Are agile design approaches useful in designing for health? A case study

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ABSTRACT When designing interventions for health, multidisciplinary teams increasingly work according to an 'agile' process. Potential benefits of this approach are better knowledge transfer, stakeholder inclusion, and removal of barriers to interactions. Unfortunately, the question whether agile approaches are useful in designing health interventions remains as yet unanswered.

To contribute to current knowledge, we analysed the process and results of a large multidisciplinary project with an agile approach. Our case study shows such an approach may indeed be a feasible method for the development of health interventions. The process allowed for a high pace, and good stakeholder inclusion. Some limitations also occurred. The agile approach favours speed over rigour, which hinders integration of user research and scientific evidence in the development process. Multidisciplinary cooperation remains difficult because of the limited availability of experts and stakeholders. Finally, the difficulties in documenting the process and results of the agile approach limit its use in scientific projects.

Keywords: intervention development, agile, design methods, case study

Introduction

The development of (digital) interventions for behaviour change is increasingly a multidisciplinary process, in which design (thinking) plays a significant role (Ferreira et al., 2015; Bazzano et al., 2017). Essential for successful collaboration between creatives (design[research]ers, human-computer interaction specialists), (para)medical and behavioural scientists, health care professionals, and patients, is a shared vision of what constitutes value, expressed in a shared methodology for intervention development (Hermsen, Renes, Mulder, and Van der Lugt, 2016). Unfortunately, medical and behavioural scientists on the one hand, and design and HCI researchers and professionals on the other, more often than not use fundamentally different methodologies (Mann, Kuppin Chokshi, and Kushniruk, 2018). The former generally use linear, theory-driven approaches (e.g. intervention mapping; Bartholomew, Parcel, and Kok, 1998, Behaviour Change Wheel; Michie, Van Straalen, and West, 2011), which rely on well-defined processes, evidence-based tools, rigorous documentation, and pre-set rules and plans. The latter increasingly use *agile* approaches (Beck et al., 2001) such as Kanban, Scrum, Google Design Sprint, Xtreme Programming, etc. Agile approaches favour individuals and interactions over processes and tools, working interventions over comprehensive documentation, stakeholder participation over clear rules, and responsiveness over pre-contemplated plans (ibidem).

Health intervention development could very well benefit from incorporating agile principles (Hekler et al., 2016). Unfortunately, the question whether agile approaches are useful in the development of health interventions remains as yet mostly unanswered; what literature exists from adjacent fields shows potential benefits, but also limitations of agile approaches. Potential advantages are horizontal – rather than hierarchical – knowledge transfer, inclusion of all stakeholders in the development process and removal of barriers to interactions (Beck et al., 2001). Potential disadvantages are problems in integrating user research and scientific theory and evidence in the development process (Ten Klooster, Noordzij and Kelders, 2020, Ploos van Amstel et al., 2017); limitations in reaching shared understanding (Ten Klooster, Noordzij and Kelders, 2020; Ploos van Amstel et al., 2017); no possibilities for testing assumptions because of high pace (Peters, 2019); and a lack of transfer of knowledge through limited documentation (Salah, Paige, and Cairns, 2011).

More knowledge of the efficacy of agile approaches for designing health interventions can help researchers and practitioners from different fields develop a shared methodology and avoid potential pitfalls. Building this knowledge starts with explorative research such as case studies, from which experimental hypotheses can be derived. The current paper provides one such case study; it describes and analyses the process and results of a large project aimed at developing interventions for paediatric physiotherapists (PPTs) to support children with physical disabilities in active play and sports participation. In this case study, we test the hypotheses that 1) an agile approach leads to useful and usable prototypes, based on insights from evidence and user research; 2) the agile approach helps include all stakeholders and fosters good interactions between them; 3) the agile approach benefits multidisciplinary cooperation, and leads to good knowledge transfer between participating disciplines.

Method

To shed light on whether using agile approaches had a beneficial effect on the development of interventions for PPTs to support children with physical disabilities in active play and sports participation, the authors of this paper collected and analysed the available data from the project: sprint reports, reflective journals (Thorpe, 2004) in which the sprint team collected their experiences and thoughts on the development process, and photos and film clips of sprint activities. All authors took part in a triangulation session with available members of the sprint team, in which we shared our findings and elaborated on them.

The case study

In this case study, a multidisciplinary team developed a toolkit for paediatric physical therapists (PPTs) to stimulate physical activity in everyday life settings of 6–12yo children with physical disabilities. The team consisted of behavioural scientists, health scientists, paediatric physiotherapists, designers from a design agency, and design researchers, with regular input from parents and children in the design process. The core sprint team contained two PPTs, two behavioural scientists, two designers, a design researcher, and a social worker.

The development process consisted of four one-week periods ('sprints'), following the rules and set-up of the Google Design Sprint (Sari and Tedjasaputra, 2017) approach: a five-day process for answering critical development questions through design, prototyping, and testing ideas with stakeholders. The goal of each sprint was to quickly develop feasible prototypes based on insights from evidence and user testing, with maximum attention to stakeholder participation. In the first two sprints, the team designed practical tools for use in physiotherapeutic practice; in the third and fourth sprint, the team designed a concept for a digital solution that enables PPTs to connect with social workers for sports participation.

Each sprint was preceded by a preparatory phase in which the team collected insights from literature and practice to inform the design sprint. Based on these insights, they prepared a start-up co-creation session. This session took place directly before the sprint and relevant stakeholders such as parents, PPTs and others took part. During the cocreation-sessions, the sprint team evaluated whether insights from literature and previous user research resonated with the available stakeholders: did they agree with the insights? Could they relate these to their own (professional) experience? What wishes, dreams and barriers for potential intervention themes transpired?

Working from these results, the design team then started the sprint week proper. On the first sprint day, the team went through a divergent phase in which they collected and mapped all available knowledge in mapping sessions, user journeys and personas, and reformulated the initial research questions into sub-questions based on the mapped knowledge. If necessary, the team performed further user research on this day, for instance by performing in-depth interviews with experts and stakeholders. The second sprint day focused on converging activities, by selecting emergent themes from the data gathered on day one. On the third sprint day, the team worked on turning these themes into intervention prototypes, by generating ideas using brainstorming techniques, and further elaborating on the ideas using guiding principles and tools to incorporate insights from the behavioural sciences in the design process. On day 4, the designers in the core team developed the

prototypes proposed on day 3. Each sprint finished on day 5, with a demonstration lunch in which the sprint team presented the prototypes to all available stakeholders, and a reflective session in which the core sprint team and other project members evaluated the sprint week. Appendix 1 provides a complete overview of the first sprint week as an example.

Figure 1: Showing connections: start-up activity for a co-creating session at the beginning of a design sprint week

Results and Discussion

The design team in this case study managed to end each one-week sprint with prototypes that received positive evaluations from stakeholders. This provides a first indication of proof for the hypothesis that agile approaches are useful in designing health interventions: they lead to useful and usable prototypes which can then serve as materials for testing the underlying change mechanisms in experimental or real-life settings.

The high pace and restricted time frame of a one-week sprint leave no room for this testing of assumed change mechanisms, nor of intervention feasibility or intervention efficacy. In this project, therefore, feasibility and efficacy testing took place after finishing the agile project, in a field lab setting which informs further iterations of the prototypes. This combination of agile development and field lab-based testing proved fruitful in maintaining a balance between speed and rigour, one of the known pitfalls of agile approaches. An example is the development of the Photoframe tool (see figure 2), meant as a probe to see what happens when children take a picture of their abilities in

therapy settings and show them to their PE teachers (who are often unwilling to let children with disabilities participate). Positive response led to its addition to the toolkit without further iterations. Pilot testing then showed that this intervention was in fact impractical because of its size and vulnerability. In later versions of the toolkit, a film clapboard will replace the Photoframe – as it is more practical, and it also invites making short films instead of static photos. These later versions of the toolkit will, once again, be tested for efficacy in field lab-settings.

Figure 2: Photoframe prototype. PPTs can use this to inform other physical activity professionals such as PE teachers of children's new skills

The second part of the first hypothesis states that agile approaches are useful in using insights from evidence and user research to build prototypes. In this project, the design team attempted to safeguard the integration of behavioural scientific and systemic insights by having experts from these fields on the team and by using design tools specifically aimed at integrating these insights into design processes. This went well as long as three conditions were fulfilled: the availability of the experts, the availability of well-developed and usable design tools, and (adherence to) a well-defined approach for integrating the insights in the development process. Experts need to be approached long before the sprint starts, but the unpredictable nature of sprints makes it difficult to know when experts are needed. In the case study, this sometimes resulted in experts being available when there were no questions for them to answer, and vice versa. Design tools need to be available and the sprint team needs to familiarize themselves with working with them before the sprint starts (cf. Van Essen et al., 2020 for an evaluation of the use of design tools in this case study). To make the best

use of both experts and tools, a pre-defined structured overview of sprint activities is necessary. The challenge then lies in keeping a balance between adhering to this pre-set schedule and remaining flexible.

Our second hypothesis states that the agile approach helps include all stakeholders and fosters good interactions between them. This case study shows once again that one of agile's strong points is stakeholder inclusion. The co-creation sessions, in which the sprint team tested important insights from literature and user research with stakeholders proved especially powerful in that respect. They delivered rich knowledge to inform the development of the intervention prototypes.

The third hypothesis states that the agile approach benefits multidisciplinary cooperation and leads to good knowledge transfer between participating disciplines. This multidisciplinary cooperation, however, remained an issue throughout the project. Non-academic designers in the team, used to full-time one-week sprints, had difficulty coming to terms with the realities of Dutch academic life and working in the health sector. Neither academics (design researchers, behavioural scientists) nor health professionals (physiotherapists) were available for a full five days at any moment, no matter how careful the planning process. The Dutch practice of working part-time was one of the reasons, and also the immensely busy schedule of many of the researchers and health professionals, which did not allow taking an entire week off other responsibilities. This, combined with the aforementioned unpredictability of the sprint process, forced the team to change from the initial plan of having a multidisciplinary team with all specialities aboard, to a more traditional setup in which a core design team of designers and design researchers worked continuously, bringing in experts when they were needed. But even that proved hard from time to time; the sprint team attempted to solve this by leaving out Mondays and have only the core team designers and design researchers work on Friday. This hindered project continuity and shared understanding, two of the alleged strong points of the agile approach. A solution may lie in slowing down the pace of the sprints.

Finally, the design team found that challenges occurred in documenting the proceedings of the sprints. Even though the sprint team had planned to keep detailed reflective journals, time pressure proved this to be difficult. This lack of documentation threatens transferability of insights in any project but is especially problematic in using agile approaches in scientific research, where rigorous reporting is essential. A solution may lie in appointing a team member with the sole task of collecting data, reporting, and planning ample time for joint reporting and reflection.

Conclusion

The current paper reports a case study in which a multidisciplinary team used an agile approach to develop a toolkit for paediatric physical therapists (PPTs) to stimulate physical activity in everyday life settings of children with physical disabilities. The study shows that an agile approach is successful in delivering a range of prototypes for interventions. Furthermore, the approach helped in bringing on board all stakeholders.

However, some limitations of the approach transpired. Firstly, it is important to keep in mind that verifying feasibility and efficacy is not possible within the boundaries of the sprints. This may be solved by combining sprints with periods of real-life testing in field labs. Secondly, the case study

showed that it is important to strike a balance between speed and rigour; high pace may especially hinder the integration of user research and scientific evidence in the development process. Thirdly, multidisciplinary cooperation remains difficult because of the limited availability of experts and stakeholders. This hinders both continuity and shared understanding. Finally, if not dealt with, the difficulties in documenting the process and results of the agile approach limit its use in scientific projects.

All in all, this case study gives reason to hypothesise that agile approaches are useful in designing interventions for health, as long as the above-mentioned known limitations are taken into account. This can be done by combining agile (sprint) approaches for development with non-agile experimental or real-life testing of assumptions, feasibility, and efficacy; safeguarding the integration of insights and evidence from science and user testing by including experts on the team, using well-developed and well-known design tools, and adhering to a predefined development process; slowing down the pace of the sprint to generate a workload that fits the schedule of team members from non-design disciplines; and making sure there is ample time for reflection and documenting. Further (experimental) research can test this hypothesis.

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Appendix 1: Overview of Sprint Week 1

Day 0 (pre-sprint)

Co-creation session with PPTs, (behavioural) researchers, designers, parents, education scientists, social workers.

Central question: how can we support children with physical disabilities and their parents, in that they can take part in daily physical activity in society?

Session was informed by a range of interviews withnPPTs, social workers, parents, and children. Participants received a homework assignment: map the opportunities and threats you see from your experience.

During the session, these insights were transformed into main themes for the project. Furthermore the participants developed a range of personas [1]: typical children, parents, social workers, PPTs.

Day 1 (Tuesday)

Diverging design activities: gathering, mapping, and analysing all insights onto a Research Wall [2] in an interpretation session. Then the design team translated the main themes into How Might We-statements [3]: trigger questions that make actionable design ideas possible.

An expert in education then gave a lecture on how to support children in mastering new, insecure tasks whilst taking care of their psychological safety. This session inspired the designers to redefine the main theme for the sprint to 'How might we support the PPT in their therapy, in such a way that they can create a safe insecurity in all stakeholders?'

The design team then decided that they needed further in-depth interviews with two PPTs and a parent, and mapped these new insights onto the Research Wall. All insights were then brought together in a User Journey [4].

Day 2 (Wednesday)

Converging design activities: redefining the How Might We (HMW)-statements from day one so that they reflected the sprint's new main theme around safe insecurity.

The design team then vote on the most relevant How Might We-statements. Selecting the following statements: HMW let children come up with their own solutions, even if they are not perfect? HMW enhance creative solution searching in all stakeholders? HMW involve the social environment? HMW give parents confidence to let their children go more?

Team members then gave short pitches with inspiration from other, similar projects. The design team concluded the day with Crazy 8s [5], a fast sketching exercise that challenges people to sketch eight distinct ideas in eight minutes.

Day 3 (Thursday)

From ideation to prototyping: developing and selecting intervention ideas
The day started with another round of Crazy 8s. The design team then pitched their ideas to one another, and further developed the ideas. They then voted for the most relevant ideas, using guiding principles (fun, equality (between child, parent, PPT), accesibility, support, positivity) and prerequisites (financial feasibility, easy to transport, fitting treatment practice).

The design team then looked which idea answered which HMW, and used the behavioural lenses to further evaluate the ideas. All this led to the selection of four ideas to be developed into prototypes:

1) 'A day', a diary tool for children and parents to map helping and overhelping by parents
2) 'Fears, Dreams, Actions' card set for PPTs to facilitate conversations
3) Dice with tips for children to help them think of their own solutions for challenges
4) A plexiglass pane to encourage parents to take an observing role rather than a helping one

Day 4 (Friday)

Prototype development by two designers from the design team

Day 5 (Tuesday)

Presenting the prototypes and reflection

During a lunch meeting, the design team presented the four final prototypes and the design process to all stakeholders who contributed to the sprint week and the preparatory co-design session. Everybody then had the opportunity to give feedback on the prototypes.

In the afternoon, the design team reflected on this feedback, and planned further development of the prototypes for evaluation in field labs. Then, the design team evaluated the sprint week and made a start with formulating HMW statements for the next sprint week.

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