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# Distributed User-Generated Card Based Co-Design: A Case-Study

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## ABSTRACT

Involving end-users is considered key to successful design of technology. It can be challenging, however to involve end-users when designing healthcare technology, due to the limited availability of patients because of their condition or treatment. This is especially difficult when co-designing healthcare technology, which often requires several end-users to collaborate in group activities such as ideation exercises and brainstorming. In an exploration of co-design methods that do not require participants to be co-located, this paper describes initial results from a small-scale ideation workshop in the context of fertility treatment. Preliminary data analysis suggests that user-generated card-based ideation could be used to inspire ideation while transferring knowledge and ideas between participants who are not co-located. This approach could benefit researchers in several healthcare technology settings that use co-design, and other domains where availability of participants is limited.

## KEYWORDS

Co-design; Creativity; Ideation; Healthcare Technology; Inclusive Design.

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Theme: .....

Describe the theme or the problem in your own words.

When would the problem been solved for you?

Do you have the same problem in another area? Or could you compare the theme with an area mentioned on one of the cards?

How is the problem solved in this other area?

Can you apply this solution to your problem?

Why is or isn't this a good solution?

**Figure 1: Ideation sheet**

## INTRODUCTION

Co-design is vital for the successful design of healthcare technology [1]. In the broad sense, co-design can be described as collective creativity of designers and participants not trained in design [6]; Creativity increases when ideas from different contexts are combined [9] and when people go beyond their own knowledge [5]. Therefore, co-design is usually done via group activities such as ideation exercises and brainstorming that allow participants to work together to address a specific problem.

The healthcare context presents challenges to co-design researchers such as limited availability of participants because of their treatment schedule on top of their work and family life or limited mobility of participants because of their condition. As a result, research in healthcare tends to take place at locations that are easily accessible to participants such as their homes and may be done in individual settings that do not allow for group activities. It can be problematic when only participants that are readily available participate in co-design activities as it may lead to solutions tailored for those groups, while excluding participants that cannot participate because of their condition or treatment. To be more inclusive, we need to explore methods that facilitate co-design without participants being co-located to be able to involve a broader range of participants and to enable them to elaborate on each other's ideas without being co-located. Therefore, we need to better understand how participants build on ideas of others during co-design activities. This challenge concerns those involved in co-design in healthcare and in other fields where availability of participants is limited.

In this paper, we study how participants build on ideas of others and we explore an alternative way for co-design without participants being co-located, enabling them to share knowledge and ideas.

## RELATED WORK

To share knowledge and ideas between participants in different locations, collaboration platforms are widely being developed and used. As an example of this, Hargreaves and Robertson [3] use a collaborative prototyping tool, Skype, screen sharing and email for participatory prototyping. As another example, Walsh et al. [8] designed a collaborative online tool (DisCo) to facilitate distributed asynchronous co-design with children and adults that are not co-located.

In an effort to deal with limited availability of healthcare staff for co-design Langley et al. [4] engaged participants in co-design sequentially. They facilitated collaboration across separate participant groups using objects that separate groups worked on sequentially to communicate ideas and knowledge and facilitate creative collaboration. The Relay Ideation Technique is another sequential technique [7]; It breaks up the ideation process into small steps allowing participants to elaborate on ideas of others and create a solution collectively without necessarily having to be co-located. Besides sequential techniques, we also draw on ideation card techniques, such as Halskov and Dalsgaard's [2] Inspiration Card Workshops to bring different sources of inspiration into the design process.

To our knowledge, co-design without participants being co-located has not been addressed extensively in the literature. In response, we explored an alternative way to involve participants in co-design without being co-located.

### CASE STUDY: PRE-LIFE

We draw on the outcomes of a case study that aims to develop a personalized mobile application to help people with fertility problems to manage their condition and encourages a healthy lifestyle in order to improve the outcomes of fertility treatment. Here, participants' time is limited as fertility treatment requires regular hospital checks on top of participants' work schedule and family life.

The application was designed and evaluated in a human-centered design process: We conducted seven observations of interactions between caregivers and people receiving IVF treatment, 11 contextual inquiries with caregivers and 17 interviews with people that had or were receiving fertility treatment. Finally, the design was refined using one iteration of usability testing. In analyzing the results we noticed that while the platform was intended for self-management, in some cases participants interpreted it as a tool for monitoring by caregivers. To further elaborate on this, we set up ideation workshops.

### METHOD

#### Participants

The sample ( $N=7$ ) consisted of one male and six females with an average age of 34 years. They were recruited via an organization for people with fertility problems and they had already participated in our research leading up to the development of the app.

#### Procedure

Based on our research leading up to the development of the app, we identified three common themes: transparency about the role of caregivers on the self-management platform, personalization and privacy. We set up a distributed ideation workshop of 1 - 1.5 hours, visiting participants at their homes. During the workshop we encouraged participants to think out loud. Based on related work we laid out the workshop in four parts:

*Introduction.* After introduction of the researcher, the topic and the goals of the workshop were explained to the participants, we asked them to describe their relationship with caregivers.

*Definition of a point of view.* To involve participants in defining the workshop goals, we presented the three common themes identified in the research leading up to the development of the app. This was

#### Stepwise ideation:

- 1 Participants described a problem they experience, related to one of the themes of the workshop;
- 2 They described when this problem would be solved;
- 3 They thought of a similar problem they have using inspiration cards (see the paragraph on inspiration cards) to think of analogies with the initial problem in step 1;
- 4 They described the current solution or a possible solution for the problem selected in step 3;
- 5 They applied the solution to the problem selected in step 3 to the initial problem described in step 1;
- 6 They described benefits and drawback of the solution they created in step 5.

#### Sidebar 1: Stepwise ideation

done to give participants a possible direction and they could formulate their own problem statement within this context.

*Stepwise ideation using analogies.* To facilitate idea generation, we used analogies as a problem-solving strategy to help participants restructure problems and combine ideas in a stepwise approach (cf. [7]). We asked participants to address a problem they experience, related to one of the themes of the workshop. To do this, they used an ideation sheet (Fig. 1) that consisted of six steps (Sidebar 1).

*Inspiration cards.* To inspire the creative process and to share and transform ideas between participants we use inspiration cards (cf. [2]). The card set contained ready-made cards and user-generated cards: The ready-made cards (Fig. 2) contained three categories of common concepts of area's that are relevant to the participants (relationships, tools and organizations) and were identified in the previous analysis (Table 1); User-generated cards (Fig. 3) were empty cards that participants filled out during the workshop; The user-generated cards communicated concepts selected by participants and were used in subsequent sessions to inspire participants and to enable them to share knowledge and ideas.

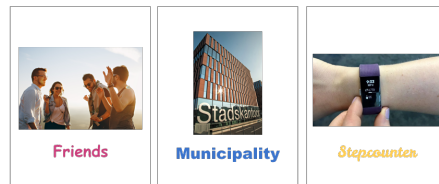


Figure 2: Ready-made cards

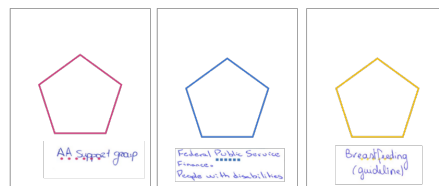


Figure 3: User-generated cards

## Analysis

To gain insight into how participants built on ideas of others we relate to what they said in the workshop or written down on the ideation sheet. Conversations were recorded and transcribed verbatim. Analyzing the data, we identified how participants developed solutions in step five of the stepwise ideation; We identified five categories of different ways that participants came up with a solution (Table 2). Doing so, we focused on the concepts they used (concepts on ready-made cards, concepts on user-generated cards or new concepts), whether it was mentioned explicitly or used implicitly and whether it was used literally or lead to another concept. In addition to categorizing the concepts that participants used, we counted the number of solutions that were generated to give an estimate about how many concepts are used to generate a solution. One solution is defined as a finalized ideation sheet.

## RESULTS

Table 2 shows the results of the analysis: We identified 15 instances of concepts being used by participants to draw analogies with and they were used to create 12 solutions; On average participants used more than one concept (1.25). Our analysis shows that participants most often used a new concept (5); They used concepts similar to ready-made cards three times; They mentioned concepts on ready-made cards explicitly and transformed them four times; They used ready-made cards literally once and they mentioned and used user-generated cards two times. In the remainder of this section we highlight two examples of how participants came up with solutions for their problems while transforming a ready-made card (P3) and while using a user-generated card literally (P7).

**Table 1: Categories and concepts for ready-made cards.**

Relationships	Tools	Organisations
Friends	GPS	Social Service
Family	Stepcounter	Supermarket
Fellow patient	Online platform	Airline
Celebrity	WhatsApp	Health Insurance
Colleague	Netflix	Municipality
Sportscoach	Ovulation Tracker	Internet Provider

**Table 2: Concepts that were used to draw analogies and frequencies**

Ideation category	N
New concept is created and used	5
Similar concept is used but not explicitly mentioned	3
Ready-made card is mentioned and transformed	4
Ready-made card is mentioned and used literally	1
User-generated is mentioned and used literally	2

After the introduction, P3 chose the theme of privacy: P3 *“I sometimes asked a doctor a question, but they were really intimate. I would not like that to end up with the midwives.”* Following the stepwise ideation, she describes her specific problem (step 1): Not knowing who has access to specific information in the fertility app. The problem would be solved for her (step 2) when it is clear to her who you are asking the questions to and who answers. While comparing the problem with another concept (step 3), she first compares it to the current conversation, with friends, and finally with her GP: Both *friends* and *GP* are concepts of ready-made cards. The GP concept, reminds her of a patient file system that her GP uses. She uses the concept of the system to compare her problem to: P3: *“With friends too. ... If I tell them things, I expect that to remain between us. But I will know, for example, my doctor who respects that. A doctor who knows that I think like that. I think it’s good all this exists such as the [patient file] and that the GP’s can access your file, I do not mind, because my doctor may know everything about me, but I want to know who has access to the system. That is not always clear.”* This problem would be solved when new caregivers ask permission to access her patient file (step 4). She applies it to the problem that she experiences (step 5): She would like to know who can access the app and who reads and answers her questions. In evaluating her solution (step 6) she highlights that it may not be feasible to expect one doctor to dedicate his time to answering questions.

As another example, after an introduction of the workshop, P7 chose the theme of transparency about the role of caregivers on the platform. Following the stepwise ideation, she described a problem that she experienced in the context of the theme (step 1): The app is used by multiple fertility centres, but while switching centres she experienced that different fertility centres have their own philosophy about the treatment and therefore information that they offer could be different. This problem would be solved for her (step 2) when it is clear if and when there is a difference. To compare her problem to (step 3) she used a user-generated card *birth list* (a wish list of presents for the birth of a child) created by a previous participant. The problem was solved already (step 4) as an online birth list clusters offers of multiple online stores: P7 *“Now it is possible that a party clusters everything and you can decide for yourself.”* She applies the solution to the problem she experiences (step 5) to have the application cluster the information of all doctors and centres and enable the user to select the relevant information. In evaluation the solution, she finds this a good solution because there is flexibility and clarity, but she is not sure whether it is realistic to create centre and doctor specific information.

## CONCLUSION

This paper attempts to tackle a problem space that affects researchers using co-design working in healthcare and in other domains where availability of participants is limited. We explored card-based ideation with ready-made and user-generated cards to enable participants that are not co-located to share knowledge and ideas. Our results show that participants came up with ideas themselves and

used ready-made and user-generated cards to find solutions for their problems. Concepts on cards either were used explicitly or further elaborated upon.

We highlight three perspectives for future work: First, in this study participants only developed ideas in individual workshops. Future work will compare the quality of these ideas to that of ideas generated in group ideation. Second, in future work we will investigate the experience of participants with one-on-one ideation. Finally, in future work we will study how we can transmit more knowledge and richer experiences using for example icons for categories on user-generated cards.

In the healthcare context, availability of participants that can or want to participate in research is limited due to their condition or treatment. It can be a problem when only participants that are readily available participate in co-design activities as it may lead to solutions tailored for those groups while excluding participants that cannot participate in co-design research activities because of their condition or treatment. In exploring a method for co-design without participants being co-located, we aim to extend the possibilities to involve participants in co-design research for successful design of healthcare technology.

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