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HOMECARE FUTURE SCENARIO DEVELOPMENT BY STUDENTS IN A MULTIDISCIPLINARY SETTING

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ABSTRACT
The development and implementation of a 'future scenario development-method', is described in this paper. The scenarios should inspire designers to create products that fit the society 10 to 20 years from now. The future scenario development-method enabled both health care and product design-students to work together at different locations. The method consists of four steps: 1. project demarcation, 2. driver analysis, 3. scenario development, and 4. scenario writing. The applied method appeared helpful in communication between the different disciplines and their mutual understanding during the project.

Keywords: Interdisciplinary, design, health care, future, scenario, caregiver, homecare

1 INTRODUCTION

This paper describes the insights generated from a project on technology and health care in which students from multiple disciplines cooperated. The project was part of a larger project funded by the Dutch government. The larger project was called "Designing for home care providers" and focused on how to design smart and usable products for caregivers in the home setting. Whereas in the development of home care innovations, the focus is often put on patients and their experiences, this project took another angle. Since caregivers are the major user group of home care innovations, rather than patients, the focus was on the professional home care providers as well as the informal care givers (family members, friends, neighbours et cetera providing at least eight hours of care a week), as the main target group. The overall project lasted two years (2011- 2013) and had several sub-projects.
One of the sub-projects of this larger project concerned future scenarios to create insight into home care design opportunities. The project took place at the Research Centre for Design & Technology of Saxion University of Applied Sciences in Enschede (the Netherlands), in cooperation with the research group Technology, Care & Wellbeing of the same university. Simultaneously, researchers from the Research Centre for Technology & Innovation of University of Applied Sciences Utrecht (UUAS) (research group Co-design), also in the Netherlands, were involved. In Enschede, two nursing-students of Saxion University and one student from Industrial Design Engineering from the University of Twente participated. In Utrecht, two students in Management in Healthcare and one Product Design & Engineering student (all from UUAS) participated. Thus, the future scenario project became a collaboration of three researchers (among them were the authors of this paper) from three research centres and six students from different healthcare and product design disciplines, who worked simultaneously on the project.
The aim of this paper is twofold. First, the development, implementation and reflection of the future scenario development are described. Second, it is explained how the method enabled the students from different disciplines to effectively and efficiently communicate.

1.1 Working in a very multidisciplinary team

Although multidisciplinary student team cooperation is common both at Saxion and UUAS, the diversity of backgrounds in this team was more diverse than usual. Consider that healthcare students are mostly trained to focus on current healthcare situations, whereas product design students are predominantly trained to concentrate on future product development. Elaborating on the complexity of the team, Utrecht and Enschede are located 140 kilometres from each other, which impeded

frequent face-to-face-meetings. This situation made the project challenging. An approach was needed in which all participants could work together on the same project, in a way that was understandable and workable for each.
Therefore, a future scenario-method was developed and implemented which will be described in the next chapter. Regular meetings were planned in line with the used method. In addition, there was contact during happenings organized as part of the overall project, such as consortia meetings or a creative educational day on the subject. When needed, the students and supervising researchers had contact via Skype and shared a common Dropbox in which relevant documents were recorded.

2 DERIVATION AND DESCRIPTION OF FUTURE SCENARIO METHOD

The used method was based on different methods and models. The process of developing future scenario's was derived from the method used in the minor "Futures: Imaging Tomorrow's World", taught at the University of Twente [2]. One of the participating students in this project, participated in this minor in 2012 and incorporated the generated knowledge into the project. This started with describing the model in a document to develop strategic future scenarios in the following seven steps [3]: 1. Focal issues, 2. Actor/factor analysis, 3. Uncertainty/ Significance matrix, 4. Scenario matrices, 5. Scenario plots, 6. Scenarios, and 7. Use of scenarios for strategic developments for tomorrow's world.
Although the model is very clear, it concentrates on strategic developments as outcome, whereas the focus needed to be on product design opportunities.
Extra input on the model was derived from the method used in the research project 'Safety at Work', focusing on Technology and Safety [4], another research project performed at Saxion University. Here the PESTEL model [5] (Political, Economic, Social-cultural, Technological, Environmental and Legal-analysis) is used to categorize future developments and predicting factors for future developments. Since multiple many factors on several levels together determine what the future will look like, a model is essential for clarifying and structuring these macro-economic factors and developments. However, the PESTEL model limited the health care oriented research, as none of the drivers considered demographic information. As there was good experience using the DESTEP-model [6] in earlier projects (particularly the health care students were already familiar with this model), the DESTEP-model was incorporated as part of the Actor/ Factor Analysis. DESTEP categorizes the Demographic, Economic, Social-cultural, Technological, Ecological and Political drivers found in literature, expert interviews and other relevant sources. Moreover, the future scenario expert who participated in a workshop during the organized creative day, used DESTEP as part of her approach.
Another interesting element from the 'Safety at Work-project' was the use of roadmaps, to map the future developments on a time line. This would make it more clear when certain developments would take place simultaneously.
The relevant aspects of all aforementioned approaches (thus 1. Seven-step-model, 2. Product design focus, 3. DESTEP-model, 4. Roadmap) were fitted into phases of the project. The reviewing of results per step were matched to planned meetings with all participants. Each step represented about a month of work. In the following paragraphs, these steps and its execution are explained in more detail.

2.1 Step 1: Project Demarcation

This step concerns determining the approach and goals of the project. This results in a 'plan of approach'-document, which is needed for the students' educational programs. It relates to the first step of the method used in the minor "Futures: Imaging Tomorrow's World" [2], where in this step, the focal issues, the assignment, the client, and the project goal(s) are described.

2.1.1 Execution of step 1: project focus for Future scenario-development for homecare

The common project focus was that at the end of the project, future home care scenarios had to be created. Scenarios that provide designers a guideline to develop new products and services for the homecare setting, taking into account the viewpoint from care providers rather than patients. Therefore, the results of this project had to be presented in such a way that they guide and/or inspire product designers.
Focus of the project was on homecare in the near future and the possible developments of technologies for product development. In order to develop realistic scenarios rather than fantasy-ideas, it was decided to focus on two moments in the future: in 2015, and in 2020. This close range was chosen

because of the limited knowledge of possible applicable technologies beyond this time range. Homecare is care provided by both professional caregivers, as well as by informal caregivers, such as care provided by family and friends at home. The type and amount of care needed depends on the patient's disease.
Working with two groups of researchers and students at two geographically different locations, created an extra opportunity. The situation was utilized by studying parallel two different diseases representing two kinds of abilities or restrictions. Therefore, researchers and students from Utrecht focused on chronic heart failure, whereas the Enschede-students and researchers concentrated on dementia. Both diseases are among the most common chronic diseases with an increasing incidence in the near future. We identified these diseases because of their diverse character. Chronic heart failure implies physical limitations for the patient, whereas dementia entails cognitive limitations.

2.1.2 Group dynamics step 1

In order to enable the students and researchers to successfully and simultaneously work on the same project on two locations, we let them stick to the same format of describing project goals. By comparing and streamlining the results of both locations, the project gained more in-depth knowledge.

2.2 Step 2: Driver analysis

After project demarcation, the actual execution of the project started by analyzing the drivers (determinants of future developments). This step relates to the second step of the method used in the minor "Futures: Imaging Tomorrow's World" [2], where major part of the work involves an extensive literature study to detect all relevant actors and factors that play a role in the future. In an Actor-Factor analysis, the relevant future developments and related groups of people and organisations are mapped.
The use of the DESTEP model particularly helped to incorporate the health care-related developments, and divides the future developments in Demographic, Economic, Social/cultural, Technological, Ecological and Political-factors. The collected data was reflected with experts.

2.2.1 Execution of step 2: overview of the driver analysis

We used a systematic literature research to gain an overview of the drivers, which resulted in mapped future developments per DESTEP-category. The results were reflected and validated in structured interviews with experts and in structured focus panels with experts. These results were again exchanged and discussed during the multidiscipline project meetings. Continuing the categorical DESTEP analysis, the results were extracted and placed on a timeline, comparing the current situation with future developments. The technological developments were placed on a time line in more detail (see ***Figure 1***). This helped in creating product ideas in a later phase. A summary from the complete results of the DESTEP-analysis, which are reported in the student reports [3] [1] [7], is given below:

- Demographically, there appeared to be an ageing population who will have a longer vital life together with a relatively decreasing amount of caregivers.
- Economically, the government care budget will be decreasing and as a consequence, homecare demand will increase. Risk of this increasing demand is overworked informal home caregivers.
- Social-culturally, there exists the risk of increasing loneliness among informal caregivers due to their (time) consuming care responsibilities.
- Technologically, whereas medical and technological solutions may decrease contact moments with healthcare providers, the medical and technological solutions may contribute to vital living, and create more freedom and social interaction on the other side.
- Ecologically, more attention will rise for safe living environments, such as privacy values in cases of homecare and distant home monitoring, or safety issues like prevention of accidents in the house, or for protection against easy targets for crime.
- Politically seen, the focus will be on self-regulation and prevention of diseases. New focus will be on healthcare policies due to the decentralizing healthcare portfolio to local governments.

2.2.2 Group dynamics step 2

The results of the DESTEP analysis were shared and reflected among the two groups of researchers at Saxion and UUAS in several phases, from first DESTEP results to the validations in interview and focus panel discussions. The DESTEP model helped in structuring the results which made it easier to compare the drivers that were gathered by both groups. Reflecting the parallel approaches on the

different diseases helped in discussing the results and creating shared understanding. Moreover, discussing the developments helped in getting more feeling for the possible future situations.

2.3 Step 3. Scenario development

The scenario development process concerns the translation from the Actor-Factor-analysis to input for scenarios. In this step, more understanding is created on the wide range of drivers. During this scenario development process, interviews and an expert panel were used again as reflection and validation.

The most relevant drivers were discussed on and placed on axes, mapping the uncertainty of drivers to happen to the rate of their importance (see Figure 2). The (un)certainty and importance of future developments form the basis of scenario matrices and plots. It helped in determining the axes to be placed in the strategic field, where the scenario scan could be plotted. The locations of the plots in the matrix determines the different perspectives on the future.

2.3.1 Execution of step 3: from drivers to places where scenario plots can be placed

Based on the mappings, such as shown in ***Figure 2***, we concluded that for the strategic field of future of home care, the amount of social contacts (Social-culturally), the available financial means (Economically) and the amount of technological developments (Technological) were particularly relevant. Moreover, these categories were most commonly mentioned in the feedback gained from experts in the field. After analysing each quadrant, four plots were chosen to develop scenarios in (see Figure 3).

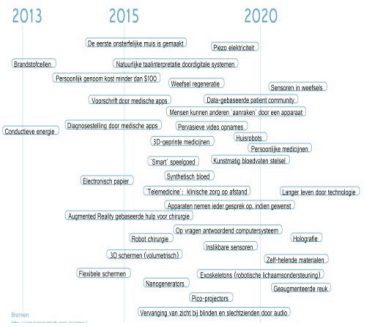

Figure 1. from Timeline of technological developments [3]

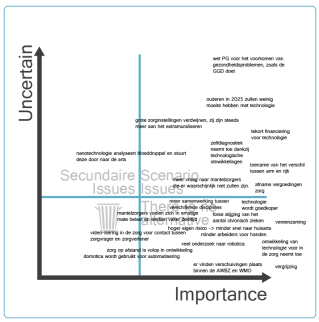

Figure 2. Uncertain-Importance matrix, a mapping of all relevant drivers [3]

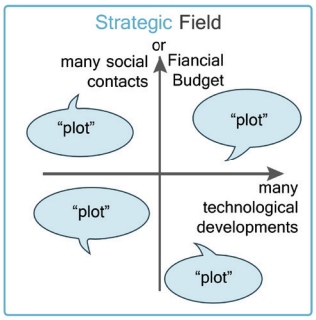

Figure 3. Strategic field with metaphoric scenario description for possible scenario plots

2.3.2 Group dynamics step 3

Discussing together which drivers had most impact and determining which axes were going to be used for the scenario matrix, brought the group closer together. The discussion gave all disciplines the opportunity to understand the different interpretations due to various backgrounds. It helped to regain the common focus on the implementation of the future scenario development. Especially this step needs extra attention for discussions and integration of different developments.

2.4 Step 4. Scenario writing and creating design opportunities for product designers

After plotting the future developments and the determination of the strategic field, the future scenarios could be written. The scenario development started with creating a macro view on the economy, which was further developed to a description of the daily life, containing dilemmas and possible design solutions. The daily life-format helped in imaging the future situation: it is easier to connect and improvise from a daily setting than from a rather abstract text.

In ***Figure 4***, a visual is given of macro scenarios placed in scenario matrices. Specific axe determine the focus of the macro scenario. For each macro scenario, first the dilemmas and opportunities for product development are determined. Based on these macro scenario's first ideas for possible product development directions were generated.

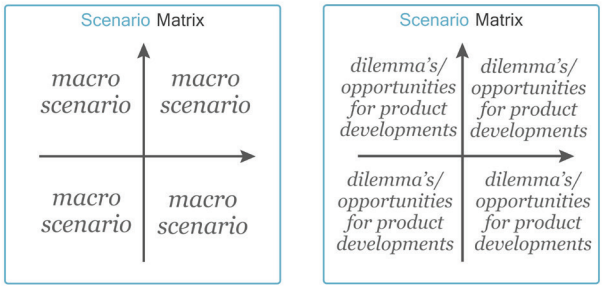

Figure 4. Mapping scenarios and design opportunities

2.4.1 Execution of step 4: from macro scenario to daily life descriptions using personas

The way of presenting the future scenarios of homecare situations was discussed with experts within the project. An overview was made including the macro scenario and the daily life description using personas. The following figure, depicts a short overview of a scenario. Next to textual descriptions, photographs of personas and graphical or sketches of design ideas were explicitly used.

The macro scenario described the situation of the society, e.g. socially, people are going to seek contact in their neighbourhood in case of asking for and/or providing care. An overview of a daily life scenario is given in ***Figure 5***.

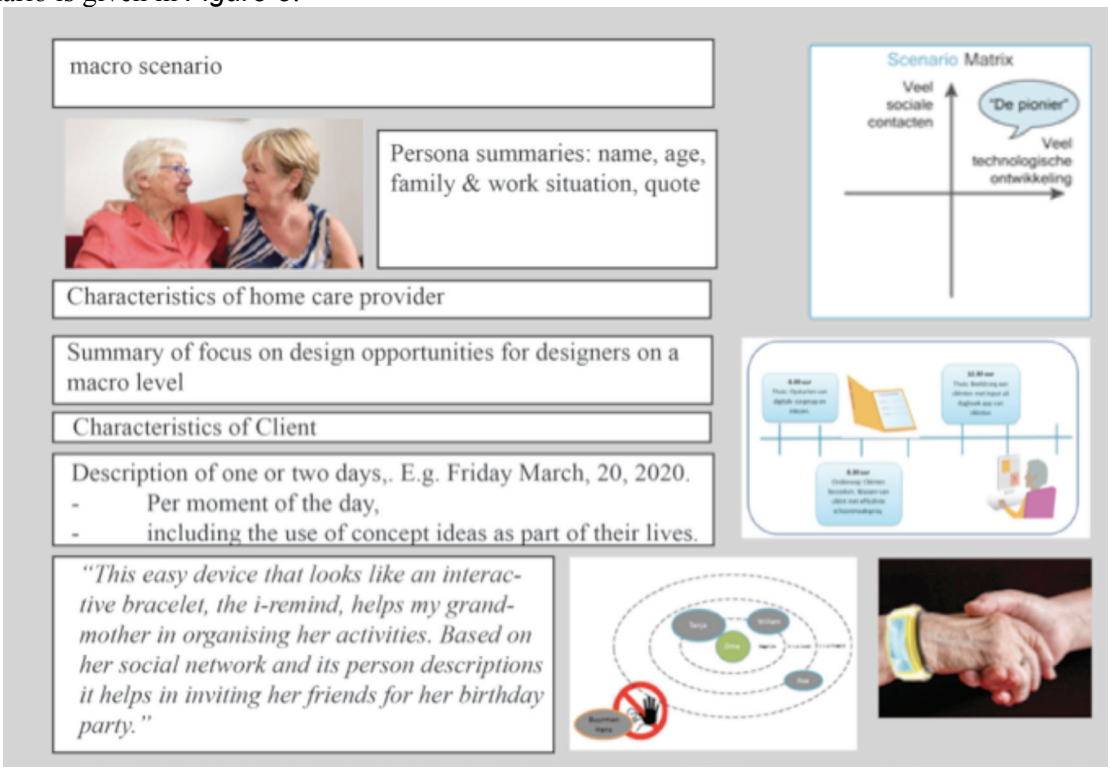

Figure 5. Elements of daily life scenario

2.4.2 Group dynamics step 4

The setup of the daily life scenario helped in the focus of the group and getting the input to a good level. ´Knowing´ the personas also helped the students to enrich the possible design solutions.

3 EVALUATION AND CONCLUSION OF THE WAY THE MODEL WORKED

The future scenario development-method entailed three major benefits. First, it enabled researchers and students from different disciplines to efficiently and effectively communicate and work together. Second, connecting the different disciplines challenged the students to cross their educational borders. Third, it generated useful and tangible scenarios for the home care setting in the future that should inspire designers to create innovations. Each of these benefits will be elaborated on in the following.

First, by formulating the project goal together and keeping that in mind during the entire project, shared understanding was realized among students from different backgrounds. Moreover, the scenario development-method consisted of specific steps and tools that enabled both technical as well as health care-students to perform the project easily and effectively. Since the method comprises formats for matrices and scenarios, it was clear for students what the output of each phase had to be. Providing students with clear formats prevents endless discussions on how to present collected data. For instance, the DESTEP model helped in structuring and comparing the drivers. Also, the matrices and scenarios stimulated common and fruitful discussions and helped to focus discussions.
Second, the interaction of the group and the guidance of the method helped students in crossing the educational backgrounds and broaden their view. They challenged each other to think out of their educational way of thinking. They mentioned themselves the value of this project in that context.
Third, the creation of the future scenarios: the rigid format of the different steps and the formats for matrices and scenarios not only enabled efficient and effective cooperation between disciplines; it also generated useful and inspiring scenarios for the home care setting in 2015 and 2020. The scenarios were presented to a group of professional product designers and they all perceived the scenarios as inspiring and useful.
The method, of course, also implied several drawbacks. Regarding the students' different backgrounds, it appeared that despite the formats within which the students had to work, they perceived it difficult to have empathy for the other discipline. Students kept close to their way of thinking and acting from their own discipline. For instance, health care-students had more difficulty in generating product design ideas for the scenarios, probably since they are more used to work according to a strict protocol rather than free thinking, which is more usual for design-students. This might also be due to the required content of the student's work for their education.

4 DISCUSSION AND POSSIBLE ADJUSTMENTS TO THE METHOD

Due to the used method with the constant multidisciplinary interaction during the project, interesting results were achieved. Attention should be paid to create empathy for each other's discipline, rather than rigid thinking from one's own background. Taking more time for the elements where cross-functional thinking is needed, this model will gain more power and better results are expected. To consolidate the method, we suggest special workshops using creative thinking theories, when mapping the drivers on the Uncertain-Importance matrix in step two, and when determining design opportunities in step three. As mentioned before, the used method facilitated shared understanding between students from different disciplines and generated useful future scenarios for the home care setting.

5 THANK YOU

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