Co-design methods and results group 18

Jutta van Engelen, Marius Ispas, Riki Ogawa, Huub Oude Vrielink, Amber Teunissen and Pol Torras Casablanca

Abstract: During the co-design phase multiple sessions to test different ideas were held. First interviews were held to better understand the co-designer's problems and get to know each other. The first test was done with the product the group tried to improve. From here the maximum weight was determined. Afterwards, during each session the group brought low-fidelity prototypes to test and see if the idea worked in practice. With these solutions the size of the product and the shape were determined.

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1. Introduction

This project is all about co-designing. The co-designer of group 18 has the pseudonym Pim Janssen. Pim has Osteogenesis Imperfecta and has a wheelchair. He has less energy, mobility and strength. As mentioned in the Context Mapping Study, the main principle of co-design is to design with someone, not for someone. The person who makes the decisions will now be the one who will be most impacted by those decisions, instead of the person that has little involvement (the designer). The co-designer was very enthusiastic and wanted to help wherever possible. This made the cooperation go very smoothly.

2. Organization

We kept in contact with the co-designer via email. The meetings were held weekly, with one week as an exception. We started off with an online meeting to introduce ourselves to one another. Subsequently, the meetings were mostly physical at his own living environment. Because we saw him often, we could better understand his decisions and reasoning behind certain thoughts. At the first meeting the whole group participated, but thereafter we met him with usually two/three persons. This was his preference because he has limited energy and gets tired quicker. Before every meeting we prepared questions or tasks for him to test or do. The meetings were thoroughly documented to allow the rest of the group to revisit them afterwards.

3. Co-design

3.1. Co-design session 1

The first co-design session was an online session where the group interviewed our co-designer to get to know each other.

3.1.1. Methods of co-design session 1

As already mentioned, for the first co-design session interviews were conducted. This interview was about him as a person, but also the problems he experiences in his daily life due to his disability. The goal was to get to know him, see what his goals in life are and what his daily life looks like. Furthermore, different style-collages were showed to him to see which style he preferred. These can be seen in figure 1 until figure 4.

Figure 1. Organic style collage

Figure 2. Dynamic style collage

Figure 3. Minimalistic style collage

Figure 4. Retro style collage

3.1.2. Results of co-design session 1

The group got to know him very well and he was clear about what he thinks could be improved in his daily life. He wants to improve the grabber that he currently uses. Currently, he needs to pick an item from the ground, put it on the table and grab it from the table. Furthermore, the handle was not specifically made for him, so the ergonomics are not sufficient. Therefore, Pim would like to see the grabber improved. A top priority when the grabber will be re-designed is that this grabber remains lightweight. Furthermore, because all items are on the edge of the table, to be easily reachable by Tim, the table is very messy.

The outcomes of the style-collages were that the style-collage of figure 3 was most preferred. The style-collage of figure 1 was boring. Furthermore, figure 2 was too formal and Pim preferred more colour than was shown in this collage. He likes light shades, nothing too bright, and blue and green are his favourite colours.

3.2. Co-design session 2

During co-design session 2 the focus was on the original grabber of Tim.

3.2.1. Methods of co-design session 2

For the second co-design session two persons went to visit Pim. The main goal for this meeting was to do a test with his original grabber. This was used to illustrate how the co-designer uses his current grabber. This helped identify where to improve the grabber. To test his original grabber, we let Pim pick up certain items from the floor. These items can be seen in figure 5. Next to that, Pim indicated that the handle could be improved, so we gave him different cylindrical products to see what circumference he can comfortably hold. Lastly, we measured the weight and dimensions of his current grabber.

3.2.2. Results of co-design session

The random items that were picked up by Pim are seen on figure 5. They are ranked on their difficulty of being able to pick up. Starting from the left are items that were the most difficult to pick up and, on the right, are the items that could be picked up with ease. The books on the left side could not even be fully lifted. The level of difficulty was dependent on both the form and weight of the product.

Figure 5. Items the Co-Designer picked up.

Furthermore, the results were noted about which circumference he can comfortably hold. Based on these outcomes some models of the handles were made. Lastly, the current grabber weighs 244 grams.

3.3. Co-design session 3

In the third co-design session some handles were tested as well as the hinge in the arm of the grabber.

3.3.1. Methods of co-design session 3

For the third co-design session the group prepared multiple clay handles. The clay gave the handles a soft rubbery feel and they were light weight. These handles were based on shapes form drawings that were shown to the co-designer, his comments on those drawings and some measurements from the second co-design session. The handles can be seen in figure 6. The group also brought the same clay to the co-design session to make some clay handles and models with direct input from Pim.

Figure 6. Models of Handles Created by the Group.

The group also prepared a basic wooden prototype, shown in figure 7, with which the hinge could be tested. When picking items up the hinge would be restricted to a maximum angle of 180 degrees. Then when the co-designer lifted his arm and turned the prototype around the top part of the arm would fall due to gravity. With this prototype the group could see if the movement the participant needed to make is feasible. The length on both side of the hinge could be changed to see what the optimal length and ratio is.

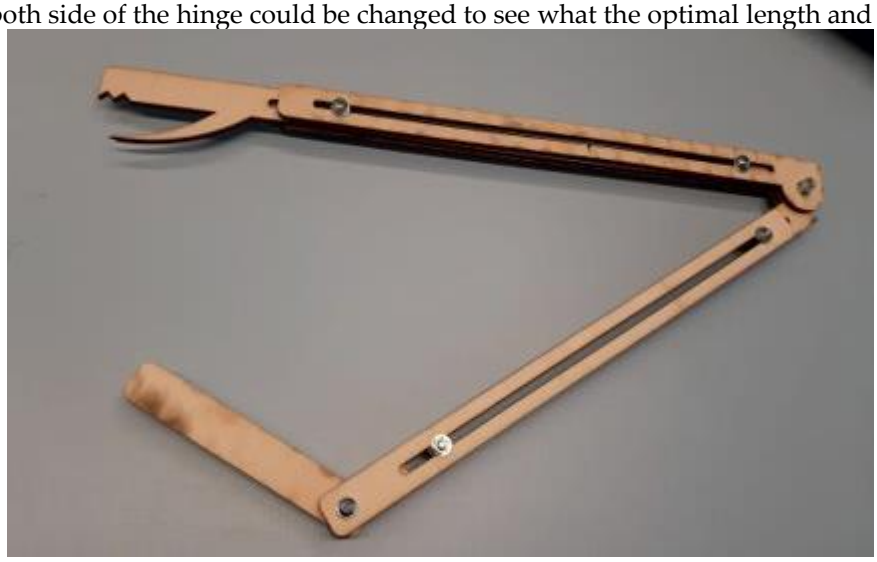

Figure 7. Model for Mechanism.

3.3.2. Results of co-design session 3

Pim liked handles 1 and 5 the most. However, he found most of the handles a bit too small. The group also noticed that that trigger on his current grabber gives him a lot of stability and strength during use. With this the group concluded that a trigger is needed to give Pim optimal support and control. Pim also mentioned that he liked the ergonomic finger imprints as well as an indent for his thumb. Lasty, it was concluded to aim for an ambidextrous handle. However, if not possible, making it perfect for one hand was already a sufficient improvement to his current grabber.

The clay models that were made during this session gave a lot of insight into how he holds his handle. The clay models are shown in figure 8.

Figure 8. Model Created by the Co-Designer.

During testing of the wooden prototype, the group noticed that the co-designer could not fully rotate his wrist. He had to turn the grabber in his hand for the top part to fall instead of turning his arm. The wooden handle was also not comfortable for Pim to hold. Therefore, testing for the length and ratio was not possible. This also indicated the importance of a well-designed handle. For the next prototype a more comfortable handle should be provided.

3.4. Co-design session 4

For this co-design, the prototypes from session 3 were improved and tested.

3.4.1. Methods of co-design session 4

For the handles, three different models were 3D-printed. The handles were made with the comments of the last co-design session in mind. The handles are shown in figure 9.

Figure 9. 3D printed models of different handles.

The basic wooden prototype from session 3 was improved with a 3d printed handle and trigger, shown in figure 10. With this the length and the ratio could be tested again as well as places he could reach with his fingers while holding the grabber. This is needed for button placement. In the new design the hinge can be locked by pushing it straight against the floor. To unlock it a button needs to be pushed instead of turning his arm.

Figure 10. Improved prototype.

3.4.2. Results of co-design session 4

The co-designer thought that the orange handle had the best overall shape but he suggested some improvements. The trigger was too far away and he would like it to be thicker. He like different aspect from different handles. For example, the finger indents were particularly valued. The locations for buttons are shown in figure 11.

Figure 11. Locations from possible buttons.

The favoured total length for his new grabber is 86 cm. This is a bit longer than his current grabber, which is 76 cm. The optimal ratio is 36 cm by 44 cm. This means the part after the hinge is a bit bigger than the part before. This also reduces the torque required to lift objects.

4. Conclusions

Overall, the co-design process worked out very well. The co-designer was highly enthusiastic and motivated to help us by creating the best possible product. Furthermore, the co-designer provided different insights we would not have thought of ourselves, which was eye-opening.