Agile Development as a Change Management Approach in Healthcare Innovation Projects

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Abstract
Although many pilots with new eHealth products have been developed, only very few of these products reach widespread adoption within healthcare organisations. The literature mentions a wide range of bottlenecks for the acceptance of new technology in the healthcare industry, among which insufficient attention for change management and acceptance by intended users. In this paper, we argue that agile software development, with its practices for user involvement and product visibility, can be used as a change management approach in healthcare innovation projects. We compare agile methods with the change approach of Kotter (1995). As an illustration of our theoretical findings, we describe a development project of an innovative eHealth application to support the care for persons with intellectual disability.

1. Introduction
The healthcare sector is a challenging field for innovation, with many innovations never achieving large scale adoption (Heeks 2006, Kaplan, Harris-Salamone 2009). Innovative ideas are often developed as proof-of-concepts but subsequently do not lead to a lasting change within the organisations involved. With the ever increasing pressure on healthcare budgets, the growing demand for care and the shortage of available staff, there is clearly a need to improve the success ratio of these innovation projects.

For an innovation to succeed, many critical success factors must be addressed. A general model of success factors for innovation is provided by the STOF model (Bouwman et al. 2008). This model organises success factors in four groups: those dealing with Service, Technology, Organisation, and Finance (see Figure 1). Key is that successful introduction and adoption of innovations in society requires the development of an overall business model that covers all aspects of the STOF model and thus creates sufficient value to the intended users and other stakeholders. Omitting any of the aspects may lead to pitfalls that eventually prevent widespread adoption of an innovation. Critical success factors mentioned for innovation in healthcare include technology, user acceptance, financing, and legislation (Kaplan, Harris-Salamone 2009, Broens et al. 2007).

Within the scope of this paper, we focus on one particular success factor: the people side of change management. This success factor covers the actions that should lead to higher user acceptance of the developed innovations. In terms of the STOF-model this concerns ensuring that prospective users understand and accept the added customer value. Since healthcare innovations invariably imply change for the intended users, chances of promising innovations being embraced are small without explicit attention for managing the change.
We have experienced the people side of change management while participating in an innovation project to develop an expert system for supporting healthcare workers caring for people with intellectual disability. In this project, we used a so-called agile software development method (see section 3) to develop the healthcare innovation together with intended users. This agile method turned out to be a strong driver for the change management process. Prahalad and Ramaswamy (2004) have argued that the creation of customer value should involve collaboration between the innovators and prospective users in a development process that essentially becomes a process of co-creation. Our approach led to such a form of co-creation.

The goal of this paper is to show that agile software development methods can be applied as a change management approach to achieve user acceptance and innovation adoption. We show this by comparing agile methods with theory from the field of change management and providing an illustration from practice.

In the remainder of this paper, we first discuss change management, in particular literature on change management in healthcare innovations and the theory of Kotter (1995). We then introduce agile software development methods in section 3, followed by the main contribution of this paper, a comparison of the agile method Scrum against Kotter’s theory. In Section 4, we illustrate our findings by describing the abovementioned innovation project and the effects on the intended users and management of the healthcare organisation. Section 5 contains the conclusion and discussion.

2. Change Management

In this section we first introduce some theories on change management to be able to assess the applicability of agile software development methods as a change management approach. Based upon the characteristics of typical eHealth innovation projects we select Kotter’s change management model to compare the agile methods with.
2.1. Change management in Healthcare Information Technology

Healthcare organizations face a number of challenges that force them to change: increasing pressure on budgets, a growing demand for care and an increasingly tighter job market. As Stace and Dunphy (1991) showed, change ranges from incremental fine tuning to radical transformation, where more radical changes have greater impact on an organization and its members. The magnitude and diversity of the challenges in healthcare are such that they cannot be faced with relatively small adjustments but require radical changes in the form of innovations. Innovations usually require major changes for individuals in organizations. The implementation of new ways of working requires people to explore previously unknown ways of working and adopt these as their new day-to-day standards. Changes like these do not come easily, but need to be supported by deliberate change management. This is even more true for the healthcare sector since it has a number of specific complicating characteristics, such as a wide range of roles, responsibilities and disciplines, the legislation and regulations involved, highly disciplined professionals who are trained to follow protocol, and the costs in case of failure (LeTourneau 2004). As this paper focuses on the intersection of healthcare, change management and informatics, we will use the definition of change management by Lorenzi (2003): “the process of assisting individuals and organizations in passing from an old way of doing things to a new way of doing things”.

On an organizational level, change management literature has two main theoretical approaches: planned and emergent change (Burnes 2009, Palmer, Dunford & Akin 2008). Planned change approaches describe a clearly defined goal, are top-down and use strict control mechanisms such as project management. Emergent change approaches describe a bottom-up process of interaction that leads to change. Although often positioned as opposing approaches, some consider the combination of both approaches the best road to achieve organizational change. Two examples of this complementary approach are Kanter et al.’s (1992) bold strokes and long marches and Beer and Nohria’s (2000) theory E and theory O. Based on the complementary approach both Kanter et al. (1992) and Kotter (1995) developed a generic plan to facilitate emergent change. These generic plans contain a sequence of steps. When the steps are followed, the implementation of the desired changes is a logical outcome. Kotter’s (1995) generic plan, the eight steps, is the most widely used approach in the field.

On an individual level, organizational change requires individual change. In research on organizational change, resistance to change is seen as one of the main causes that change does not “stick” (Kotter 1995, Kanter, Stein & Jick 1992, Beer, Nohria 2000). Resistance to change can be reduced by enhancing readiness for change. Holt et al. (2007) found that four factors influence the individual readiness for change: 1. Am I capable to bring about this change (self-efficacy); 2. Are our leaders committed (management support); 3. Is this the right change for our organization (appropriateness); and 4. Is the change beneficial to our organization (personal valence). For transformational changes self-efficacy and management support are confirmed as key factors (Rafferty, Simons 2006). Self-efficacy is often achieved by end-user involvement or co-creation, as systems that are co-created better fulfil the user’s needs (Prahalad, Ramaswamy 2004) and the opportunity to experiment with new ways of working while creating the system adds to individuals belief in their own capacity (Rafferty, Simons 2006). In recent years a number of papers have focussed on end-user involvement when developing healthcare innovations (Nies, Pelayo 2010, Scandurra, Hagglund & Koch 2008, Teixeira, Ferreira & Santos 2012). Some have even gone so far as
Innovation projects in eHealth typically share a number of characteristics: 1. the transformational nature as described before, 2. the outcomes of the projects are not exactly known when the projects are initiated, and 3. some system or software is developed. From the previous paragraphs follows that approaches for eHealth innovation projects must ensure management support, self-efficacy and a way to allow for emergence (Burnes 2004). From a software development perspective, the so-called agile methods have been specifically tailored for projects that have uncertain outcomes and require user-involvement, as will be explained in section 3. We believe that, apart from their value for realizing a system, agile development methods can be seen as a valid change management approach for this kind of changes. To support this statement we will compare agile with the most widely used change management model for emergent change, Kotter’s eight steps (1995). For reference, we now give a brief overview of Kotter’s model.

2.2. Kotter’s theory of change management

Kotter focuses on the people aspects as a method for realizing lasting changes in organisations. He proposes an 8-step model (see Table 1) which can be divided in three different phases. Kotter states that all 8 steps need to be addressed or else it will be difficult to realize the change.

The first phase consists of three steps necessary to create the right climate within the organisation. Step 1 involves developing a sense of urgency in the people involved. A lacking sense of urgency occurs when people do not see the necessity of the change. This may lead the people involved to resist the change because it will drive them out of their comfort zones. Step 2 is to create a guiding team representing the different stakeholders. This guiding team will be the main force driving the change. The guiding team needs shared commitment and enough organisational power to take the necessary decisions. A pitfall for this step is senior management not having a significant role, since management commitment reflects the urgency of the change. Step number 3 is the creation of a vision that will guide the change effort. The quality and clarity of the vision can make or break a change effort.

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Table 1: Kotter’s 8-step model

The second phase in Kotter’s model is Engaging and enabling the entire organisation. This phase consist of three steps as well, starting with the communication of the vision and the necessary changes. Frequent communication of the vision and upcoming changes is important to get people engaged. Obviously, the behaviour of the management and the guiding team is in itself an important
message, they have to “walk the talk”. Step 5 is enabling action through empowering others to act. When the required changes start to take effect and the ‘early adopters’ start to function in the new situation, there will be roadblocks, resistance and pitfalls along the way. At this step it is important to quickly identify and remove these blockades. In Step 6 the short term wins are created. These quick wins are important to keep the stakeholders motivated and to get the followers on board.

The third phase in Kotter’s model concerns implementing and sustaining the change. This phase involves scaling up. In Step 7, the early wins are used to remove even more impediments and get more people involved. In this step the effort should not stopped be too soon or the organisation may risk losing the momentum. The final step is to connect the new approaches firmly in the organisational structures such as policies, human resources, or new initiatives.

3. Agile as a change management tool

In this section we introduce agile software development and the Scrum method. We then continue with the comparison of the Scrum method against Kotter’s model to assess the applicability of Scrum as a change management approach.

3.1. Agile software development in healthcare

In software development, the last decade has seen the rapid rise of so called agile methods. United through the formulation of the underlying values in the Agile Manifesto (Beedle et al. 2001) these methods approach the development of software projects in an iterative, interactive, and exploratory fashion. The approach is iterative in the sense that new working functionality is produced in so-called iterations, each delivering fairly small increments. The approach is interactive in the sense that customer representatives, for example the intended users, get actively involved in evaluating the last iteration and in planning the contents of the next iteration. The approach is also explorative, meaning that a full specification only emerges as the consequence of subsequently planned iterations.

With regard to the agile methods in healthcare a number of papers have been written. Offenbeek (1996) already suggested the applicability of interactive and iterative methods in situations with a high resistance potential, to which we categorize healthcare. Krause and de Lusignan (2010) states that, from the point of usability of clinical applications, agile techniques are more appropriate than processes that separate developers from users, and test products against theoretical assurance models. Kitzmiller (2006) presents the agile approach as an improvement and evolution over the traditional plan-driven approach. For a general academic overview in agile methods we refer to (Dybå, Dingsøyr 2008, Lee, Xia 2010). Since agile methods are a actively developing field, there is a continuous need for more rigourous studies (Lee, Xia 2010, Abrahamsson, Conboy & Wang 2009).

The main industry survey (Version One 2010) shows that, at the moment, Scrum is the most widely used agile method. Scrum is the method we applied in our healthcare project. Below, we describe the Scrum method and then discuss how Scrum supports the change management steps in Kotter’s model.

3.2. The Scrum method
Scrum (Schwaber, Beedle 2002) is an approach that emphasizes the project management aspects of projects where it is difficult to know the full specification of the desired end product at the beginning of the project and therefore impossible to plan everything at the start of the process. Scrum originated in software development but is generic enough to be applied in other domains. Central to Scrum is empirical process control whereby a self-organising team continuously inspects and adapts its own process. Software is developed incrementally in periods of 2-4 weeks called sprints (see Figure 1(Figure 1)). Features to be implemented in the system are registered in a product backlog. At the sprint planning at the beginning of every sprint, the product owner (a representative of customers, management and intended users, see Figure 2(Figure 2)) decides through prioritisation which backlog items have the highest business value and should be developed in the following sprint. Team members estimate the amount of work and indicate how much backlog items they can commit to.

![Scrum process diagram](https://example.com/scrum-process.png)

*Figure 1: Scrum process, from Lakeworks; Scrum Process; WikiMedia Commons;9 Jan 2009; Web; 20 May 2012*

During the sprint, team members coordinate their work through daily stand-up meetings. One team member, the Scrum Master, is in charge of removing any impediments. Progress is tracked using visual artefacts as a scrum board and a burn down chart.

Every sprint ends with a sprint demo. During the sprint demo the progress of the system is demonstrated to the stakeholders using the live system. Stakeholders are encouraged to experiment with it and give feedback. Best practice is to deliver a working product with every increment, since immediate use increases the feedback during the remainder of the development. After the sprint demo the team perform a sprint review during which it inspects and adapts its own process.
Two things are essential in this process with respect to the notion of co-creation. The first is that sprint demos enforce that the product owner and the building team repeatedly discuss visible and tangible results that have meaning to both parties. This way a common understanding and even shared language emerges, where often problem owner and team members come from completely different disciplines and have difficulty to “speak each other’s language”. The second is that the problem owner gets to decide each iteration (or sprint) what is to be developed next: this turns the customer or intended users effectively into co-creators.

### 3.3. Change Management support through Agile

In this section we explore how the use of agile development methods can benefit change management. The reverse of this question is outside the scope of this paper and is investigated in (Hayes, Richardson 2008). We will analyse which parts of Kotter’s model are supported by an agile approach. Results are summarized in Table 2. We restrict ourselves to the Scrum method since it is widely used in practice and was also used in the project described in Section 4.

The first phase in Kotter’s model (steps 1-3) is developing a climate for change. Scrum does not support developing the sense of urgency needed to start the actual project. If an organisation does not yet view the change as important enough to start a project than other ways of developing a sense of urgency must be applied. But once a project has been started, be it a small size pilot-project or a full-scale one, Scrum has several supporting constructs. Since the basis of Scrum is a prioritised product backlog, often projects start with an initial collaborative session with all stakeholders. In such a session the initial vision is translated into finer grained backlog items which are then prioritised by the appointed product owner. Such a session contributes to developing a sense of urgency, building a guiding team and creating a vision. The fact that the first sprint will provide a first rudimentary working version of the system within the space of weeks and that this can be examined at the sprint demo also adds to the creation of the vision and the sense of urgency. Good practice is to have a guiding team of management, healthcare staff and software developers present at the sprint planning and sprint demo.

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<td>The next phase according to Kotter is engaging and enabling the entire organisation. Step 4 concerns communication, a central principle in agile methods. The progress that is demonstrated through a working product at the end of every sprint, has a powerful communication effect on the organisation involved. It is good practice to make the sprint demo open for all interested parties. The fact that it is possible for the organisation to view an intermediate version of the product and contribute feedback or concerns adds to the buy-in. Stakeholders can actively participate in the process of change rather than be confronted with the facts afterwards. Another supporting aspect of Scrum is that the priority of the development of demonstrators can be adapted as the need arises during the project. The empowerment to act on the visions (Step 5) is supported in several ways. Part of the process is to regularly inspect which impediments are holding the project back. Within the development team it is the task of the Scrum Master to remove these impediments. As far as other project participants are concerned, the periodic nature of sprints forces them to fulfil their designated tasks quickly. The next sprint demo and sprint review will quickly point out any impediments within the organisation and allow for action to be taken. Another factor that improves empowerment to act is the fact that an early version of the system actually exists, it is not some imaginary system in the future. How well Scrum supports Kotter’s final phase of implementing and sustaining the change depends on whether Scrum is still applied at that time or not. If Scrum is still in operation during Steps 7 and 8, perhaps at a slower rate or with a smaller team, then the above benefits are still in effect. Another scenario however is that Steps 7 and 8 are disconnected from the development phase, perhaps due to the time needed to evaluate a pilot system, take decisions or change policy. In such a case there...</td>
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exists a real risk that the momentum gained during the agile development phase is lost. A common issue in practice is that agile development has fairly simple rules but requires strong discipline during execution. When the pressure is off, other priorities often intervene.

We conclude that the characteristics of the Scrum method inherently support change management in a number of ways. The strong points are in the development of a climate of change once a project is underway and engaging and enabling the part of the organisation where the change will take place. The support of Scrum for the third phase (implementing and sustaining the change) depends on the way the project is run. If this phase involves implementing the system on a larger scale after the pilot project has been finished then there is a real danger that the momentum created during the pilot project is lost in the time between.

4. Illustration: developing an Intelligent Monitoring System

In the previous section, we gave a theoretical explanation why the application of agile methods can be viewed as a valid change management approach. In this section, we offer an illustration of a project in which we developed an intelligent monitoring system to support the care for persons with intellectual disability who live semi-autonomously. Firstly, we give a brief description of the setting and scope of the project. Secondly, we show how we used the Scrum method during the development of the monitoring system. Thirdly, we discuss how the process and impact were perceived by the major stakeholders, i.e. the users and the management of the healthcare institution, to indicate how well the agile approach supported change management.

4.1. The Intelligent Monitoring System (IMS)

The project concerned the care for persons suffering from mild intellectual disability (IQ 50-70). These clients are ambulatory resident and in general have some form of daytime activity such as supported work. The NOVO foundation helps the clients with their basic living conditions, such as safety, security, food and health, and also tries to promote self-reliance and personal development. As a result of their disability the clients have issues with a sense of time, duration, place, distance, risk estimation, "if-then" cause-effect, planning, taking action, continuing and finishing activities and determining errors and / or dangers. Currently, the clients are mainly supported through human intervention, in which personal coaches observe, identify and intervene. These personal coaches are guided in their decisions by treatment plans written by behavioural specialists.

Due to shrinking of the potential workforce in the northern region of the Netherlands, NOVO expects it will be faced with employee shortage in the future. An Intelligent Monitoring System was envisioned as a potential solution to this problem. Such a system would be able to monitor the clients situation and take appropriate interventions where necessary. This allows the client to resolve the situation and, perhaps, over time learn how to avoid them. This would lighten the workload for personal coaches, but the main potential benefit is in the shift from reactive care to proactive care. Another benefit is that this category of clients generally prefers as little human intervention as possible. If the client can resolve a situation with the help of the monitoring system then the personal coach need not be notified.

The Intelligent Monitoring System consists of a number of components (see Figure 3):
• Sensors in the home of the client, i.e. a bed sensor to detect whether a client is in bed or not.
• A rule-based expert system containing rules for certain situations in the home of the client. In evaluating the rules the system recognizes critical situations based on the received sensor data and determines which interventions should be applied. These interventions are typically first sent to the client and escalated to the personal coaches after a number of resends.
• Actuators in the home of the client which can perform an intervention, e.g. playing a sound clip that tells the client it is time to go to bed or a phone that can be sent text messages. Physical actuators like closing a window or shutting down a computer are technically feasible but were not used in the project.
• A user interface for behavioural specialists to define and manage the rules for the clients in the expert system. To create an Graphical User Interface that allows a healthcare professional to create generic logical rules was both a technical and an usability challenge.
• A user interface for the coaches to see issues that require their intervention.
• A reporting system with which, among others, the effectiveness of interventions over a period of time can be traced.

![Intelligent Monitoring System Diagram](image)

**Figure 3: Intelligent Monitoring System**

The introduction of the IMS has major consequences for the organisation and for all stakeholders involved. The following lists the most significant ones:

• The behavioural specialists would need to learn how to create logical rules to enter in the expert system. An example of such a rule could be “IF time>=23.00 AND isActiveInLivingRoom THEN send(timeToGoToBedMessage)”. Over time the specialists would also need to verify which type of rule is effective for a client with a certain treatment plan.
• The personal coach on duty needs to be able to interface with the system on a real-time basis through computer or mobile device to see if there are issues that the client failed to resolve. If so, the coach contacts the client and helps with resolving the situation. This is an entirely different workflow than the current one in which there can be multiple days between a situation, for example the client goes to bed too late, and the symptoms, for example the supervisor complaining that the client has been late for work this week.

• The clients and their families need to get accustomed to the systems presence in the house and how to handle notifications. In the pilot project the requirement for a client controlled shutdown mechanism emerged, future use cases could include the client entering specific settings.

• The entire process of informing clients and their families about the system, getting consent, and having third parties perform the installation of the required components turned out to be a major task for the management.

4.2. The application of Scrum

When choosing a development method for the project, the main factor was the novelty of such a system for all parties involved. This novelty posed difficulty for the elicitation of requirements. Determining the correct requirements is a demanding task for any project, let alone for an interdisciplinary innovative project with healthcare professionals who have to alternate between their project tasks and operational crisis calls. The importance of these requirements however was acknowledged by all parties involved and underlined by the signing of intellectual property agreements. To address the requirements elicitation under uncertainty an agile software development approach based on the Scrum method was chosen.

The typical Scrum components were implemented in the following ways. The Product Owner position was performed by an behavioural specialist from NOVO. She was to be the one person in charge of the requirements, gathered in the product backlog. The Scrum Master role was performed by one of the authors. He was to ensure that the development process kept working and any impediments were resolved. The development team consisted of staff and students from the Hanze University of Applied Science. Care was taken to include expertise on Human Computer Interaction on the team.

The main product development was done in twelve sprints lasting three weeks each. Each sprint was given an explicit sprint goal. These sprint goals were planned for several sprints upfront but adapted after every sprint according to new insights. The work in the sprints was guided by the requirements which were prioritised in the product backlog. The main meeting at the end of every sprint was the sprint demo. In this meeting the developers presented their results directly to NOVO staff. Senior management and behavioural specialists were present at the earlier sprint demos since those sprints involved the rule editor functionality, later on the personal coaches and IT-staff also joined. Sprint demos started with summarizing the sprint goal and then demonstrating the different backlog items that had to be realized during the sprint. This demonstration would then trigger discussion about (dis)advantages of the implemented solution, possible exception scenarios and how to deal with them, implications for NOVO and their clients, and new ideas for features. Ideas and suggestions were recorded on the spot to prevent them of getting lost in the following discussion. After the
demonstration and discussion the *sprint planning* for the next sprint was done. The product backlog, together with the newly generated ideas, was again prioritised. The long term sprint planning was reviewed and a decision was made concerning which backlog items were to be developed in the next sprint. Organisational actions or impediments that were identified during discussion were handled by management.

Finally, the typical Scrum practices such as *daily stand up, scrum board* and *burn down chart* were applied by the development team, but were not part of the interaction with the product owner.

### 4.3. Results

In this section we will discuss the effects that applying Scrum had on this project and its stakeholders. For the NOVO employees this was their first experience with using an agile method. It turned out that the change management process was stimulated in ways NOVO had not experienced before. The most significant observations were:

1. Due to quick feedback, NOVO staff were actively engaged. An idea suggested at the *a* sprint demo could be implemented by the end of the next sprint.
2. The participants in the sprint demo’s acted as the guiding team. The demo’s ensured that the entire team had the same vision. This vision was spread through the healthcare organization during regular meetings and demonstrations.
3. The frequent increments led to a sense of progress prompting the NOVO to take necessary actions to be ready for the next step.
4. The frequent demo’s gave insight into the effect of the system on their daily work. This often led to exchanges like “For this to work we will need to change our working process. Let’s plan a meeting to discuss this with the colleagues.”
5. The ability to steer the project created a sense of ownership. This was no longer a technological product but a system the users controlled. If any function was not readily understood this became clear during demonstration and was fixed in the next sprint.
6. Short-term wins and requirements from the work packages on privacy and ethics could be included in the product backlog during the project.
7. With a working product early in the project there was the possibility to demonstrate the product to colleagues, clients and family interested in the pilot phase. This led to widespread familiarity of the project within the organisation.
8. All in all there was a sense of creating value by building expertise jointly

If we compare these observations with Kotter’s model as described in Table 1Table 1 and Table 2Table 2, we see that the phases *Creating a climate for change* and *Engaging and enabling the entire organization* (steps 1 to 6) are realized. This coincides with the theoretical analysis as described in section 3.2. For the project participants these effects came as an additional benefit, the original reason for selecting Scrum being the novel and unclear requirements.

The main potential problem identified in section 3.2. regarding the phase *Implementing and sustaining the change* also surfaced in practice. After the main development work on the product was done, there was a delay in starting the pilot due to finance discussions. With the dissolving of the development team the sprint demo’s were abandoned and the momentum declined quickly.
A final confirmation of the effect the agile approach had at NOVO came later. Based on the experiences in the IMS project the NOVO management decided to incorporate agile practices into their organisation-wide innovation policy. A company-wide backlog was created, quarterly sprints were defined and staff was given a large say in the prioritization of tasks. In the first iteration this new policy resulted in solving issues that had been floating around in the organization for several years (Molenaar 2011).

5. Conclusion and discussion

In this paper, we have examined the applicability of agile software development methods as a change management approach. Our comparison with the change management model of Kotter has shown that the practices of agile methods can facilitate organizations through the necessary steps of creating a climate of change, engaging and enabling the organization and implementing the change. In other words, agile practices can be seen as a valid change management approach. The main risk is that agile methods are generally confined to the development phase, thus leading to a loss of momentum in the implementing and sustaining of the change. This risk can be mitigated by continuing agile practices such as iterations and demonstrations in some form throughout the final phase. These conclusions were illustrated with a real-life project.

Healthcare organizations now have an additional approach at their disposal to address the critical success factor of change management and user acceptance. Combined with attention to other critical success factors, such as finance, legislation and organization, this may lead to an improved success ratio of sorely needed healthcare innovation projects.

The results presented in this paper have a number of limitations. We have chosen to focus on the Scrum method and did not consider other agile methods such as eXtreme Programming. However, the underlying values are the same and Scrum is the most widely used method. From the change management point of view we have chosen to focus on the model of Kotter. This is a widely used model which fits the type of change management under discussion. However, other models could be considered.

Another limitation is the amount of practical evidence. The experiences of the participants in the illustration project support our theoretical analysis, but one individual case cannot be used to make strong claims. This project was a small scale innovative project in the Netherlands, a large scale implementation of electronic health records in another country might give different results. Furthermore there is researcher bias as the authors participated in the project. Finally the data is secondary, the primary purpose of the project was not to research the relationship between agile and change management.

Future research could be aimed at systematically investigating healthcare innovation projects with regard to the impact of the software development method on change management, such as a longitudinal multi-case study measuring user acceptance when applying agile methods. Further research on the applicability of agile methods in healthcare projects with different characteristics, such as size or application type, would also be a valuable contribution.
Acknowledgements

The IMS project was partly funded by the EU (European Fund for Regional Development) and the province of Groningen (Innovation Action Programme Groningen 2). Partners were healthcare organisation NOVO and IT system integrator AVICS.

The authors wish to express their gratitude to reviewers and proof readers, both known and anonymous.

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