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The Value of Agile Methods in Designing for Behavioural Change: A Case Study

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Abstract: Past research on designing for behavioural change mostly concerned linear design processes, whereas in practice, *Agile* design methods are increasingly popular. This paper evaluates the possibilities and limitations of using Agile design methods in theory-driven design for behavioural change. We performed a design case study, consisting of a student design team working on improving waiting experiences at Schiphol Airport security and check-in.

Our study showed that Agile design methods are usable when designing for behavioural change. Moreover, the *Behavioural Lenses* toolkit used in the design process is beneficial in facilitating theory-driven Agile design. The combination of an Agile design process and tools to evidentially inform the design enabled the design team to formulate viable and interesting concepts for improving waiting-line experiences. However, limitations also occurred: a mismatch between the rate at which the *Scream* method proceeded and the time and momentum needed to conduct in-depth research.

Keywords: Agile design, theory-driven design, behavioural change, waiting line behaviour

1. Introduction

Designing for behavioural change is currently on the rise in the public and the commercial sector, not least because of the growing insights into the effect of our behaviour on our health (Free et al., 2013) and our planet (Griggs et al., 2013). The rise of phenomena such as *nudging* (Thaler & Sunstein, 2008), *social design* (Van der Zwaag, 2016), and *service design* (Stickdorn & Schneider, 2012) in professional and educational practice typify this development.

Designing for behavioural change is complex and, therefore, needs theoretical grounding, increasing the design's efficacy (see Michie et al., 2009; Noar, Benac & Harris, 2007; Taylor, Connor, & Lawton, 2011) and the designers' decisional accountability (Van Woerkum & Aarts, 2012).

In recent years, linear design processes, such as the Double Diamond (Design Council, 2015; Van Essen, Hermesen, & Renes, 2016), have informed design research projects aimed at behavioural change. However, in business practice and education, *Agile* projects are increasingly prevalent. In short, Agile is a method derived from software development. It embraces change rather than

following a pre-determined plan (Jongerius & Berghuis, 2012). A well-known example of an Agile working method is *Scrum*. Used by agencies in the creative sector to develop interactive products (Chicken, 2015), Scrum contrasts the linear approaches associated with traditional linear working methods by using an iterative process; it incorporates 'sprints' instead of working step by step. The sprints comprise an iterative sequence of steps to improve the design (Lee, 2012).

Scrum's basic principles – user-oriented approach, a self-propelled team, flexible scope – are potentially very suitable for designing for behavioural change. The user-oriented approach – prioritising relevance to the end user and not the team, customer, or product (Jongerius & Berghuis, 2012) – mirrors a similar user orientation in designing for behavioural change. A strong emphasis of this approach is the target audience (end user) and the accompanying goal (changing specific behaviour). The user-oriented approach does not comment on or try to influence the choice of instruments (Hermesen, Renes & Frost, 2014, Hermesen et al., 2015).

Another similarity between Scrum's principles and designing for behavioural change is the 'flexible scope' principle, which doesn't determine the result in a detailed way at the process's beginning; the product should instead fit the client's vision and goals (Jongerius & Berghuis, 2012). Designing for behavioural change similarly focuses on regular evaluation and adjusting concepts accordingly.

Differences also exist between Scrum's principles and designing for behavioural change. Scrum has a poor track record in encouraging creativity and conducting applied research (Van Hout & Gootjes, 2015; Lee, 2012). The latter can adversely impact on the application of designing for behavioural change because using evidence to inform designs can be time-consuming (Hermesen, Renes & Frost, 2014, Hermesen et al., 2015).

In this paper, we evaluate (1) to what extent non-linear design methods, such as Agile and Scrum, apply to designing for behavioural change, and (2) to what extent theory can inform the Agile design process. To do so, we conduct a case study in which a group of design students worked on improving waiting-line experiences at Schiphol Airport, the Netherlands. This case study can demonstrate how to pursue these goals by applying Agile design processes for behavioural change in business

2. Method

2.1 The case study: improving airport waiting line experience

Our design case study was commissioned by the Amsterdam Airport Schiphol, and consisted of a student design team working on a design question about improving waiting experiences at the airport's security check. As one of Europe's biggest and most popular airports, Schiphol Airport attaches great importance to enhancing their services, implementing centralised security in the entire terminal in June 2015. Travellers queue before entering the security check, which is considered a challenge to making it a more positive experience. Schiphol's commission sought solutions to positively influence the waiting experience of passengers waiting in this queue. A consortium of [Left Blank for Peer Review] assembled a multidisciplinary team of international students with different academic backgrounds to fulfil the assignment. The team worked according to *Scream*, an Agile design process based on the Scrum method (Van Hout & Gootjes, 2015). The team used the Behavioural Lenses toolkit (Hermesen, Renes & Frost, 2014, Hermesen et al., 2015) for user experience research and concept evaluation, as a means of informing the design process with theory from the behavioural sciences.

2.2.1 *Scream Method*

The Scream method is a version of Scrum especially adapted for creative processes. It has three distinct additions to the more general Agile workflow: (1) implementing *Ideation* in the sprint planning, (2) use of the Design Method Toolkit (MediaLab Amsterdam, 2016), and (3) implementing *Translate* sessions halfway through every sprint to filter and translate all results (Van Hout & Gootjes, 2015). The Schiphol project involved seven three-week sprints, each starting with an Ideation brainstorming session for identifying and drafting ideas. The most promising ideas are selected and divided into tasks, and the team defines clear sprint goals (Van Hout & Gootjes, 2015). Deliver design products (prototypes) that provide answers to the main question, defined at the project's start, is the main goal of each Scream sprint. During a sprint, the individual design products are accomplished using the iterative principle of 'research, create, and translate' (Van Hout & Gootjes, 2015). Creating a design product involves research and creation. The created design product is evaluated using stakeholders' theoretical input. Ideally, at this evaluation, the design product is adapted to a more accurate version or end product. During the overall process, these instruments adapt and improve through iterative repetition in the sprints.

To translate research insights into concrete design requirements, halfway through each sprint, a translate session involving all the project's stakeholders took place, defining essential demands for the optimised solution (Van Hout & Gootjes, 2015).

2.2.2 Behavioural Lenses toolkit

To ground the design process in theory from the behavioural sciences, the team used the Behavioural Lenses toolkit (Hermsen et al., 2015; Van Essen, Hermsen & Renes, 2016), which enables designers to conduct theory-driven user research and concept evaluations. It is based on the main principles of the Persuasive by Design Model of Behaviour Change (Hermsen, Renes & Frost, 2014), which has a proven track record (Hermsen, Renes & Frost, 2014; Hermsen et al., 2015, 2016; Van Essen, Hermsen & Renes, 2016) in using theory to inform designs. The Behavioural Lenses toolkit was freely available to the design team throughout the project, as part of the larger Design Method Toolkit (MediaLab Amsterdam, 2016; see figure 1). The design team could use the Behavioural Lenses toolkit as they saw fit. During sprint one, we conducted an introductory workshop, informing the design team about the Behavioural Lenses toolkit's basic principles and application.

The design team created the design product using the iterative principle of 'research, create, and translate'. Creating a design product involves research and creation. The created design product is evaluated using the stakeholders' theoretical input. Ideally, at this evaluation, the design product is adapted to a more accurate version.

2.2 Measures

We conducted overt participatory observation throughout the project. In our role as tutors, we helped the student design team theoretically ground their designs using the Behavioural Lenses toolkit, but only if requested. We attended translate and review sessions, providing the team with critical questions for theoretically grounding their research results and concepts. The student design team could also correspond with us by email or phone.

During the sessions, we took unstructured field notes, collected emails with questions from the design team, and kept a diary, noting when the design team requested support. Subsequently, we conducted tri-weekly, semi-structured interviews (at each sprint's end) with the team 'experts' on the topic of designing for behavioural change. The interviews' most important topics and accompanying questions regarded the Agile workflow and applying the Behavioural Lenses. We asked the design team where and how they practised these tools, what their experiences were, to

what level they applied and appropriated the tools, and to what extent they felt they were experts of behaviour change design within the team. We also used a visual analogue scale (VAS, Funke & Reips, 2012) to measure the perceived value of the usage of The Behavioural Lenses per sprint (regarding research on the target audience, the grounding of the prototypes and the behavioural lenses as evaluation tool): on a 10cm line, with one end corresponding to 'not at all' and the other end corresponding to 'very much so', the design team members could indicate their position regarding their expertise and the usability of the Behavioural Lenses toolkit.

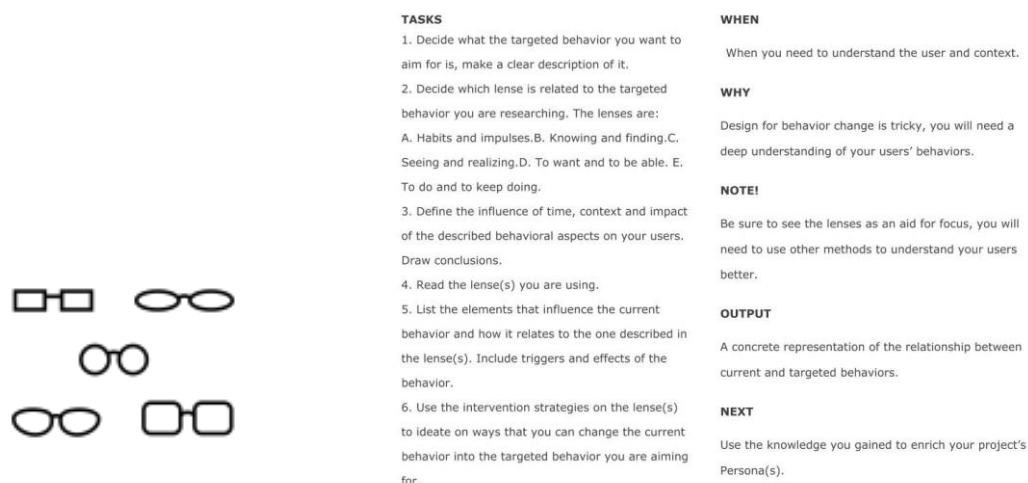


Figure 1: The Behavioural Lenses as described in the Media Lab Design Toolkit

3. Results

3.1 Stages, sprints and designed products

In figure 2, the arrow from left to right indicates the project's overall progress. The first three sprints are sprints aimed at analysis, to zoom in on the target group and their behaviour. The fourth sprint is transitional; starting with making definitive choices regarding the specific choice for a target group. In this case, the design team chose to work with the leisure flyer rather than a business audience. In this fourth sprint, the final concept to solve the main question was also selected. The fifth sprint is an intervention-developing phase, translating the selected concept into practical interventions for behaviour change. The sixth sprint is evaluative, validating the concept and interventions.

Sprints one to six resulted in several designed products. Since the first sprint is introductory, there were not many products. During sprint two, a cultural probe and a user profile were developed, gaining insights into the target group. A cultural probe (Stickdorn & Schneider, 2012) is a method for gaining user insights from a user perspective, without the presence of the designer, whereas a user profile is a design product comprising a collection of all user insights. The cultural probe's and user profile's main goal is to translate insights into a customer journey map, in this case a rich overview of the process a traveller goes through when passing through security, inspiring the next sprint.

In sprint three the design team made observations at the waiting line, to map the leisure flyer's current behaviour and analyse frictions between meaningful and unfilled time. In sprint four, the design team organised a brainstorm session. One student developed a Harris Profile (Harris, 1982) using insights from the Behavioural Lenses. The goal of this design product is to test to what extent the different concepts correspond with the requirements of successful concepts in general. At the end of sprint four, the design team delivered three conceptual prototypes as an answer to the main

question, validated by the Harris Profile. The conceptual prototype they chose for further development was 'Leave Your Worries Behind' Using a mobile application and several screens, the leisure flyer can (1) receive information about the security process and (2) be entertained while waiting.



Figure 2: Stages and sprints during the project, design products per sprint, and direct and indirect application of the Behavioural Lenses during several sprints

In sprint five, the design team developed 'preparatory screens' – screens placed in the area leading to the security check gates, with the intent of helping travellers during the security process. In sprint six, evaluating the user's willingness to participate in the final concept at the waiting line was the main goal. The design team constructed a test plan and updated a diary log on the responses to the concept. This final evaluation did not lead to further iterations.

3.2 Designing for behavioural change, the Agile way

The team started with many preconceived ideas about the behaviour of their target audience. They felt obliged to prove these assumptions and use them as a starting point for their research. In the initial sprints, the team used the first half of the sprint (the first 1.5 weeks from start to translate session) to conduct research, mainly trying to fill information gaps that had become apparent in the previous sprint. In the mid-sprint translate session, the design team sought to filter and categorise their research results, turning them into ideas for the sprint's second half, where they created or improved a prototype.

Figure 3: initial (left) and adapted (right) version of the cultural probe

Figure 3: initial (left) and adapted (right) version of the cultural probe

This Agile design method helped the design team focus on a practical approach, translating research into an actual prototype. By involving the client in the design process, the Agile approach also prevented a possible expectation gap between the designer and the client. At the end of the project, the client stated their satisfaction with the end result of the design process.

An example of the iterative nature of the Agile design process is the creation of the cultural probe in sprint three. Figure 3 demonstrates how the cultural probe evolved from its initial form to its final version. At first, the design team conducted research on the psychology of waiting lines (Norman, 2008). Based on principles from this research, the design team created an initial cultural probe, retrieving expectations and memories of waiting line experiences and frictions between expectations and reality. The initial version of the cultural probe was evaluated by presenting it to our team of researchers. During the evaluation, it became apparent that the initial cultural probe was overly biased by how the design team perceived the waiting line experience, rather than actual behaviour displayed by the target group. The design team applied the Behavioural Lenses as an evaluative tool, translating the initial version to one more based on actual behaviour.

Unfortunately, the Agile working method had a tendency to lead to a reduced focus on research. Because of the practical goal set at the beginning of each sprint, the team felt pressured to create a designed artefact in every sprint. The sprints only had a three-week duration, so the design team perceived time pressure as a limiting factor. The resulting pressure reduced their willingness to conduct research and increased the tendency to create concepts based on premises, even when confronted with the possible negative effects of minimal research. At the project's end, the team felt that an increased focus on creation and a lesser focus on research could very well have had consequences to the concept's potential efficacy, because they lacked crucial information about their target audience.

The placement of the Translate sessions (in the middle of each sprint) further augmented the detrimental effect of time pressure. Although these sessions afforded the design team new insights, the sessions were less effective than expected. The team had already finished their research when these sessions occurred, and there was not much additional time for research in the second half of the sprint, after the translate session. Moreover, in the Translate sessions experts from outside the team were invited to provide feedback. Because of the timing of this feedback, it was not always followed up.

3.3 Agile design using the Behavioural Lenses

During the sprints, The Behavioural Lenses toolkit was used to ground the design of the prototypes in theory from the behavioural sciences. Figure 2 shows where and how the design process uses the Behavioural Lenses toolkit.

In sprint two, the design team attempted to gain insight into the target audience using a cultural probe and by creating a user profile. Before making the observations required for creating these design research products, the design team used the Behavioural Lenses for generating hypotheses and research design. They made an observation list and survey partly based on three Behavioural Lenses: 'Wanting and Being Able To', 'Knowing and Believing' and 'Habits and Impulses'. The design team participated in a session about observation using the Behavioural Lenses and decided to focus on the leisure flyer as the specific target audience.

The design team chose to use the Behavioural Lenses as a method in sprint three to conduct action research by creating and testing one friction-relieving concept, particularly between current behaviour and target behaviour. During the translate session their results were discussed from a behavioural change perspective; however, unlike the initial plan, categorising research results using the Behavioural Lenses was cancelled due to time constraints.

In sprint four, the design team used the Behavioural Lenses to categorise their earlier research results and evaluate concepts developed in previous sprints. This session provided a clear overview of challenges and opportunities, and the design team used these to improve their concept. It led to a significant change in the concept, forcing the design team to choose between two kinds of target behaviour, and selecting a more specific target group. Later on in the sprint, a brainstorm session using the Behavioural Lenses took place. Time constraints meant the design team could not process all findings into the concepts in sprint four; however, they did manage to make a Harris profile, incorporating some of the opportunities and challenges.

In sprint five, preparatory screens were created as one of the final concept's deliverables: a consequence of a challenge (the friction) found in sprint four. The Behavioural Lenses were indirectly applied: the design team studied and applied the underlying theory of the Behavioural Lenses.

During the sixth and final sprint, the design team tested the high-fidelity prototype. They decided not to test the creative concept, but the willingness of leisure flyers in the waiting area for security to participate in the concept. The design team did not use the Behavioural Lenses for their test design, but while observing, they found the Behavioural Lens 'Wanting and Being Able To' very suitable for interpreting the results. Most test persons did not have the time to participate in the concept, and they could not scan the required QR code. These test results are not processed in the final concept but are included for discussion in the research paper as a final deliverable.

At the beginning of the project, the design team did not use the Behavioural Lenses toolkit to its full potential for researching the target audience. The design team felt this was due to their lack of knowledge on effectively using the Behavioural Lenses for their research. The design team also

stated they found it difficult to combine the Behavioural Lenses with other design methods from the Design Method Toolkit. However, once the design team learned more about the Behavioural Lenses, they noted that their perceived value of them increased. Additionally, interviews with two students from the team confirmed increased appreciation of the Behavioural Lenses after mapping out challenges and opportunities concerning their prototype.

4. Discussion

The current paper evaluates whether (1) Agile is applicable as a method to designing for behavioural change and (2) tools such as the Behavioural Lenses are valuable for informing the Agile design process. To do so, we analysed the use of the Behavioural Lenses during a project with Schiphol Airport. In this project, a design team of students from different backgrounds researched and developed a diversity of concepts to create a more positive experience at waiting lines of a specific target group: Leisure Flyers. The concepts were delivered to Schiphol stakeholders after testing. During the six design sprints, we conducted observatory research and interviews about the Agile workflow and the use of the Behavioural Lenses toolkit.

Our research demonstrated that the Behavioural Lenses were sometimes applied in a direct way at first (e.g. in the user profile, cultural probe, which were created using the Behavioural Lenses), and then, later on, in a more indirect way (e.g. the customer journey map, which was created without direct application of the Behavioural Lenses, but with the Lenses in mind). The application of the Behavioural Lenses in the first phase of ‘target group analysis’ were applied in a direct way, whereas at later stages ‘conceptualizing’, ‘development’ and ‘evaluation’ their application was more indirect, not by using the Lenses but by keeping the Lenses in mind. During the project, the Behavioural Lenses demonstrated their importance in the theoretical validation of the presented design products. However, the project showed some shortcomings when researching the target group. The specific target group and target behaviour were defined relatively late and indirectly because of the product-oriented approach and the high speed of the sprints. Subsequently, the actual designing was less focused than desired.

The Behavioural Lenses were applied more effectively relatively late in the design process: in sprint three and further on. Our research showed that this was a consequence of a knowledge and experience gap in how and where the tools are applied. During the interview at the end of the second sprint, the design team informed us they considered the Behavioural Lenses to be a substitute for other tools in the Media Lab Toolkit. Furthermore, the design team felt it was hard to translate insights from the Behavioural Lenses into other research methods, such as the cultural probe. The learning curve of the Behavioural Lenses toolkit seems too steep for inexperienced users, resulting in them being unable to start their research without help from experts in the field of behavioural change or people who use the Behavioural Lenses on a regular basis.

4.1. Conclusions and recommendations for further research

Firstly, this research combines two elements: design research practice – especially within the field of designing for behavioural change – in which developing methods where theory informs the design process has seen much progress; and industry practice in which new and Agile design methods are gaining traction. Secondly, this research demonstrates the complexities of using Agile design for behavioural change, shows there are limits to a viable speed of working, and stresses the importance of evaluation. Thirdly, our research provides some starting points to develop more adaptive tools to make it easier to use the Behavioural Lenses in Agile design processes.

To significantly improve Agile design processes for behavioural change, we recommend: (1) implement an explanatory pre-sprint to foster thinking about ways of using theory to inform the design process – it would make sense to invite experts during this phase. (2) Include researchers (preferably with a background in the behavioural sciences) as participants of the Scrum team. (3) Adapt or rewrite user stories (an already existing procedure at the start of a sprint), making the target behaviour an explicit goal of the sprint. And (4) before sprint one, inform users of the Behavioural Lenses and their complementary and constructive applications for other design products, such as user profiles, cultural probes, customer experience maps, and customer journeys.

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