (Bohgard, 2008).

#### **8.3.3 Procedure**

FUNC haven't produced any kind of headsets before and therefore were five different headsets from competitors used in the observation. Three users used and tested the headsets and become questioned of what was good and bad; and how the headsets felt during the use.

Each of the headsets were used for two days each to get the user adjusted to each of the headsets. The studies were performed in each of the user's homes with their own setup with games etc. to rule out as much interference in usage as possible.

### **8.4 Result from all studies**

In the focus groups, interviews and brainstorming were the various competitors discussed. Several problems and lack of features ascended, but also positive properties and new ideas were discussed. Through this analysis of competitors' products conclusions could be drawing; about which properties the new product shouldn't have, but also the good solutions that already existed and could be taken advantage of.

The headset will not stand out too much from the environment and surroundings, but instead blend into the home; the different users have their computer in different places in the home. The younger part of the participants has often computer in living room and then it's extra important that the headset does not stand out, while the older part has a separate room for the computer and it is then less important how the headset looks. But there are still a desire the headset shall be aesthetically appealing. Users also want to have a detachable cord and a place for the headset to be when it's not in use. The headset shall shut out noise, but at the same time the user wants to hear important information, from e.g. the family or dangers such as fire alarms etc.

During the research several interesting features and problems were brought up. Among others, the attendees didn't feel that digital USB audio was something that they would rely totally on, an analogue 3.5 mm connection was something they preferred. They didn't either like the idea of having the mike on a long stick attached in one of the earphones. The idea of having it "in the face" was very disturbing.

There are several problems with today's microphones. The users perceive that the microphone often breaks before the rest of the headset. The microphone should be able to move away from the face. The microphone should be as invisible as possible. The cord is another part of the headset, the users find that the cord gets twisted and it's annoying to untwist it. The cable is often too long, making it more twisted and if the cord is made in plastic it breaks more easily, so a cord in textiles is preferred. The headphones should have a good ventilation capability, the users ears should not be warm and full with moisture even after extensive use.

During research, users were asked what they thought about buying a headset that was more environmentally friendly but users do not think this is worth spending money on and if the headset will be environmentally friendly, users will wonder what the company has cut back on.

When users buy headsets, they read reviews so that they know what they are buying. They want the headset to have good sound and be sturdy. The headset should be affordable and not cost too much. The headset should be neat and clean, and the headset may not seem cheap, but it must be of quality.

In the focus groups and group interviews, the headset was rated by their function and quality. The results were widely separated; the older part of the target group had a very different view than the younger ones. The older part of the target group rated headsets quality as follows, see Figure 16-19.



Figure 16. Quality rated by the older group



Figure 17. Quality rated by the younger group

Although the functions were rated and the older part thought it would be the same rates as before, that is:



Figure 18. Functions rated by the older group

While the younger group rated them to:



Figure 19. Functions rated by the younger group



The result of the ratings was very different and proves that the target group is large and that the view of headsets was different depending on age.

The participants in the interviews and focus groups were asked if there were any problems with the current headset on the market today. A number of common issues were raised and by being aware of the common errors, these can be avoided in the new headset. The experienced users have demands on the headset; such as it should be comfortable to wear for a long time, since users use a headset for several hours at a time. Therefore it's important that the headset isn't too heavy as it gets tiring to use it after a while.

Users want to hear their surroundings through their headsets, and if it is not possible to hear through it, they want to be able to place it on one ear. It is the wish that the fabric on the ear muffs should be in velour and not leather, because leather becomes sweaty and adhere on the ears. Commonly perceived problems with the current headset; is that the products often breaks and gets a bad connection after a while, users also wanted the headset to be impact resistant.

## **8.5 Discussion**

During the interviews certain trends due to the different age spans was seen, younger people in the given age span liked SteelSeries and saw it as product of quality; the older part of the target group, on the other hand, questioned the quality due to the flimsiness of the headset and rated it as the outmost worst headsets. They didn't even want it to be on the scale.

The different approaches regarding interview methods was very fruitful especially the group interviews that were conducted with two persons that created a good discussion that were solely maintained by the interviewed them self's, which gave a very objective result, only the topics were chosen by the interviewer.

The interviewed during all of the approaches did also have much to add, such as problems with their own headsets but also wishes that wanted to see in new headsets.

## **9 Analysis of functions**

The function analysis is made to get an understanding about the headset's functions; it helps to see the possibilities in a product. The product has an assignment or a function to perform.

### **9.1 Function analysis**

#### **9.1.1 Theory**

The function analysis investigates why a product exists and its main purpose. By analysing the functions it is easier to understand why a product has a certain function and if it is possible to solve a problem in another way. By thinking in functions instead of solutions one can keep a more open mind, the functions must describe what problems the product shall solve; but not how to solve them. The functions are not allowed to limit the ideas, because this can impede the development process. The functions are described with a verb and a noun (Cross, 2000).

#### **9.1.2 Method**

To make it easier to understand and discover all of the functions, a headset were analyzed. To get a better overview of the functions and to understand how the functions are connected to each other; a tree structure was made.

In the tree structure the main function was placed at the top and the part functions construct the main function. There are also support functions, which are a part of the main function but aren't necessary for the product to work. In the so called function tree, the two directions in the tree have different meanings; the direction towards the main function answers the question of why the function is needed and direction away from the main function answers the questions of how the function is achieved (Cross, 2000).

#### **9.1.3 Procedure**

The analysis were performed by ask questions about an already existing headset; the SteelSeries Siberia. This headset was chosen because it has smart solutions and a user-centric design. By analyzing an already existing headset, all of the most necessary solutions/functions become listed in the analysis.

#### **9.1.4 Result**

The SteelSeries Siberia headsets main function is to transport signal of sound, and it is supported by Emit sound and Pick up sound; which are part functions to the main function. Attract target group is a support function to the main functions and brings an added value to the product. By analyzing the Siberia headset, the functions that are necessary for a headset and the functions that are important for the user are listed, see Figure 20. Function Tree result.

To emit sound the headset shall be able to transport the sound from the computer to the position of the human ears, during this event the sound shall be opted for a gaming experience and therefore increase the sound quality. The emitted sound should also be able to be adjusted by the user.

To emit sound the headset shall be able to transport the sound from the headsets position to the computer and therefore grant communication abilities with the outside world through the internet. The volume of the picked up sound should be able to be switched off, and the sound quality should remain the same as it were spoken.

To attract the target group the headset should not only perform the main functions but also bring an added value by being comfortable. Should be easy to use by be adjustable in size, be sturdy and flexible. The headset should also contribute interest by giving away clues of its existence and origin.

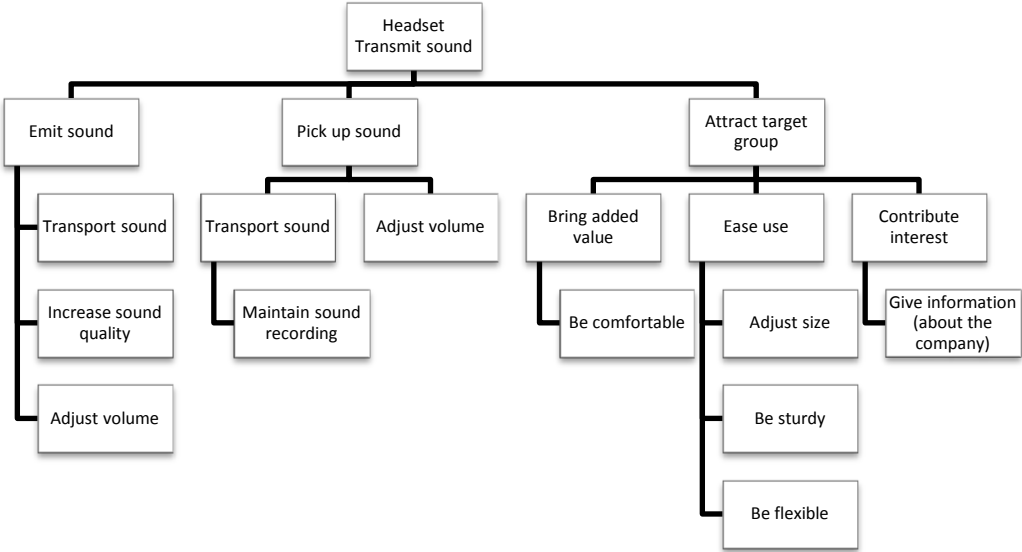


Figure 20. Function Tree result

**9.2 Known functions**

To get the largest scope of information available in the research, a vast sweep of image gathering on other headsets and their functions and tech was done, earphones was also added due to the similarities in structural features. These images were later on ordered in a large grid to be able to get a good overview when working on the project, see Figure 21. A small part of the wallpaper with known functions.



Figure 21. A small part of the wallpaper with known functions

By using the function research grid, the functions mostly used in today's headsets was displayed. These functions were divided into four groups to get a clear image how today's headsets are built up; see Table 2. Known functions in four categories. The four groups were; the microphone, ear cups, ear cups surfaces and the headband.

Table 2. Known functions in four categories

<b>Microphone</b>
Detachable
Turn able
Bom
Bom (unified)
Bendable
Slide
Telescopic
Throat
Dual (req. USB)
<b>Ear cup shape</b>
Circular
Elliptic
Rectangle
Triangle
Quadratic
Drop shape
Prism
Irregular
<b>Speaker</b>
Hole (small)
Hole (big)
Flat
Mesh (parts)
Mesh
Switchable
Open-able
<b>Headband (adjustment)</b>
Up/Down, Swivel, Turnable, Foldable
Up/Down, Swivel (left), Turnable, Foldable
Up/Down, Swivel(right), Turnable, Foldable
Up/Down, Swivel, Turnable
Up/Down, Swivel (left), Turnable
Up/Down, Swivel (right), Turnable
Up/Down, Swivel, Bendable
Up/Down, Bendable
Bendable

## **10 Requirement specification**

A requirement specification is a list that specifies both demands and wishes of the product in hand. It compile the requirement and wishes that the product has; from the company, the users etc.

The requirement specification has combined both the requirement tree and the function list and is a result of the demands that been brought up. From the focus groups, the interviews and the observation of users more demands and wishes were arose; all of them are assembled in the requirement specification, see chapter 10.4 Requirement specification - Result. To make the specification more perspicuous other relevant data were specified. The requirements were specified to the extent of what was possible. Where the information was collected from is noted as reference in the specification.

### **10.1 Ergonomics**

To determine the various measurements on the human head a data base called People Size 2008 were used. The following measurements of the human head were established; ear breadth, ear length, ear to top of the head, face breadth (cheek), head breadth (in front of the ears), head breadth (maximum, above and behind the ears), ear to the back of the head and moth to back of the head. By having these measurements an ergonomic specification for the headset that fits the 5<sup>th</sup>%ile up to the 95<sup>th</sup>%ile American citizen, both men and women. To be sure, data for American, German, and British and in some cases were the data were specified, Swedish. Although the data for the American population did incorporate all measurements given by all the other populations specified, see Appendix C - Ergonomics.

### **10.2 Requirements from FUNC**

Along with the different functions researched earlier in the process, FUNC had some requirements that were needed to be fulfilled.

To fit a 50mm speaker driver in to the headsets ear cup, along with two speaker volumes of a front air 22,6cm<sup>3</sup> and back air 59,5cm<sup>3</sup>.

A detachable microphone and cables to secure an easier Return Merchandise Authorization (RMA) process, which is used when the user uses his or her warranty guarantee. The user can therefore switch the faulty part instead of the whole headset.

### **10.3 Requirement specification - Result**

The requirement specification is in this case built upon headers from Pugh's headers (Pugh, 1991). Pugh's headers are used to get the requirement specification more structured and it is by this easier to get an overview of the requirement specification.

Several requirements and wishes are arisen, not all of them are of high importance. The strongest demands have been listed in the table below, see Table 3. Requirement specification.

The most important requirement is to develop a product that doesn't need any adjustments; it can be used right away. It's important that the new product doesn't stand out in the user's home, one shall be able to have it both in the living room and in the computer room. This was a requirement from the users in both the interviews and the focus groups. But the headset shall at the same time

stand out from the competitors and be visible on the shelf in the store. The headset shall express the feelings in the image board, because the image board is the core of what the headset shall emanate.

The company also has some constraints, such as manufacturing cost and unit cost. This demands can't be fully evaluated in the end of the project, but rather be a guideline in the development of the headset. The headset shall be of a circumaural/full-size headset.

The headset shall attract the target group, which is in the age of 25-45 years old and who uses the headset about 50 hours per week, and it shall last for 2-3 years. The ergonomics are of high importance to fit the users; the headset must not be too heavy and have to fit the users' head. To be able to use the headset for a long time, it has to have good ventilations in the ear cups. The users sets high requirements on the sound quality and the headset have to be designed to bring good sound. The headset shall be able to be customized, by removable cord and microphone.

As stated in the beginning of the project, one aim is to involve the human senses into the design of the headset. It is important that the user understand how the headset works; usability is of high importance. No small parts and simple connections; so every user can use it. The headset will have consistency; both in visual elements and have a coherent appearance.

Table 3. Requirement specification

<u>Attributes</u>	<u>Explanation</u>	<u>Wish/ Demand</u>	<u>Origin</u>
<b>Main requirement</b>			
Transmit sound		D	Function tree
<b>User</b>			
Affordable		D	User
Attract target group		D	Function analysis
Be comfortable		D	Function analysis
Good usability		D	Personas
Aesthetically appealing		W	User
Bring added value		W	Function analysis
Confident		W	Image board
Customization		W	Personas
Mature and adult		W	Personas
Reliable feeling		W	Image board
Self-Confidence		W	Personas
Tactile feeling		W	Personas
Well-thought-out product		W	Personas
<b>Aesthetics</b>			
Express image board		D	Design team
FUNC colours	Orange and black	D	FUNC
Not stand out	Blend into the home environment	D	User
	Discrete product	D	Personas

Uniqueness		D	Core values
Clean		W	User
Consistent		W	Personas
Geometrical forms		W	Shapes from USA
Heavy		W	Shapes from USA
Large details and radiuses		W	Shapes from USA
Neat		W	User
Oversized		W	Shapes from USA
Solid shape		W	Shapes from USA
Sweeping lines		W	FUNC
<b>Company constraints</b>			
Adult	<i>25-45 years old</i>	D	<i>FUNC</i>
Casual & Gamers	<i>~ 50h/week</i>	D	<i>FUNC</i>
Circumaural/full-size headphones		D	FUNC
Communication tool		D	FUNC
Contribute interest		D	Function analysis
Driver	40mm	D	FUNC
Give information (about brand)		D	Function analysis
High end product		D	FUNC
Manufacturing, tooling	<i>\$20k-\$35k</i>	D	<i>FUNC</i>
Manufacturing, unit	<i>\$25 - \$35 per unit</i>	D	<i>FUNC</i>
Praiseworthy	Price restrictions	D	FUNC
Reliability		D	Core values
Self-confidence		D	Core values
Well-thought-out		D	Core values
Intuitive solutions		W	FUNC
Recognition in form language		W	FUNC
Well-designed solutions to affordable prices		W	FUNC
<b>Ergonomics</b>			
Ear breadth, min/max	<i>26-39mm</i>	W	<i>Ergonomic studies</i>
Ear length, min/max	<i>49-76mm</i>	W	<i>Ergonomic studies</i>
Ear to top of the head, min/max	<i>106-151mm</i>	W	<i>Ergonomic studies</i>
Head breadth in front of ears, min/max	<i>115-167mm</i>	W	<i>Ergonomic studies</i>
Weight	<i>max: 320g</i>	W	<i>User</i>
<b>Performance &amp; Function</b>			
Adjust volyme		D	Function analysis
Be sturdy		D	User
Connection	<i>analogue 3,5mm plug</i>	D	<i>User</i>
Ear muffs - velour		D	User

Durability	Life cycle 2-3 years	D	User
	Durable	D	FUNC
	Impact resistant	D	User
	Work without hassle	D	<i>Personas</i>
Good ventilation capability		D	<i>User</i>
Speaker front air volume	22,6cm <sup>3</sup>	D	<i>FUNC</i>
Speaker back air volume	59,5cm <sup>3</sup>	D	<i>FUNC</i>
Feel/see that the headset is on mute		D	<i>User</i>
Transport sound	Emit sound	D	Function analysis
	Pick up sound	D	Function analysis
	Transport sound	D	Function analysis
Sound	Increase sound quality	W	Function analysis
	Maintain sound recording	W	Function analysis
	Shut out noise	W	User
	Hear important information	W	User
Microphone	Move away from the face	W	User
	Detachable	W	User
	Invisible	W	User
Cord	Right length	W	User
	Detachable	W	User
	In textile	W	User
Allow to place it on one ear		W	User
<b>Usability</b>			
Be versatile (by twisting)		D	Function analysis
Comfortable - long time use		D	User
Easy to understand		D	<i>User</i>
Easy to use		D	<i>Personas</i>
Fits the user, without adjustments	Adjust size	D	FUNC
	Be adjustable	D	FUNC
Good quality		D	User
Easy to untwist		W	User
Feedback		W	<i>Personas</i>
Involve the human senses		W	<i>Personas</i>
No small parts		W	<i>User</i>
Simple connections		W	<i>User</i>
User-centered		W	FUNC



## **11 Development of functions, outputs & evaluation of functions**

To be certain that the best solutions were derived. A vast number of functions were recognised and taken into account for further development, see chapter 9 Analysis. These functions were later on developed into different kinds of concepts, this by sketching and a tight discussion with the company.

### **11.1 Idea generation**

When a product is to be developed is it important that the project group can create and develop different kinds of ideas without any restrictions, this makes it possible to think outside of the box and get new and fresh solutions. To make the development of the headset easier; various methods of a creative character were used such as brainstorming and sketching.

#### **11.1.1 Brainstorming**

##### ***11.1.1.1 Theory***

A brainstorming is a group based creativity method used to both talk through the subject at hand but also get new ideas and solutions on the problem that needs to be solved. Brainstorming as such can be divided into different subgroups, such as; Brainstorming, positive brainstorming, negative brainstorming (Cross, 2000).

##### ***11.1.1.2 Method***

A normal brainstorming generally takes place around a table, where a group of 4-8 people discuss and access the problem at hand. These people are often users who have a lot of experience on the subject, but it can also be interesting to involve non-users since their perspective of the problem can be different. They are usually provided with pen and paper, to be able to communicate as good as possible. They are led by an objective person who doesn't have formed any conclusion regarding the given problem. By this, not to jeopardize the whole brainstorming with their own judgement, but only to lead and encourage the group through a pair of topics that the project group wants to be answered or discussed (Cross, 2000).

This normal brainstorming can also take form in a positive and negative state, there positive means that the attendees must only be positive and don't criticize any solutions by the others that attend. By doing this all attendees will be able to, at their pace, provide the group with their thoughts even if it is really crazy at the time, although, this crazy thought can evolve to a solution later on since this is a group based method. A negative version is also at hand where the attendees must criticize every idea that any of the attendees brings to the table. By doing this the attendees is encourage and forced to explain the idea to the solution more in detail until everybody is convinced.

##### ***11.1.1.3 Procedure***

A brainstorming was carried out with several members of FUNC staff; people from product development, marketing and economics attended. Some were frequent users of headsets some don't. Some used their headset for gaming, and some did only use it for telephone calls via voice over internet protocol (VOIP) applications such as Skype, Ventrilo or TeamSpeak.

Although, the brainstorming didn't turn out as expected as the attendees didn't follow the rules and were very eager to turn down ideas that they didn't like. The moderator took therefore the opportunity to change the aim of the brainstorming and converted it into a focus group instead, since the brainstorming didn't clearly work out as expected.

### 11.1.1.4 Result

With the results at hand from the brainstorming with FUNC’s staff, didn’t add any solutions that weren’t already known by the project group. Although the discussion gave some side information, for example on how they used their headsets and what new functions they wanted to add.

### 11.1.2 Sketching

During the development of the headset for FUNC; sketching was used to enhance the development process and to be able to communicate the different functions and shapes both in between the design team and towards FUNC. Parts including the different groups from chapter 6.3 Known functions were considered but also new components such as the cable connection design was accessed. A vast number of sketches were produced in this stage, everything from small thumbnail sketches to computer aided renderings depending on what the end purpose was, see figure X – Thumbnails.

## 11.2 Output – Idea generation

From creative idea generation methods varied approaches were recognised to solve the different features on the headset.

### 11.2.1 Microphone

From the idea generation a vast amount of solutions of different microphones was introduced, see Figure 22. Microphone ideas and Table 4. Microphone ideas.

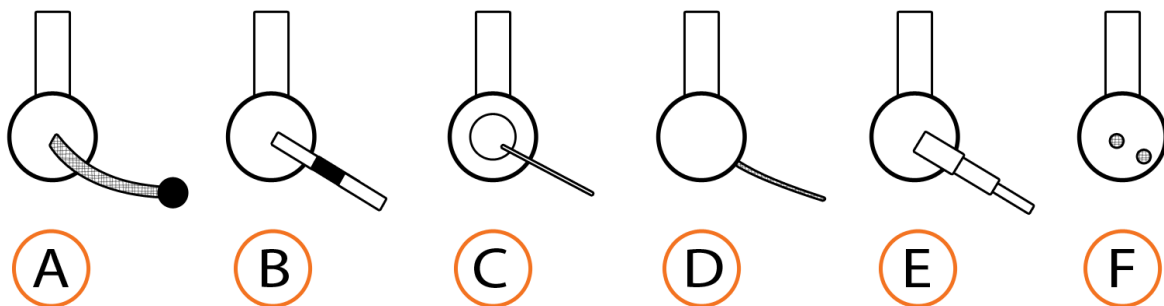


Figure 22. Microphone ideas

Table 4. Microphone ideas

Microphone ideas	
<b>A</b>	A flexible but fixed wire that can bend in different angles and positions
<b>B</b>	A solid arm that is divided by a rubber middle part that makes it flexible in a horizontal way
<b>C</b>	A hard pipe solution with a transparent material which makes the microphone more discrete
<b>D</b>	A flexible wired drag in/out solution that is hidden within the actual structure of the ear cup
<b>E</b>	A telescopic arm
<b>F</b>	A non-arm solution that works in similar way as several in ear Bluetooth headset on the market, with dual microphones and active noise cancellation.

### 11.2.2 Headband

To be able to extend the headset down to the desired location of the user’s ears, an extension mechanism were invented according to the requirement specification and the user interviews. From

these demands several ideas of how that mechanism could operate were developed, see Figure 23. Headband ideas.

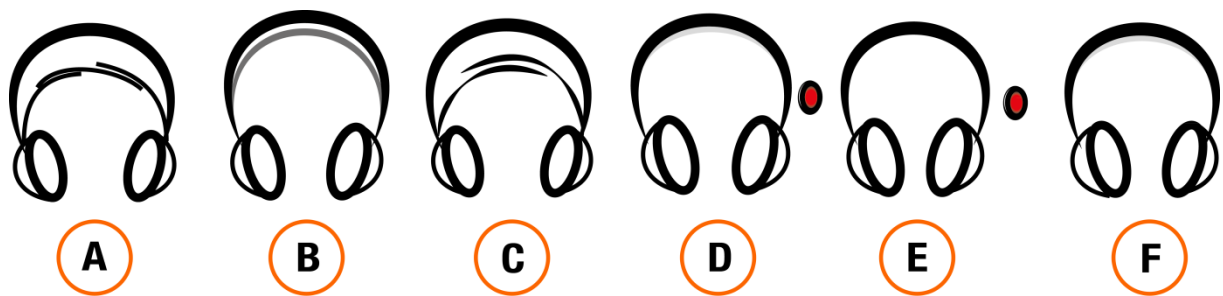


Figure 23. Headband ideas

- A. Dual headband with triple folding headband
- B. Dual headband with self-contracting mechanism
- C. Dual headband with dual folding headband
- D. Single headband with self-contracting mechanism with safe button
- E. Single headband with safety button
- F. Single headband with self-contracting mechanism

### 11.2.3 Interface

The interface is the main tie between the product's functions and its user. Several notes were taken on today's interface; their clumsiness was emphasized as a big problem of today's competitors, hence that the volume and mute control was located in the cable itself. Therefore a high focus was pushed towards getting a new and fresh interface that excluded these problems.

Several new ideas were processed with a high focus on usability, since the ability to feel beyond the sense of hearing what respective control shows. The objective as an interface got therefore divided into two parts; the volume, see Figure 24. Interface, volume ideas, volume and the microphone mute function, see Figure 25. Interface mute ideas.

From the earlier research phase several ideas on standard or already known solutions were presented and taken into account when designing the new interface, see chapter 9.2 Known functions.

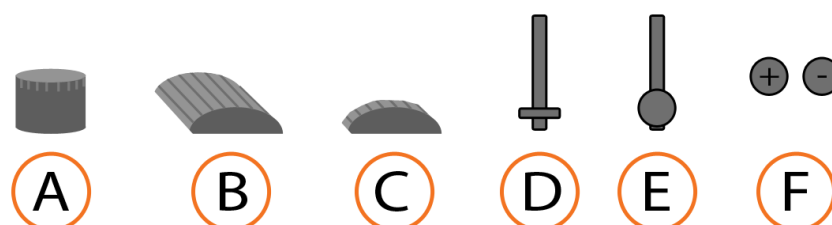


Figure 24. Interface, volume ideas

- A. A regular knob that the user turns to adjust the volume.
- B. A wide scroll wheel the user turns to adjust the volume.
- C. A thin scroll wheel the user turns to adjust the volume.

- D. A slider that the user slides to adjust the volume, hence the volume can be felt by the senses hearing and touch.
- E. A combination between the knob and the slider, the user turns the knob to adjust the volume and it slides and cannot accidentally slide without the users' knowledge, hence the volume can be felt by the senses hearing and touch.
- F. Two buttons, a positive and negative adjustment of the volume.

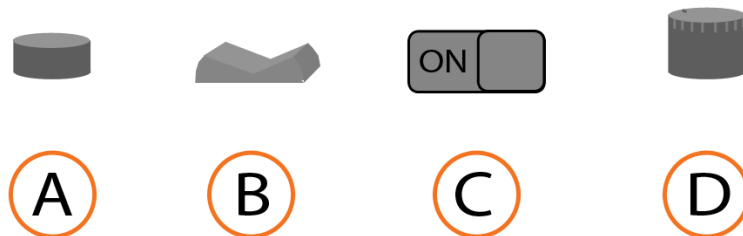


Figure 25. Interface mute ideas

- A. A regular button
- B. A flip switch
- C. A drag switch
- D. A knob with two positions

#### 11.2.4 Environment switch

From the interviews a special wish was noted, due to the fact that some of the interviewed had children, a wish for some sort of flexibility when it comes to sorting out different sounds came up. Sometimes they want to hear exactly what their child is doing and sometimes they want to be able to prevent other sounds to get in.

##### 11.2.4.1 Procedure

A process that could bring a solution to this problem was therefore put in place.

From this process which was mainly done by sketching and brainstorming several ideas was brought up.

- A. A hatch that is opened, which lets in the sound that the user wants to hear
- B. A electronic based system similar to systems used by the military that uses external microphones to let the important sounds pass to the user
- C. A active noise cancelling system also seen in today's military equipment

### 11.3 Evaluation

To ensure that the development of the functions and designs of the headset, both under the process and at the end had the right properties and shapes, several evaluation methods was i.e. mock-ups, positioning evaluation and morphological chart.

#### 11.3.1 Positioning evaluation

This method can be used to in a comprehensible way be able to choose from the given concepts, this by analysing the relationship of different attributes of value that corresponds to the goals in the project.

### 11.3.2 Morphological chart

Usually if one has made several solution based on the actual problem, one can use morphological charts to discover every possibility in the designs with these properties. The morphological chart is built up similar like a matrix where every dimension is a solution of a specific part of the product that the design team has development on its own. The designs are thereafter combined with one solution from each dimension and are together forming a total solution for the given problem (Cross, 2000).

## 11.4 Solutions

From the idea generation several solutions and modifications on different parts of the headset were derived. The solutions, microphone, headband, interface and environmental switch, are presented one by one to make it easier to understand them. An evaluation is also performed for each solution, to get an understanding about which solution was best suited for the headset.

### 11.4.1 Microphone

To narrow them down to a more reasonable amount of solutions a number of screenings took place. Firstly a simple evaluation where the most expensive and dissolute solutions were excluded such as the flexible but fixed microphone and non-arm solution with dual microphones, see Figure 26. Excluded microphones. Secondly a screening there the microphone arm was compared in a positioning chart by cost versus integration, where integration is the overall integration between the function and a headset as a whole and the cost is an estimation in the manufacturing process, see Figure 27. Microphone solutions rated by cost vs. integrated.

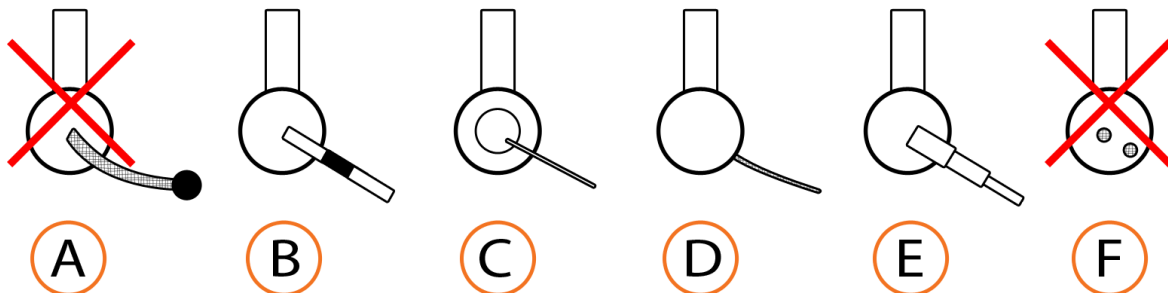


Figure 26. Excluded microphones

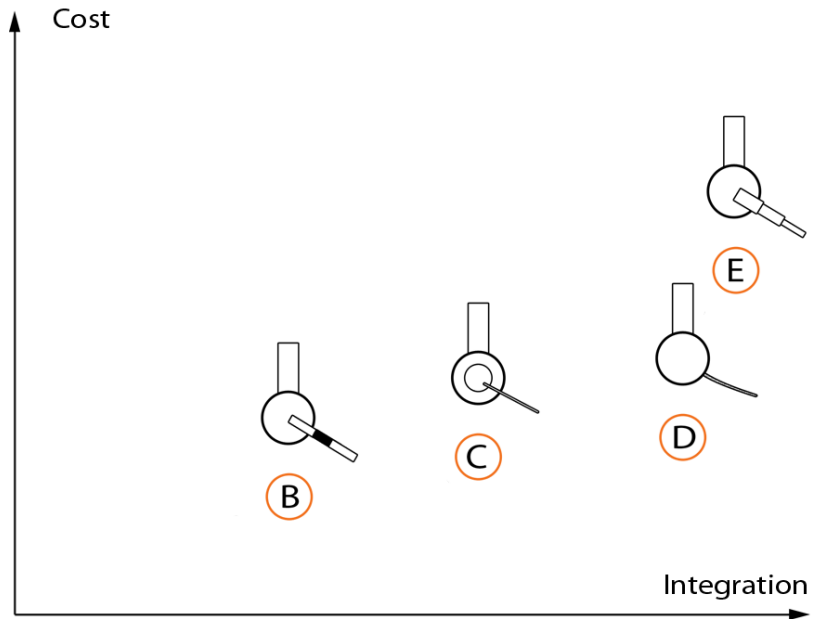


Figure 27. Microphone solutions rated by cost vs. integrated

### 11.4.2 Headband

With all the different solutions taken into account a massive number of solutions were available. To narrow them down and to get a good view of what paths in matter of different combinations that was available, a screenings were done by using a positioning chart where cost versus usability was taken into account, where usability a measurement for how well the user to understands and the product but also the needed amount of configuration in the scope of use, see Figure 28. Headband solutions rated by cost vs. usability.

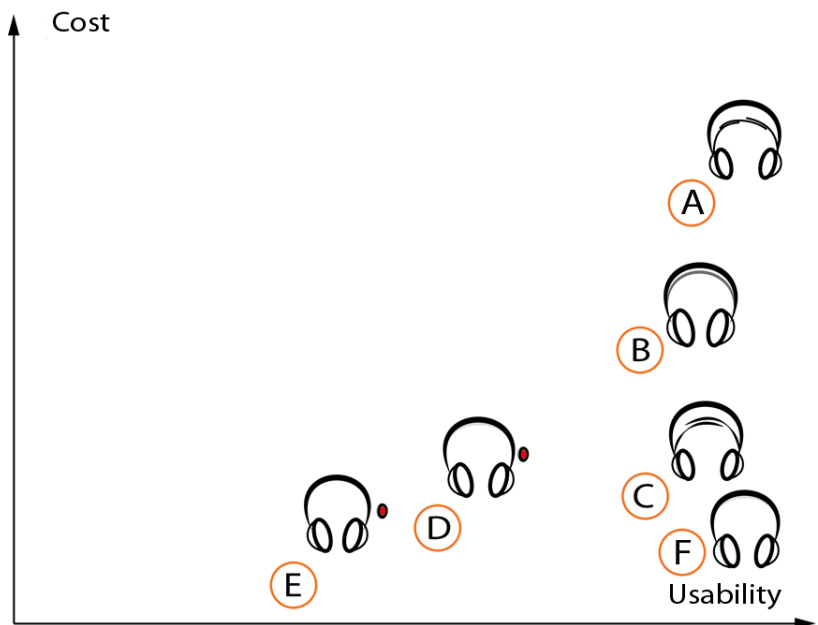


Figure 28. Headband solutions rated by cost vs. usability

### 11.4.3 Microphone and headband merged evaluation

From the two earlier evaluations with the positioning charts a second evaluation method called morphological chart were carried out to merge the two solutions; microphone and headband.

#### 11.4.3.1 Procedure

Two concepts were selected together with the morphological chart as an aiding tool in cooperation with FUNC. One to focus on and one as a backup in case if the first one didn't work as expected, see Figure 29. Morphological chart, headbands and microphones.

#### 11.4.3.2 Result

The concept that were chosen was the single headband with self-contracting mechanism with an automatic shrink mechanism together with a solid arm microphone that is divided by a rubber middle part (check mark).

In case this concept didn't work out as expected a backup was chosen (diskette), the single headband with safety button together with the same microphone as on the chosen one.

		(A)	(B)	(C)	(D)	(E)	(F)
(E)		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
(D)		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
(C)		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
(B)		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>		

Figure 29. Morphological chart, headbands and microphones

### 11.4.4 Interface

In comparison to other evaluation stages in this thesis, this one did not rely on any specific design method or technique. But more on hands-on studies in conjunction with the research phase. The studies indicated that the best placement for the two controls, e.g. volume and mute should be placed on the headset itself instead on the cable, seen on many headsets of today's market. Although these controls should neither be placed close to each other to minimize the chance of interference with each other.

#### 11.4.4.1 Result

The volume control should be placed far up on the backside of the headset, this to minimize the risk of unintentionally adjustment of the volume, which in return can damage the users hearing ability, see Figure 30. Interface placement, this because the part or spot of the headset is less likely to be interfered with when using the headset generally. Therefore should also the control itself be of such

type that it can't be adjusted in large steps, e.g. turning the volume knob 2 degrees should not raise the volume by 200% and it should neither be easy to accidentally slip when using the headset and therefore raise the volume.

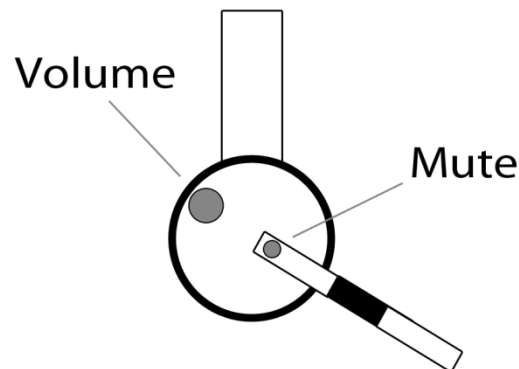


Figure 30. Interface placement

The control that were chosen was the thin scroll wheel, this since that solution did not compromise the overall shape of the headset but on the same time had a low risk of accidental raising of the volume in any way.

The mute control is placed on the microphone itself, this to make it easier for the user to be reminded of how to mute the microphone. A regular "push-in" button was chosen because it did not compromise the headsets comfort when pushing it.

#### 11.4.5 Environment switch

Together with FUNC an evaluation was done, the sound switch solution was chosen since it was the only solution that didn't require an external power source. Although, the wish as an environment sound solution got turned down due to the fact that the sound picture gets altered, which is hard to control (Yamaha, personal contact 2011-07-09).

### 11.5 Discussion

During the development a method called brainstorming was used to generate new ideas regarding the functions for the new headset. This session was done with FUNC staff which didn't result in an expected way. Often a session of brainstorming is good to generate a lot a new ideas and surrounding information. But due to inexperience of the actual method, even though it was clearly specified the brainstorm did not result in any new ideas. On the other hand, it did bring up a lot of user experience and side information, similar to a focus group. The design team did therefore shift focus in the middle of the process to gain as much info as possible since they had a good discussion between users.

Another method called Morphological charts was also modified to suit the design teams need. Instead of generating new ideas from the two factors of different functions, the matrix was used in an inverted way to exclude the combinations that wasn't doable or did cost too much money to carry out.



## 12 Development of shapes, outputs & evaluation of shapes

In previous stages the functions have been developed and the next important step was to develop the headset shapes. By sketching in different ways the headset could be developed further. Also computer modelling was an important part in the next stage. The sketching and computer modelling final lead to shapes. Also by deriving all technology before attempting to design any shapes, the actual shape generation could be narrowed down much easier.

### 12.1 Shape exploration

By an iterative sketching process were the design team both developed sketches side by side, but also on their own where they only had re-occurring meetings where they discussed their progress. In the beginning a massive amount of primitive thumbnail sketches was produced this to in a fast way develop a favoured shape, Figure 31. Sketched thumbnails. These shapes were later on screened and a developable amount of sketches were chosen for further process.

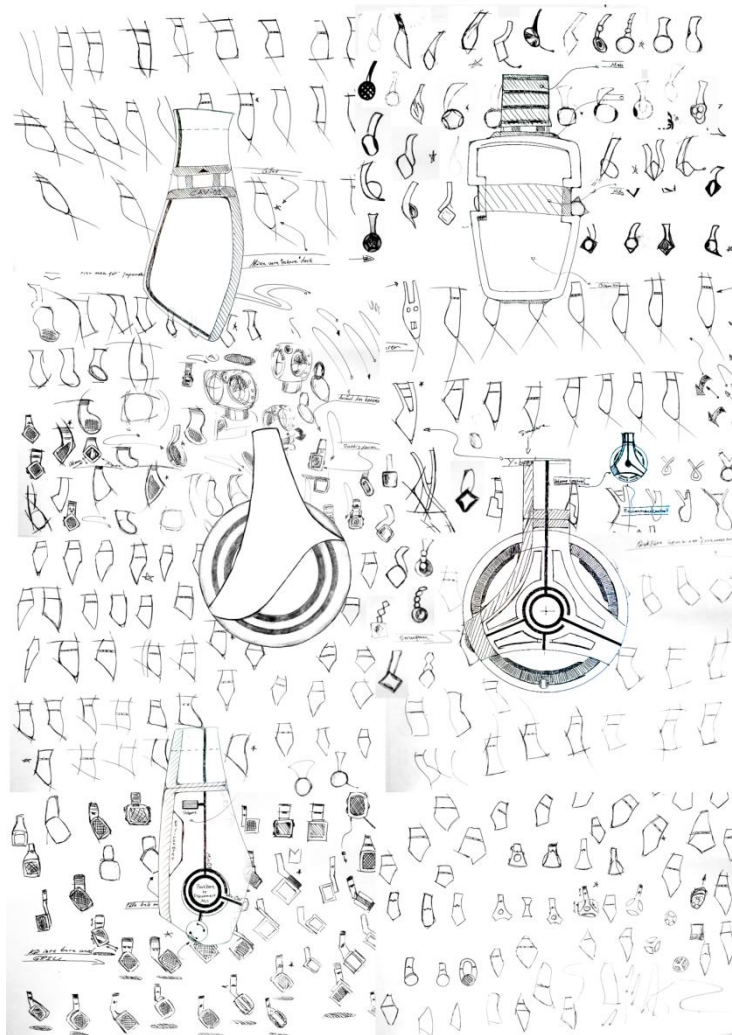


Figure 31. Sketched thumbnails

## 12.2 Shape development

With the screened shapes at hand further development through more advanced rendering was done, both using markers but also Photoshop. This to bring them to as an advanced level as possible before making any 3D-models, these renderings did not aim to be as realistic as possible but to describe the actual form as good as possible, see Figure 32. Six Photoshop renders of headsets with the microphone excluded. During this step, the aim for an integrated shape with flowing lines was also followed tightly.

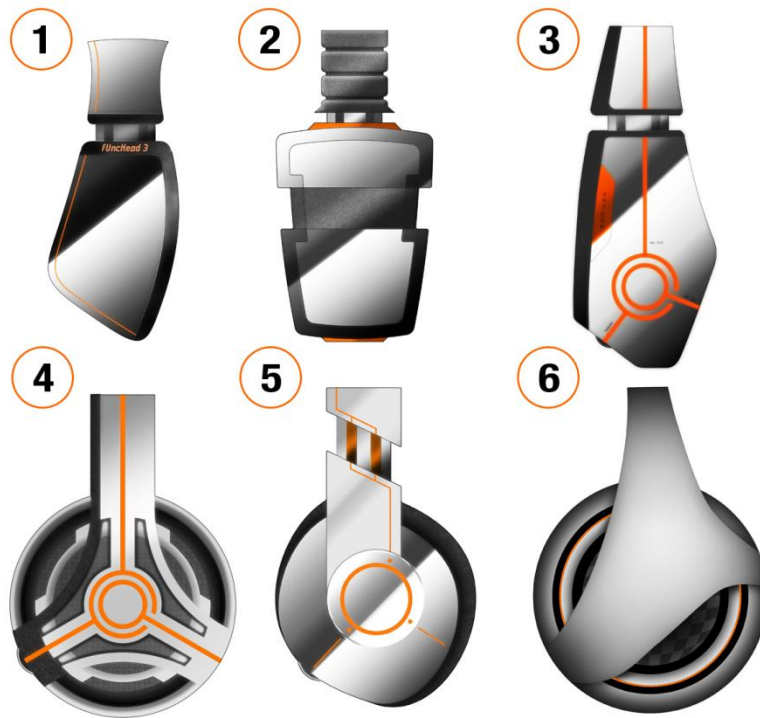


Figure 32. Six Photoshop renders of headsets with the microphone excluded

These renderings were later on presented to FUNC which did not like shape number 2, which therefore were excluded from the development, see Figure 32, #2.

## 12.3 Concept

The next stage of the development process was to combine the previous development of the functions and the shapes. With this in mind a merge were started, this by an iterative modelling process with the surface modeller Rhinoceros 4.0. Several models of each concept were built until satisfaction was met, see Figure 33. Modelling. The concepts did in this stage also exclude the microphone as this part was very much relying on which designs that were chosen. All designs in this stage were also bound strictly to the requirement specification created earlier, this to narrow down the number of unrealisable concepts.



Figure 33. Modelling

The concepts could be divided into two different groups, one where the design was of a more flowing and integrated character, see concept A and B, and one where the design was more of a geometric one which fit the company due to its roots Shapes from USA, see concept C, D and E, all in the range of the requirements that was set up earlier. One element that is consistent through all concepts is the orange colour and the steel grey appearance.

### 12.3.1 Concept A

The focus for Concept A was to get an integrated shape that felt hovering, see Figure 34. It feels feminine by its curvy shape. It has influences for the image board with sweeping shapes and distinct edges. It has a room for the user's ears.



Figure 34. Concept A

### 12.3.2 Concept B

Concept B has a masculine and edgy appearance. Also this concept has an integrated shape and is a development of Concept A. The shape differentiates from the competitors on the market today by its integrated and angular shape. The edges are distinct and the concept has a strong expression, see Figure 35. The integrated shape has been a goal for this concept from the beginning.



Figure 35. Concept B

### 12.3.3 Concept C

Concept C has a more ordinary shape. The shape is simple but has details that make the concept more visually interesting, see Figure 36. It has a more integrated shape than other headsets on the market today. The concept feels balanced and creative. The triangular shape has been a strong influence in the development of the concept.



Figure 36. Concept C

### 12.3.4 Concept D

Concept D has a unique expression with a mixture of strong and soft form elements, see Figure 37. It has many details that give it an interesting shape, and the details build the concept, it feels balanced and hovering.

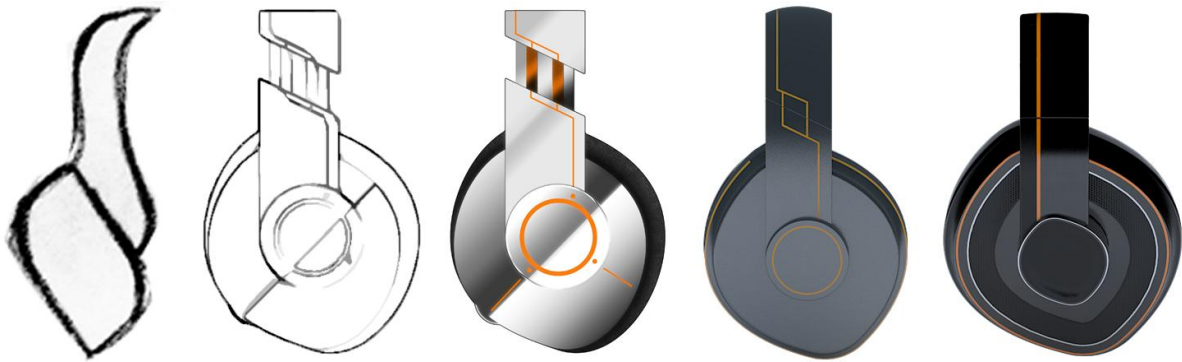


Figure 37. Concept D

### 12.3.5 Concept E

Concept E has an interesting shape by its many details and unequal sides, see Figure 38. It has a direction that is distinct for the concept and show how the headset shall be placed on the head. The concept has sweeping lines and details that feel hovering. The details and the form elements inside the shape, builds the unique expression in the concept.

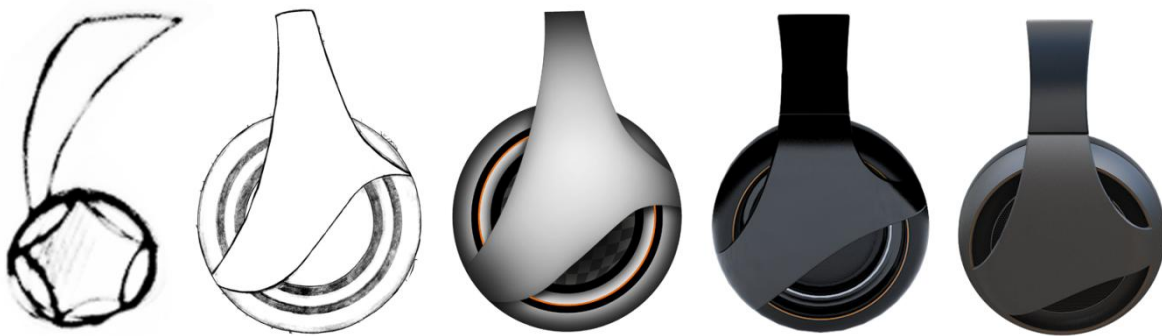


Figure 38. Concept E

## 12.4 Evaluation

To evaluate if the concepts met the requirements that the project group and company FUNC had put up; several gates of evaluation methods were done to be certain that the right concept were chosen for final development.

### 12.4.1 Evaluation towards the research, survey

According to Jordan, 2002 one can evaluate if the current design of a product has followed. By utilizing a survey based on antonyms that have been correlated with the image board and the qualities that were supposed to be associated with the headset itself.

#### 12.4.1.1 Procedure

The survey was sent out to 18 applicants. Seven pairs of antonyms were extracted from the research e.g. futurism, proper, living room, light, hovering, dull and new thinking. Along with 5 adjacent areas that also could correlated with the image board to get a good combination and to prevent answers based on preconceptions. Examples of the antonyms; retro – modern, light – heavy, living room – office, etc. see Appendix D – The Survey. Three questions were also made to verify if the headset; was pleasing, if the user wanted to buy the specific headset and if it emanated quality.

These antonyms had also specific weights attached to them; this to weight the different antonyms towards each other. The seven antonyms extracted from the research were worth two points than the additional five that only was worth one, if the user chose a faulty antonym that was worth minus one point, these values were on the other hand not known by the applicants of the survey.

**12.4.1.2 Result**

Concept C got 56 % of the weighted votes, users thought that concept C were a proper headset that should fit in a living room, light and hovering were also associated with the concept. This tight followed by concept E with 54 %, which also were seen with the similar features as concept C, but instead with the properties futurism, dull and innovation. Followed by B, A and D with 42 %, 39 % and 36 % each, see Figure 39. A more detailed version can be seen in Appendix D – The survey.

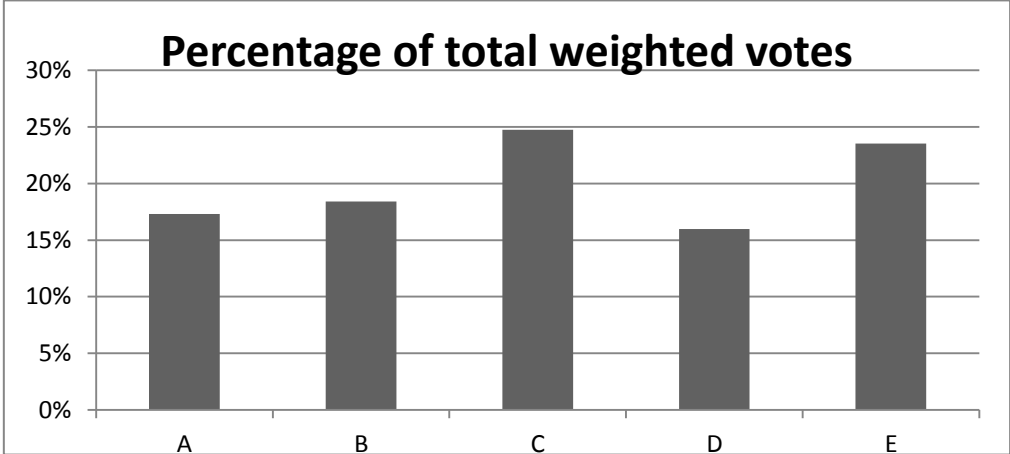


Figure 39. Survey score

**12.4.2 Weighted Objectives Method**

**12.4.2.1 Theory**

The Weighted Objectives Method compares different concepts but also competitors by an in-depth analysis of each of the feature that builds up the product or that the designer wants to be fulfilled.

**12.4.2.2 Method**

This method compares the most necessary requirements with each other to easier see which requirements are of most importance (Cross, 2000). The comparison method investigates if a requirement A is more important than the requirement B. This results that all requirements got a value of one or zero and in the end a percentage, which can then be used in a matrix in which the concepts are compared towards each other, see Figure 40.

IDEAS/Requirments																				Total	Rank (place number)	Abs. % (i.e. total/total sum)	
Cost	Aestetics	Not stand out	Consistency	Differ from competitors	Quality feeling	Integrated	Dull and ease	Levitating	J	K	L	M	N	O	P	Q	R	S	T				U
A	B	C	D	E	F	G	H	I													8	1	0,22
A	A	A	A	A	A	A	A	A													6,5	2	0,18
	B	B	B	B	F/B	B	B	B													4	5	0,11
		C	D	C	F	C	C	C													5	4	0,14
			D	D	F	D	D	D													0	9	0
				E	F	G	H	I													6,5	2	0,18
					F	F	F	F													2	7	0,06
						G	H	G													3	6	0,08
							H	H													1	8	0,03
								I															0
									J														0
										K													0
											L												0
												M											0
													N										0
														O									0
															P								0
																Q							0
																	R						0
																		S					0
																			T				0
																				U			0
																					Total sum	36	100

Figure 40. Comparison matrix

The concepts are rated on a scale of one to five, there one doesn't meet the requirement and five meet the requirement very well. The concepts are scored and then multiplied by the percentage that the requirement had received from the comparison matrix.

#### 12.4.2.3 Procedure

The procedure was followed according to the given methodology. All the concepts plus two additional competitors; Sennheiser and SteelSeries were evaluated in the method. These competitors were selected due to the fact that they both scored high and low depending on the age of the user, see chapter 8.4 Result from all studies

#### 12.4.2.4 Result

The result from the weighted objectives method showed which concept that was the best one to develop further. The concepts with the highest scores were C and E, to be noted Sennheiser did also score good regarding it is a competitor, Figure 41.

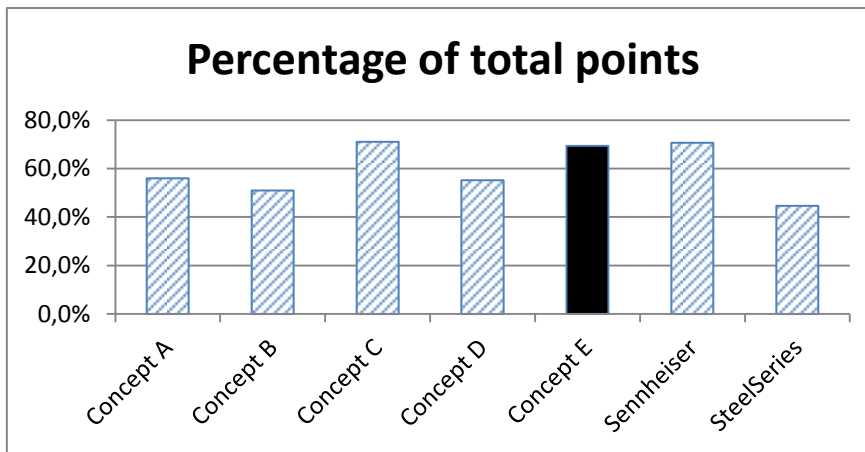


Figure 41. Result, weighted objectives score

## 12.5 Conclusion

With the results from the concept evaluation in mind a conclusion with the company were made. Together, concept E were chosen for final development and adjustment, see Figure 42. Even though it didn't get the best grade concept E was chosen due to its lack of symmetry which made it more interesting than concept C.



Figure 42. Chosen concept

## 12.6 Discussion

By using antonyms in a survey to secure that the design team had followed the given specifications earlier in the project was a fruitful technique. Good antonym values could be correlated with amount of points that the user had rated the design with. Therefore an assured selection could be done.

The weighted objectivities method did also summarize all the data from the earlier methods in to one value. The concepts could therefore be compared to each other but also its competitors at the market.



## 13 Final concept

### 13.1 Detail development

A number of changes were done to the chosen concept E, this to assess the problems associated with the concept that was identified during the evaluations.

Smaller ear cups, since the current ones were too big in contrast to the rest of the headset, see Figure 43, A. Since the ear cups got smaller in diameter, they had to increase in depth to access the volume of the speaker. Although, these changes wasn't satisfying in an aesthetical way, therefore the inner dome had to be made higher than the other dome to access the same amount of volume. Due to the changes of the ear cups an alteration of the outer dome surface had to be made, see Figure 43, B. This also made the outer arm more integrated in the shape. To make the headset as comfortable as possible a hinge were introduced to be able to slant the ear cups into a good position when using them, see Figure 43, C. The other arm that extends from the dome shape got thicker because the microphone attachment mechanism should fit; on the other hand did the headband remain the same, see Figure 43, D. The microphone was added and followed the same form language as the rest of the headset, see Figure 43, E.

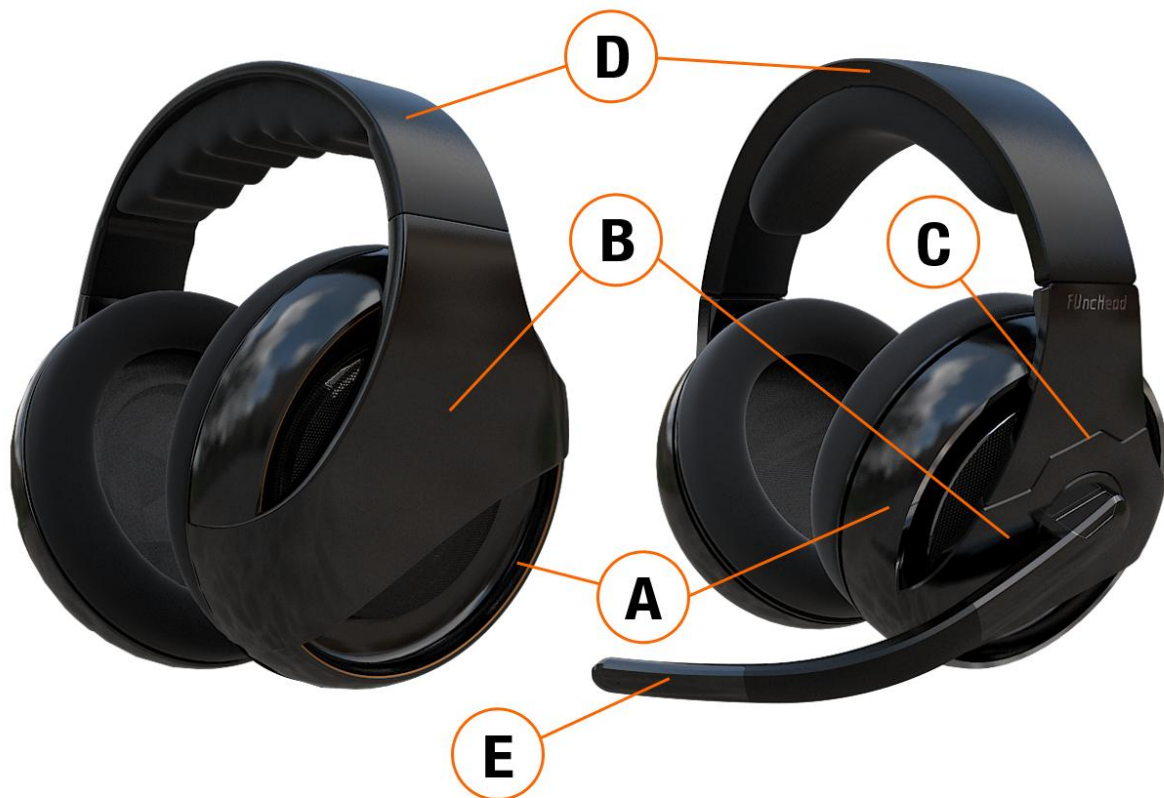


Figure 43. Comparison perspective

A 3D-print of the final shape were also made to get a good understanding how the shape felt in a 1:1 scale, see Figure 44. 3D-print. The company FUNC came also after this 3D-print to the conclusion that the ear-cups had to be smaller, even if it meant to discard some of the users in an ergonomically perspective.



Figure 44. 3D-print

### 13.1.1 Microphone

The microphone was developed the same form language as the headset and the ideas from the function phase. By using these shapes the microphone arm got integrated and did not protrude as much as on other headsets, since that was one of the main goals with the design of the headset.

The microphone that was incorporated was a standard microphone arm. Even though this solution didn't have a high innovation approach FUNC didn't want to risk a higher cost.

### 13.1.2 Headband

With the idea evaluation from chapter 11 Development of functions, outputs & evaluation of functions, in mind a more precise model was developed. By incorporating a rubber band within the structure of the headband and fastened it to both of the extenders in the extension on both sides of the headset. The headband has therefore a self-shrinkage mechanism that shrinks the headset to the contracted size every time the users don't have it on their head. This also removes the action to check if the headset doesn't align right when the user puts a headset on the head.

### 13.1.3 Interface

The volume control was placed far up on the backside of the headset, see Figure 45. Interface, mute and volume wheel. The mute button on the other hand got placed near the central area of the microphone. With a pinch grip the button is easily pressed to mute all sound that is received by the microphone. The user can also in an easy way feel if the button is pressed or not to know if it is muted.



Figure 45. Interface, mute and volume wheel

### **13.2 Manufacturing**

In cooperation with FUNC, methods for manufacturing were discussed due to the fact that all pure engineering work is outsourced for their part, its therefore important to note that these proposals is only suggestions for FUNC to evaluate.

Injection moulding was a method that was chosen for the main body of the headset due to the large batch size and the complexity of the parts (Ashby & Johnson, 2009).

Material vice for the headset ABS plastic was chosen as the main material due to its sturdiness and good sustainability, and it's also good from a recyclability perspective. Secondly TPE was chosen for the plastic parts in the headband due to its flexibility. For the padding at the ear cups and on the headband a velour cloth was chosen since the positive reaction to it in the interviews, but also for its durability. For the outer speaker, a metal mesh was chosen to protect the inner speaker. The audio- and microphone cable will be braided with a cloth material for flexibility purposes and the ends will be a regular 3.5mm audio jack in black and orange plastic.

### **13.3 Description of features**

With all data in hand a description of the most important features could be assembled. The headset as a whole can be derived into seven technical parts, e.g. the elastic strings that hold the two ear cups at a contracted state when not used, but will extend the size of the headset on the fly depending on the size of the users head, see Figure 46. Different functions and Figure 47. Microphone functions.

Secondly the link extension that connects the headband and the two ear cups but also permits an total extension of 50 mm which includes at least 95 % of the American population. Third, the hinge which allows the ear cups to rotate in a Y-axis to make the headset more comfortable. Fourth, the interface which is placed on the actual headset to permit the best user experience. Fifth, the detachable cord that induce an easier overall use but also an easier transport of the headset. Sixth, the detachable microphone which permits an everyday use not only next to the computer. Last but not least, seventh, the headband and ear cup cushions which contains of a soft and dirt resistant velour cloth.



Figure 46. Different functions

## Microphone's functions

### Functions of the rotation

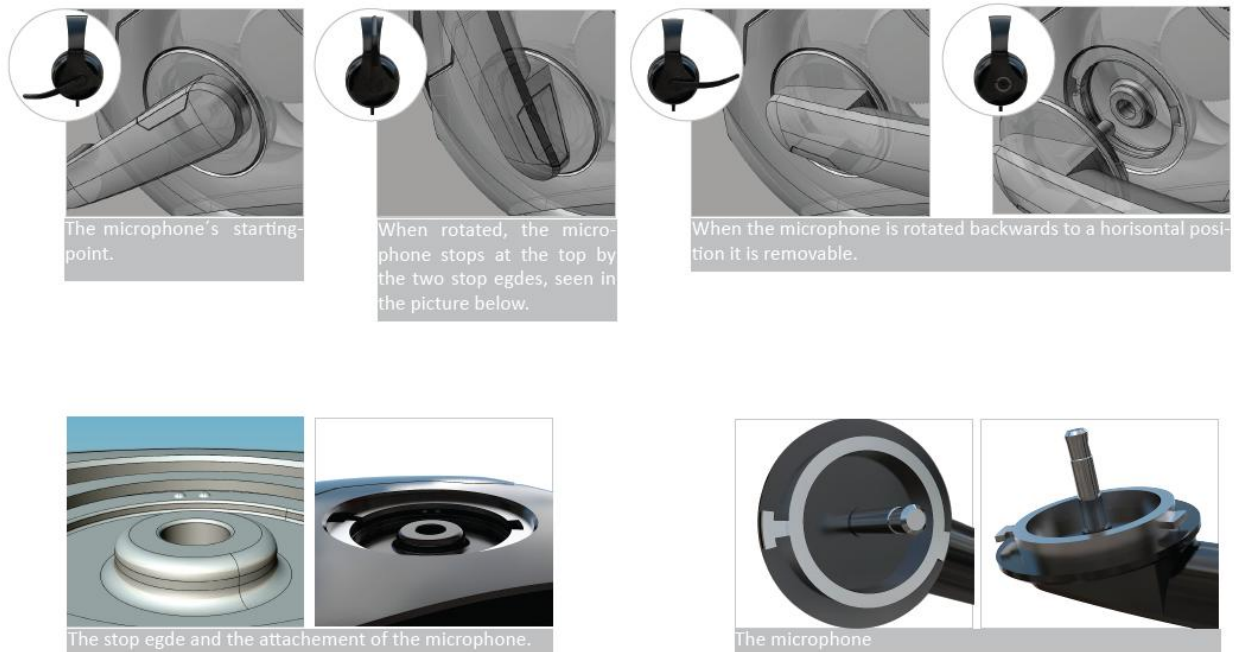


Figure 47. Microphone functions

### 13.4 Correspondence of requirement specification

In the beginning of the project several requirements were specified and along the project more and more requirements were added. In chapter 10.3 Requirement specification were a requirement specification set. Now, when the concept is finished it is important to go through the requirements to analyze that the most important requirements are fulfilled. Not every requirement has been fulfilled because the headset isn't a manufactured product, it's a concept. Requirements regarding ergonomics and comfort are thought upon but cannot be evaluated because of there isn't a product that can be evaluated with real people, the evaluation of these requirements are theoretical, see Table 5. Correspondence of requirement specification.

Table 5. Correspondence of requirement specification

<u>Attributes</u>	<u>Explanation</u>	<u>Wish/ Demand</u>	<u>Correspondence</u>
<b>Main requirement</b>			
Transmit sound		D	Yes
<b>User</b>			
Affordable		D	Yes
Attract target group		D	Yes
Be comfortable		D	-
Good usability		D	Yes
Aesthetically appealing		W	Yes
Bring added value		W	Yes
Confident		W	-
Customization		W	Yes
Mature and adult		W	Yes
Reliable feeling		W	-
Self-Confidence		W	-
Tactile feeling		W	Yes
Well-thought-out product		W	Yes
<b>Aesthetics</b>			
Express image board		D	Yes
FUNC colours	Orange and black	D	Yes
Not stand out	Blend into the home environment	D	Yes
	Discrete product	D	Yes
Uniqueness		D	Yes/No
Clean		W	Yes
Consistent		W	Yes
Geometrical forms		W	Yes
Heavy		W	No
Large details and radiuses		W	Yes
Neat		W	No
Oversized		W	Yes

Solid shape		W	Yes
Sweeping lines		W	Yes
<b>Company constraints</b>			
Adult	<i>25-45 years old</i>	D	Yes
Casual & Gamers	<i>~ 50h/week</i>	D	-
Circumaural/full-size headphones		D	Yes
Communication tool		D	Yes
Contribute interest		D	Yes
Driver	40mm	D	-
Give information (about brand)		D	Yes
High end product		D	Yes
Manufacturing, tooling	<i>\$20k-\$35k</i>	D	-
Manufacturing, unit	<i>\$25 - \$35 per unit</i>	D	-
Praiseworthy	Price restrictions	D	Yes
Reliability		D	-
Self-confidence		D	-
Well-thought-out		D	Yes
Intuitive solutions		W	Yes
Recognition in form language		W	Yes
Well-designed solutions to affordable prices		W	-
<b>Ergonomics</b>			
Ear breadth, min/max	<i>26-39mm</i>	W	Yes
Ear length, min/max	<i>49-76mm</i>	W	Yes/No
Ear to top of the head, min/max	<i>106-151mm</i>	W	Yes
Head breadth in front of ears, min/max	<i>115-167mm</i>	W	Yes
Weight	<i>max: 320g</i>	W	Yes
<b>Performance &amp; Function</b>			
Adjust volume		D	Yes
Be sturdy		W	-
Connection	<i>analogue 3,5mm plug</i>	D	Yes
Ear muffs - velour		D	-
Durability	Life cycle 2-3 years	D	-
	Durable	D	-
	Impact resistant	D	-
	Work without hassle	D	Yes
Good ventilation capability		D	Yes
Speaker front air volume	<i>22,6cm<sup>3</sup></i>	D	Yes
Speaker back air volume	<i>59,5cm<sup>3</sup></i>	D	Yes
Feel/see that the headset is on mute		D	Yes
Transport sound	Emit sound	D	Yes
	Pick up sound	D	Yes

	Transport sound	D	Yes
Sound	Increase sound quality	W	-
	Maintain sound recording	W	Yes
	Shut out noise	W	No
	Hear important information	W	Yes
Microphone	Move away from the face	W	Yes
	Detachable	W	Yes
	Invisible	W	No
Cord	Right length	W	Yes
	Detachable	W	Yes
	In textile	W	Yes
Allow to place it on one ear		W	-
<b>Usability</b>			
Be versatile (by twisting)		D	Yes
Comfortable - long time use		D	-
Easy to understand		D	Yes
Easy to use		D	Yes
Fits the user, without adjustments	Adjust size	D	Yes
	Be adjustable	D	Yes
Good quality		D	Yes
Easy to untwist		W	Yes
Feedback		W	Yes
Involve the human senses		W	Yes
No small parts		W	Yes
Simple connections		W	Yes
User-centered		W	Yes

It is important that as many requirements as possible are fulfilled. Since the headset is just a concept; it is not possible to evaluate if all requirements are fulfilled. Early in the project it was stated that the new headset shouldn't stand out. This means that, it shall fit into the users' home. This requirement is met by the colors and shapes which is subtle and neat; which the survey shows. Although the project the image board has been a communication tool, and by having it as an inspiration the headset has strong connections with the image board. The geometrical shapes to answer to the requirement from the shapes from USA. The headset's distinctive shape in combination with its colours makes the products stand out.

Requirements such as tooling costs, unit costs and life in service for the headset are in the current situation impossible to evaluate, it depends on the company, and their choice of material, manufacturing tools and solution, the project group can just have suggestions of how to solve it. All necessary components fit into the headset, and by this the requirement is fulfilled.

The headset fits the target group both by the aesthetical approach and the ergonomics. By several interviews and surveys the project group got positive responses from the target group. The ergonomically aspects are fulfilled, several studies have been made and the measurements that have

been found has been fulfilled. By working with dummy heads in the computer, the different measurements have been tested. But how comfortable the headset is cannot be evaluated.

The performance and function requirements were arise in the interviews with the target group; these requirements are fulfilled by the solutions, by e.g. the possibility to remove cord and microphone. Every solution is adjusted to fit the users' wishes. By having changeable parts the users just needs to replace one part, if broken.

The headset is easy to understand by simple solutions and clear functions. It is consistent by visual elements. The functions of removable cord and microphone etc. are simple connections that are easy to understand for the target group. The headset is designed with a focus on the user; by simple functions and simple signs the product becomes easy to understand. The headset has a mixture of well-known technology and new shapes and forms.

The user can easily understand how to move the microphone away from the mouth and the user gets feedback when the microphone comes to the upright position. The user also gets feedback when the microphone is pushed further back and eventually comes to a position where the microphone can be taken out. In the third position the user also gets visual feedback by the headsets appearance change to another direction see Figure 47. Microphone functions.



## 14 A headset for gamers – the new product

The new headset for FUNC is an innovative product with its headband solution that stands out on the market. The self-contracting mechanism has several pros against its competitors and is a good flagship product for the company as a first product in many years.

So does also the detachable microphone, which signals to the user that this product is not only focused on a gaming experience. This does also unlock new possibilities, like listening to music in their living room or have it connected to the TV, without the hassle of having a large microphone attached to their head. To support this use in a larger span, the braided cable will also be detachable from the headset itself. To in an easy way reach volume and mute functions, that has been placed on the top backside of the headset. This will allow an easier everyday use without having the hassle of get the volume/mute control jam between the table and the chair, but also to get rid of the concern for raising the volume and accidentally hurt the hearing.

To secure an everyday use in many years the ear cushions will be of a velour based cloth material that feels soft against the skin, but also doesn't get sweaty in matter of minutes. The cushions will also be changeable to assure a great service for the end-user. This does not only serve as goodwill towards the end user, but also will make the headset a product that doesn't impact as much to the environment as other.

With the flowing and integrated shapes the headset is well adapted to the forms that statues the company itself, this will also serve as an origin in the forthcoming products of FUNC, see Figure 48. The headset. The headset is targeted to adult gamers who have an urge for design and quality for an affordable price. It has also a contemplated thought to aid the targeted user as a more mature group; this thought does also imbue the whole company and its forthcoming products.



Figure 48. The headset

## 14.1 Form analysis

From the final headset and the first product from FUNC in a large span of years, several form correlations could be derived. These directions are substantial shape and form paths that the company can use for development of additional products and other media that circulates around it. These design directions are therefore very important to secure a clear image of the company, especially in its early days.

These correlations that could be found in the former heritage from mouse pads and the newly developed headset, is especially and long sweeping lines that can be found in the headband but also the microphone. Geometrical shapes can also be found in the areas of the ear cups, speakers and the mounting of the microphone, see Figure 49. Form analysis. The colours have been of importance in FUNC's heritage and the concept has suppressed and subtle colours in dark grey and a details in orange. The orange colour in contrast with the dark grey and the sweeping lines are features that are brought into new products, from the heritage.



Figure 49. Form analysis

A hovering look is secured due to the mushroom looking speaker and the overall design of the headset. The concept has a smooth shape with integrated buttons and mate surfaces, this give the user a feeling of calmness and comfort. Other details such as the chamfers, helps the headset to express its shape and functions; when you can't hide the unwanted, express it and take advantage of it. The headset becomes visually interesting, through lines running throughout the headset. The irregular shape contributes to the unique expression. The distinctive shapes are, for example, the direction and the feeling of movement in the products, see Figure 50. The headsets direction.

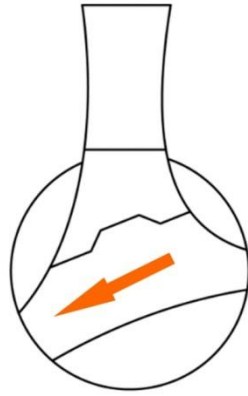


Figure 50. The headsets direction

## 15 Conclusion

With the new headset FUNC is becoming a company with self-esteem, it knows its capability. The company has three important values that the foundation relies on; self-confidence, well-thought out and reliability. These three values are also connected to the product and what the user shall experience when using a FUNC product.

The project resulted in FUNC's new product, a headset with new solutions and technology. Throughout the project the target group has been computer gamers in the age of 25-45 years old. The headset attracts this target group by its shapes and smart solution of the headband, detachable microphone and easy access interface.

The project started with a thorough examination, which gave an understanding about the users' needs and demands on the headset. By exploring the competition, a headset with new and unique solutions could be developed.

The headset has a clear link to its heritage by its shape and function. FUNC also has been known by its new thinking technology, which goes hand in hand with the new headset. Functionalities like having the interface regarding volume and mute is or should be a given fact when designing a new headset. The ability to make the headset dynamic regarding to use for multiple users should also be taken in consideration. By an analysis of FUNC; the shapes and colours are also kept in the new headset.

The headset differentiates itself from its competitors in the gaming industry; it aims at an older target group. The user is a central role in FUNC and is important for the new headset. It's the user that uses the product and it have to be both comfortable and functional. The product uses well-known technology in combination of new form elements.

The headset is a concept and further work has to be done before it becomes a product to manufacture, aspects such as material and drawings has to be set by FUNC and developed further.

The product has well-designed solutions to an affordable price. The user is the most central part in the headset and the goal is to make the users satisfied. When buying a FUNC headset the user will begin a journey and the user will discover more possibilities during the use of the product.

## 16 Discussion

To establish a good connection and to understand what FUNC wanted to become from the present was a bit hard in the beginning since they had very divided thoughts what the new FUNC should look like. Although this was resolved with a diligent use of image boards, that helped both the design team but also FUNC among them to understand what they really wanted with their company.

Another thought were also that the disintegration of a headset as such that imbued the whole project, can in some cases been too deep. It can therefore be possible that too harsh restrains have been set; on the other hand did these restrains help to prevent an endless amount of ideas and concepts to be generated. This also gave the design team a way to shift focus when designing the shapes since they had all data regarding technical aspects derived. It's therefore very important to research this depth in technical restraints before applying them to the process.

Even though some features that were less wanted were used in the end anyways due to company constraints and other factors. A good example on this were the microphone which was discussed early in the project, there were certain discussions going on about that it should be as invisible as possible in regarding to the overall headset. Although since a lot of efforts already had been allocated to the headband a decision was made with FUNC to choose a regular microphones used on many headsets today.

The use of different observation methods was also something that was fruitful, especially the group interviews that contributed a lot to the research. It can therefore be concluded that doing an interview were a very small amount of attendees are participating and that everybody can contribute on them self's without being in a total controlled environment where the interviewers are the only ones asking the questions. It's therefore very important that the interviewer are very objective and does only choose the topic if necessary. The important part in this session is the discussion between the two attendees. On the other hand did the focus groups with a larger span of attendees work out less productive, even though they had a lot to say, the depth of the facts didn't reach the same level as the group interviews.

Brainstorming is one example of what didn't work as expected. The participants were too involved in the product and hadn't an open mind of new ideas and they had problems to understand the brainstorming method. This was taken into consideration during the procedure and the brainstorming redeveloped to a focus group. By the focus group the views of the already existing product instead of developing new ideas.

Another very good outcome of this project was the survey that was made to evaluate the shapes that were developed for the headset. It became a very good tool to measure an otherwise very hard and diffuse goal which mainly consists of different images.

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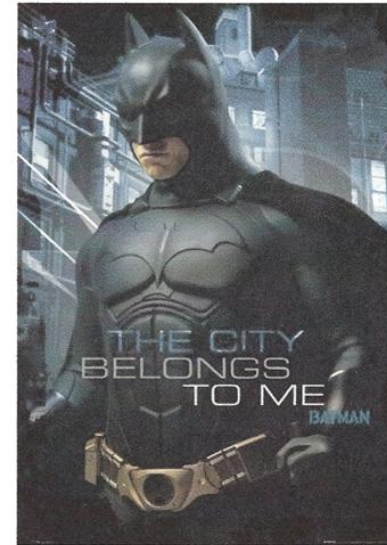
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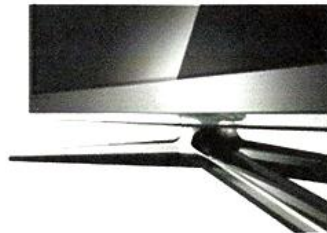
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## Appendix A - Inspiration images



Motivering: Bra kombination av futurism och minimalism, utan att bli för avskalad



Samsung 8 series LED TV.

Gillar kontrasterna mellan svart->Transparent. Futuristiskt och enkelt utan att vara rymdskepp. I ett rent snyggt intryck med raka långa linjer utan att vara kantig.



Audi R8, I mitt tycke en av de snyggaste bilarna som gjorts.

Enkel, dock med en "dold" råhet som man inte ser vid första anblicken. Speciellt den svarta kolfiberbågen som går i kontrast mot övriga chassiekropp.





Motivering: Alfa Romeo Competizione 8C, en av de snyggaste bilar ever made ☺ Runda och kurviga former utan att tappa coolheten och bli för mesig

## Appendix B – Combination of personas and the four pleasures

### Stefan

#### Physio-pleasure

The total product experience from the package to the product shall be of supreme quality

The visual, audio, tactile and even the scent of the product is of importance

#### Socio-pleasure

He is self confident and wants to show that through his choice of products

Has a mature/adult taste in products, but not "old and grey"

#### Ideo-pleasure

Likes contemporary design with a clean expression

Wants discrete products that are consistent with the environment.

#### Psycho-pleasure

High usability – easy to use

### Fredrik

#### Physio-pleasure

The tactile feeling must be good for the gaming products - the headset have to feel right

The feedback is important

The material shall have a good grip and feeling

The keyboard shall have mechanical switches

Good feedback time - no skipping

#### Socio-pleasure

The physio pleasure is more important and takes more space than socio.

He doesn't care about the socio status, the products' feeling is more important

#### Ideo-pleasure

He knows how the gaming industry works

He is more interested in the technical aspects of the products than the colour and shapes

#### Psycho-pleasure

Easy to use - Plug-and-play

Good quality

Support an advanced usage

Shall support some customization

## Maria

### Physio-pleasure

The tactile feeling of the product is of importance  
When she does buy a product she wants to touch it before it happen

### Socio-pleasure

She is more or less influenced by her boyfriend when deciding which product she shall buy

### Ideo-pleasure

Wants a discrete product  
Likes round shapes and interesting patterns

### Psycho-pleasure

Shall work and function without hassle

## Victor

### Physio-pleasure

It should look good  
Listens more on the shop keepers recommendation on products of good quality

### Socio-pleasure

He has a requirement from Sara to disguise his hobby. Therefore, the gaming accessories must not stand out

### Ideo-pleasure

When he is allowed to, he chooses preferable coal fiber looking products.  
The dream on the other hand is the Cyborg R.A.T. 5 mouse, purely made in coal fiber and steel.  
With this product, he would feel young again.

### Psycho-pleasure

It shall work and it shall not break easily

## Appendix C – Ergonomics

### Measures (mm) People Size 2008

#### Ear breadth

Min: 26

Max: 39

#### Ear length

Min: 49

Max: 79

#### Ear to top of the head

Min: 106

Max: 151

#### Face breadth, cheek

Min: 121

Max: 157

#### Head breadth, just in front of ears

Min: 115

Max: 167

#### Head breadth, maximum, above and behind ears

Min: 134

Max: 174

#### Mike length

#### *Ear to the back of the head*

Main: 77

Max: 119

#### *Mouth to back of the head*

Min: 169

Max: 221

#### *Sum*

Min:  $169-77=92$

Max:  $221-119=102$

# Enkät - Headsets

LÄS DENNA TEXT!

Tack för att du vill vara med och bidra till denna enkät.

Enkäten består av 5st koncept av headsets, dessa skall utvärderas individuellt, bläddra därför INTE igenom enkäten tack, utan ta en i taget!

Varje del består av två sidor, en sida med enbart bilder, stanna gärna en stund på denna sida och "ta in headsetet", efterföljande sida består av frågor.

Headseten kommer i ett utförande utan mikrofon, detta är något som vi kommer addera senare, så ta inte hänsyn till detta just nu. Det är också viktigt att inte funktionerna betryggsätts utan endast konceptens uttryck och utseende.

Denna enkät ÄR konfidentiell! Vilket innebär att du INTE får prata med någon om den.

Mvh Arvid Pålsson & Madlin Petersson

Ditt Namn: \_\_\_\_\_

Ålder: \_\_\_\_\_

A



A

Välj de motsägelseord som du tycker överensstämmer med konceptet. Du måste välja ett begrepp per rad!

- |                                 |                                   |
|---------------------------------|-----------------------------------|
| <input type="radio"/> Nutid     | <input type="radio"/> Futuristisk |
| <input type="radio"/> Retro     | <input type="radio"/> Modern      |
| <input type="radio"/> Passande  | <input type="radio"/> Opassande   |
| <input type="radio"/> Kontorer  | <input type="radio"/> Vardagsrum  |
| <input type="radio"/> Hetsig    | <input type="radio"/> Lugn        |
| <input type="radio"/> Svävande  | <input type="radio"/> Fastankrad  |
| <input type="radio"/> Lätt      | <input type="radio"/> Tung        |
| <input type="radio"/> Silten    | <input type="radio"/> Plöttig     |
| <input type="radio"/> Dov       | <input type="radio"/> Livful      |
| <input type="radio"/> Personlig | <input type="radio"/> Uttryckslös |
| <input type="radio"/> Mjuk      | <input type="radio"/> Kantig      |
| <input type="radio"/> Klassisk  | <input type="radio"/> Nytränkande |
| <input type="radio"/> Enkel     | <input type="radio"/> Komplicerad |



Betygsätt konceptet i en skala från 1 till 5 där fem är högst

Hur tilltalande är detta koncept?

- 1 2 3 4 5

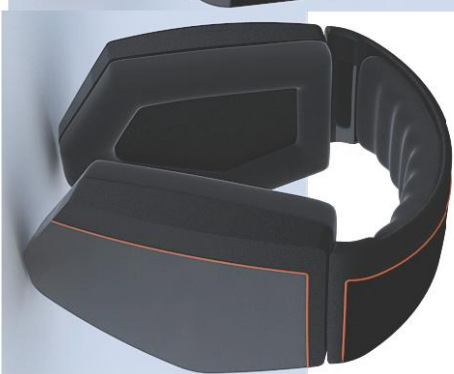
Skulle du köpa detta headset?

- 

Utsålar detta headset kvalitét?

- 

B



B

Välj de motsägelseord som du tycker överensstämmer med konceptet. Du måste välja ett begrepp per rad!

- |                                 |                                   |
|---------------------------------|-----------------------------------|
| <input type="radio"/> Nutid     | <input type="radio"/> Futuristisk |
| <input type="radio"/> Retro     | <input type="radio"/> Modern      |
| <input type="radio"/> Passande  | <input type="radio"/> Opassande   |
| <input type="radio"/> Kontoret  | <input type="radio"/> Vardagsrum  |
| <input type="radio"/> Hetsig    | <input type="radio"/> Lugn        |
| <input type="radio"/> Svävande  | <input type="radio"/> Fastankrad  |
| <input type="radio"/> Lätt      | <input type="radio"/> Tung        |
| <input type="radio"/> Stilen    | <input type="radio"/> Plöttig     |
| <input type="radio"/> Dov       | <input type="radio"/> Livful      |
| <input type="radio"/> Personlig | <input type="radio"/> Uttryckslös |
| <input type="radio"/> Mjuk      | <input type="radio"/> Kantig      |
| <input type="radio"/> Klassisk  | <input type="radio"/> Nyttänkande |
| <input type="radio"/> Enkel     | <input type="radio"/> Komplicerad |



Bebygg ditt konceptet i en skala från 1 till 5 där fem är högst

Hur tilltalande är detta koncept?  1  2  3  4  5

Skulle du köpa detta headset?

Utsålar detta headset kvalitets?

C



C

Välj de motsägelseord som du tycker överensstämmer med konceptet. Du måste välja ett begrepp per rad!

- |           |                       |             |                       |
|-----------|-----------------------|-------------|-----------------------|
| Nutid     | <input type="radio"/> | Futuristisk | <input type="radio"/> |
| Retro     | <input type="radio"/> | Modern      | <input type="radio"/> |
| Passande  | <input type="radio"/> | Opassande   | <input type="radio"/> |
| Kontoret  | <input type="radio"/> | Vardagsrum  | <input type="radio"/> |
| Hetsig    | <input type="radio"/> | Lugn        | <input type="radio"/> |
| Svävande  | <input type="radio"/> | Fastankräd  | <input type="radio"/> |
| Lätt      | <input type="radio"/> | Tung        | <input type="radio"/> |
| Stilen    | <input type="radio"/> | Plöttig     | <input type="radio"/> |
| Dov       | <input type="radio"/> | Livful      | <input type="radio"/> |
| Personlig | <input type="radio"/> | Uttryckslös | <input type="radio"/> |
| Mjuk      | <input type="radio"/> | Kantig      | <input type="radio"/> |
| Klassisk  | <input type="radio"/> | Nyttänkande | <input type="radio"/> |
| Enkel     | <input type="radio"/> | Komplicerad | <input type="radio"/> |



D



Betygsätt konceptet i en skala från 1 till 5 där fem är högst

Hur tilltalande är detta koncept?

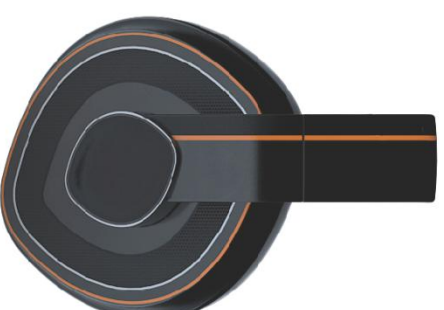
- 1 2 3 4 5
- 

Skulle du köpa detta headset?

- 

Utsändlar detta headset kvalitét?

- 





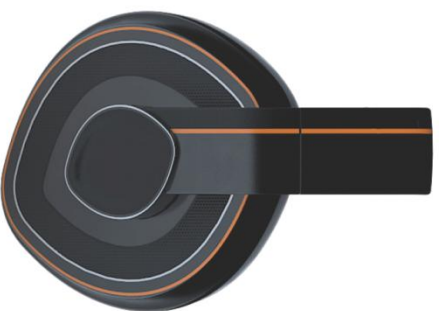
D

Välj de motsägelseterord som du tycker överensstämmer med konceptet. Du måste välja ett begrepp per rad!

- |                                 |                                   |
|---------------------------------|-----------------------------------|
| <input type="radio"/> Nutid     | <input type="radio"/> Futuristisk |
| <input type="radio"/> Retro     | <input type="radio"/> Modern      |
| <input type="radio"/> Passande  | <input type="radio"/> Opassande   |
| <input type="radio"/> Kontoret  | <input type="radio"/> Vardagsrum  |
| <input type="radio"/> Hetsig    | <input type="radio"/> Lugn        |
| <input type="radio"/> Svävande  | <input type="radio"/> Fastankrad  |
| <input type="radio"/> Lätt      | <input type="radio"/> Tung        |
| <input type="radio"/> Stilen    | <input type="radio"/> Plottrig    |
| <input type="radio"/> Dov       | <input type="radio"/> Livful      |
| <input type="radio"/> Personlig | <input type="radio"/> Uttryckslös |
| <input type="radio"/> Mjuk      | <input type="radio"/> Kantig      |
| <input type="radio"/> Klassisk  | <input type="radio"/> Nyttänkande |
| <input type="radio"/> Enkel     | <input type="radio"/> Komplicerad |

Betygsätt konceptet i en skala från 1 till 5 där fem är högst

- |                                   |                       |                       |                       |                       |                       |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Hur tilltalande är detta koncept? | 1                     | 2                     | 3                     | 4                     | 5                     |
| Skulle du köpa detta headset?     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Utsärlar detta headset kvalitén?  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



E



## E

Välj de motsägelseord som du tycker överensstämmer med konceptet. Du måste välja ett begrepp per rad!

- |           |                       |             |                       |
|-----------|-----------------------|-------------|-----------------------|
| Nutid     | <input type="radio"/> | Futuristisk | <input type="radio"/> |
| Retro     | <input type="radio"/> | Modern      | <input type="radio"/> |
| Passande  | <input type="radio"/> | Opassande   | <input type="radio"/> |
| Kontoret  | <input type="radio"/> | Vardagsrum  | <input type="radio"/> |
| Hetsig    | <input type="radio"/> | Lugn        | <input type="radio"/> |
| Svävande  | <input type="radio"/> | Fastankrad  | <input type="radio"/> |
| Lätt      | <input type="radio"/> | Tung        | <input type="radio"/> |
| Stilen    | <input type="radio"/> | Plöttig     | <input type="radio"/> |
| Dov       | <input type="radio"/> | Livful      | <input type="radio"/> |
| Personlig | <input type="radio"/> | Uttryckslös | <input type="radio"/> |
| Mjuk      | <input type="radio"/> | Kantig      | <input type="radio"/> |
| Klassisk  | <input type="radio"/> | Nyttänkande | <input type="radio"/> |
| Enkel     | <input type="radio"/> | Komplicerad | <input type="radio"/> |

Betygsätt konceptet i en skala från 1 till 5 där fem är högst

- |                                   |                       |                       |                       |                       |                       |                       |                       |                       |                       |                       |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Hur tilltalande är detta koncept? | <input type="radio"/> | 1                     | <input type="radio"/> | 2                     | <input type="radio"/> | 3                     | <input type="radio"/> | 4                     | <input type="radio"/> | 5                     |
| Skulle du köpa detta headset?     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Utsålar detta headset kvalitets?  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



# Tack igen!

1. Spara nu PDF:en genom att klicka på knappen uppe i högra hörnet.
2. Var då nogga med att ta "Internet email" och INTE "Desktop application"
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4. Bifoga filen i ett mail
5. Skicka till: [palsson.arvid@gmail.com](mailto:palsson.arvid@gmail.com)