‘Designing and prototyping a therapeutic device that researches and stimulates the mobility, senses and communication through influences of colored light, sound and vibration.’

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Thyra Koeleman is a formal speech therapist and founder, writer and trainer of a method called: ‘Ervaar het maar’. This method stimulates mobility, senses and communication for people with an intellectual disability. After writing the theory behind the method, Thyra now reaches the stage of testing her method in a new practice. To test this new theory, she needs a product that can deliver five different colors of light, five different sounds and three different types of vibration. After testing several old prototypes, she needs a new prototype that is an improved version of the old ones. Therefore, the subject of this thesis is: ‘Designing and prototyping a therapeutic device that researches and stimulates the mobility, senses and communication through influences of colored light, sound and vibration.’

To start off the thesis, the following main question is asked:

How can a new prototype be made that displays five different colors of light, five different sounds and three different vibrations?

First, an analysis is needed to conduct a list of requirements. The stakeholders are analyzed, together with the method Thyra wrote and the market. As said, Thyra already has some old prototypes that are not satisfying her expectations. To create requirements, the old prototypes are analyzed and the improvement points are pointed out. When this analysis is done, a complete list of requirements can be created. with these requirements, the ideation phase begins.

The ideation phase starts by gathering some inspiration out of collages and making sketches. A shape study helps to create even more ideas. After the sketches together with the shape study, three concepts are chosen to pick out the good ideas and be able to present this to the client (Thyra). This is done with a reduced list of requirements. To eventually choose the preferred concept, the list of requirements is evaluated with relative importance and the opinion of Thyra is taken. The chosen concept can be seen in figure 1.

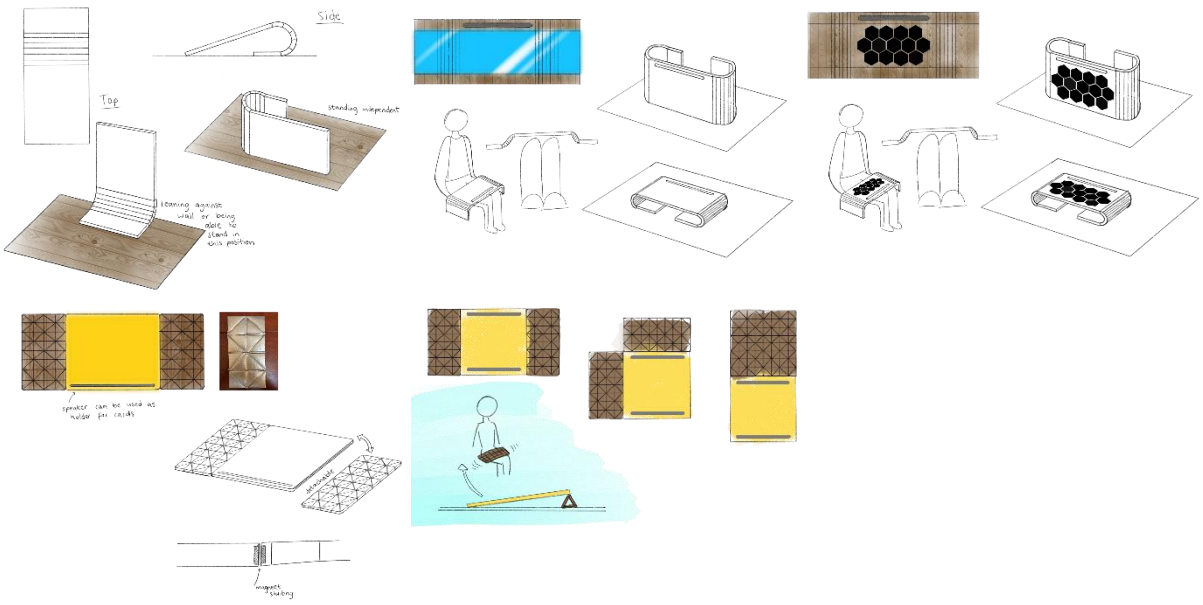

Figure 1: chosen concept

To be able to create a prototype out of this concept, the concept needs to be more detailed. To create a detailed concept, more sketches are made together with SolidWorks and cardboard models. When the final shape is known, it is time to make some pre-prototypes (figure 2). These pre-prototypes serve as a tool to let Thyra feel the shape. With a co-design session, the final choices are made for the prototype.

Figure 2: pre-prototypes

The prototyping can start now. For light, a LED strip is turned into a light panel that can create all five colors. To create the sound, a Bluetooth box is taken apart and the components are re-arranged in the wooden compartment. The vibration is created by three vibration motors, each with a different weight on the shaft. The wooden middle compartment is created by layering MDF sheets of different sizes. The flaps are created using MDF as well. To be able to control the variables, a control box is made where the five colors, three vibrations and Bluetooth box can be controlled independently. To finish off the prototype, the wood gets a black color and the flaps are attached using wood glue and fabric. The final prototype can be seen in figure 3:

Figure 3: final prototype

Thyra wants to produce this product at one point. To give an insight in the possibilities of reproduction, the materials and method are described. Besides that, a cost estimation gives an estimation on the investment Thyra has to make to start production.

Lastly, the prototype is evaluated together with Thyra and the list of requirements is checked. A lot of requirements are met. In the reflection, the research questions are analyzed again and answered. With the help of the report, the main question can be answered completely.