

Strategies for doing Agile in a non-Agile Environment

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ABSTRACT

Background: Most companies practicing Agile are not fully Agile but instead they combine both Agile and traditional practices in their operations. It is not clear how these practices can be successfully used together in an organisation. **Aims:** We investigate practitioners' mitigation strategies related to the challenge of doing Agile in a non-Agile environment. **Method:** Strategies were collected during two studies, an online survey and an interactive workshop run at an Agile meetup and analysed thematically. **Results:** Strategies related to the wider organisation and not just software development. Two perspectives emerged from the data: an organisational and a change perspective. Five organisational themes were identified with Management and decision-making and Culture the two biggest themes. Nine change themes were identified, with Being open, Using specific approaches and Educating the biggest themes. **Conclusions:** Better understanding is needed of how Agile practitioners can accomplish bottom-up change in their organisation.

CCS Concepts

• Software and its engineering → Agile software development • Software and its engineering → Software development methods.

Keywords

Agile development; mitigation strategies; plan-driven development; hybrid Agile

1. INTRODUCTION

Agile approaches to software development (Agile) are becoming widespread and mainstream [7]. In the early days Agile methods were recommended for use in certain circumstances i.e. by co-located teams, for projects with clearly defined user groups and visible functionality [3, 10, 21]. However, as Agile has been adopted more widely it is being used in many different settings and as a result many challenges are being faced in practice.

One particular challenge being experienced widely as Agile becomes more mainstream is that of doing Agile in a non-Agile environment: Companies tend to combine traditional plan-driven practices with Agile methodologies [20, 24, 25] and tailor Agile methodologies to better suit their needs [6]. There are many ways in which this challenge can be experienced. Some large companies use Agile in the software development section but not elsewhere, some companies use Agile for certain types of

development, or have pockets of Agile use in an otherwise heterogeneous development environment. Some software companies are all Agile but their customers are not. Other companies are gradually adopting Agile and experience a long period during which they are partly Agile and partly not. Since the use of the Agile approach impacts on many aspects of the organisation such as management, teamwork, decision-making, and software process it is challenging for organisations to partially use Agile and partially use more traditional approaches.

In this paper we present findings from an investigation into strategies used by practitioners who have experienced the situation described above. We approach the question from both an organisational perspective and a change perspective. Thus, we investigate both the organisational aspect of the strategies and the change approaches suggested. We link these findings with the change literature and with the challenges of expanding Agile adoption outside the IT department into the wider organisation.

The rest of the paper is structured as follows. Section 2 presents related research. Section 3 introduces our research methodology. Results are presented in section 4 and discussed in section 5. Section 6 gives conclusions to the paper.

2. RELATED RESEARCH

Agile methodologies are described as flexible and lightweight, often built on short iterations, and having short validation loops [27]. In general, Agile is best suited for conditions where plan-driven methodologies are not well-suited. Those include turbulent, high-change environments where feedback is constantly available [10]. Moreover, Agile is based on assumptions such as having competent, creative and cooperative team members, having cooperative, preferably co-located customer, and being able to chunk work into small tasks and proceed in increments [10, 21]. These values and assumptions do not hold in all organisations and environments which can make the use of Agile challenging.

Tailoring Agile is often seen as an absolute necessity for successful adoption in large organisations [13, 23]. Both environmental factors including organisational culture and business domain, and project factors such as system size, stability of architecture, business model and team distribution should be considered when selecting a process and practices to use [12]. Scrum of Scrums [19] for large distributed projects and R-Scrum [8] for regulated environments are examples of Agile methodologies that are tailored for specific organisational contexts.

Agile is tailored for several reasons. Companies alter Agile to make it more efficient [6]. On the other hand, they may tailor Agile to suit a hierarchical organisation [6, 20, 25]. A core reason for the latter is that Agile is commonly adopted bottom up by practitioners who do not have power of decision outside the development team and thus other areas often continue working with traditional practices [1, 25].

Cooper et al. [5] identified challenges faced when using a tailored model combining both Agile and plan-driven qualities called an

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Agile-stage-gate hybrid model. They found the following: resource allocation delays projects, company reward systems are not suited for Agile, documentation is too bureaucratic, knowledge management across organisations is poor, current IT systems are not suited for Agile, it is difficult to end or hand over projects, project members might not follow Agile, management does not understand Agile, teams do not have enough responsibility, and customers are not actively involved.

Gregory et al. [9] conducted a rigorous study of Agile challenges. They theme challenges under claims and limitations, organisation, culture, teams, sustainability, scaling, and value. One of the subthemes identified was Agile in a non-Agile environment. In an earlier study, Cao et al. [4] identified three types of challenges, namely those related to development process (e.g. requirements engineering practices), to developers (collocation, communication, and knowledge), and to organisation and management (hierarchical vs. flat management).

Van Waardenburg et al. [23] identified insufficient business involvement and increased landscape complexity as the two main challenge themes in the co-existence of Agile and plan-driven development. The reason for insufficient business involvement lay in centralised IT departments and in traditional project organisation. The former creates a gap between business and development organisations and slows down the delivery of IT services. The latter leads to maintaining traditional roles and producing extensive documentation and planning. All the identified mitigation strategies by Van Waardenburg et al. were related to communication on the interface between Agile and non-Agile parts of the organisation.

Van Manen et al. [22] identified factors that affect the expansion of Agile in large organisations. They found that the Agile mindset such as willingness to try new ways, culture of taking responsibility and giving feedback, and dedicated, self-steering teams is important for a successful expansion.

Rohunen et al. [18] investigate wholesale and incremental strategies in Agile adoption. In wholesale strategies the entire Agile process is adopted at once whereas in incremental strategies new practices are gradually taken into use. They claim that the parallel use of both bottom-up and top-down strategies is important especially in large companies. While bottom-up strategies more often initiate the Agile transformation [1], top-down strategies can be beneficial in defining or operating Agile development, business objectives, transformation process and its management, organisational values, and changing the management culture and behaviour [18].

Based on related research, it is clear that challenges in being Agile in a non-Agile environment are numerous and concern multiple aspects of software engineering. Thus, we expect that companies also use a multitude of strategies to mitigate those challenges.

3. METHOD

The study presented in this paper discusses mitigation strategies used in companies to doing Agile in non-Agile environments. We had the following research question:

RQ: *What strategies do companies use to overcome challenges faced when being Agile in a non-Agile environment?*

3.1 Data Gathering

Two approaches to investigating practitioners' experiences were taken: an online survey and an interactive workshop. Both approaches aimed to investigate further the findings from a detailed Case Study [9, 16] by eliciting strategies.

3.1.1 Online Survey

The survey asked whether respondents had experienced any challenges in relation to doing Agile in a non-Agile environment, and what strategies they had used to mitigate them.

The survey was developed iteratively and piloted by practitioners working at the Case Study company before being released online. It was conducted through SurveyMonkey over a period of nine months (June 2014 to February 2015) and distributed through more than 20 Agile forums/message boards, LinkedIn and Meetup groups. The forums included Yahoo on specific methods, and local and international forums, the LinkedIn groups were mostly of practitioners and the Meet-up groups reached were worldwide.

3.1.2 Interactive Workshop

The interactive workshop was run using Ketso (www.ketso.com) with the help of a Ketso facilitator. Ketso is a technique for engaging communities in discussion around specific topics. A Ketso session builds up a picture (called a 'felt') of attendees' feedback (Fig 1). This picture emerges through a structured discussion. Our session used the context of doing Agile in a non-Agile environment, and findings from our original Case Study were used as initial prompts. There is a 'branch' on the Ketso felt for attendees to add their own issues. This paper focuses on this branch.

The Ketso process consisted of the following steps

1. Five tables were set up with Ketso felts and the initial prompts. On arrival, attendees spread out among the tables.
2. The Ketso process and the overall challenge were introduced
3. Knowledge and experience about doing Agile in a non-Agile environment were shared by attendees on each table
4. Creative ideas on ways to enhance what works were elicited
5. Attendees swapped tables and added highlights and comments on other groups' work
6. Attendees added more comments on their own tables.



Figure 1. A completed Ketso with challenge branches (lines), challenges (ovals), strategies (leaves), and notes (rectangles).

The felts were photographed and data entered into a spreadsheet.

3.2 Data Analysis

The data was collated and thematically analysed by the first and the second authors in two iterations.

The first analysis iteration used an inductive, qualitative, data-driven content analysis with the aim of generating thematic groupings from the data [17], with no preconceived ideas about what would emerge. The two authors completed the analysis separately. Both authors used a tangible approach whereby the data was printed onto paper and each strategy statement was cut up into individual strips which could be physically moved around

on a desk as they were being grouped. This approach enabled a free analysis approach whereby thematic groups could be formed, moved and merged easily. Once this process was complete the two authors discussed their analysis and detected there are two equally interesting angles to the data, one focused more on the organisational aspects of the strategies and the other on the change approach that was indicated in the data. After a full discussion with all the authors it was agreed that the two views represented distinct perspectives. The two authors then worked together to undertake a second round of analysis from these two perspectives. The aim of this second round was to ensure that the two analyses were distinct, coherent, and focused on the chosen perspective. Finally, the two resulting analyses were discussed with the other authors.

4. RESULTS

Altogether, we collected 69 distinct strategies: 23 from the survey and 46 from the Ketso workshop.

Twenty Survey participants suggested strategies. These participants came from a number of roles including coach, project manager, Scrum master, developer, analyst and tester. From the 20 answers, 23 strategies were identified because some answers included more than one strategy. Data collected in the Survey were all strategies that had been tried in respondents' organisations.

The Ketso workshop was attended by 24 participants. Attendees were all members of a regional Agile meetup group in the UK, and were practitioners with experience of Agile in the workplace. Detailed demographics of attendees were not collected. Through the Ketso workshop 46 strategies were collected. Of these 20 strategies were currently being tried out in respondents' organisations and 26 were identified as potential strategies.

In the next section we explore the research question using the two perspectives that emerged from the bottom-up data analysis. In section 4.1 we look at the data from an organisational perspective and then in 4.2 we look at it from a change perspective.

4.1 Organisational Perspective

When exploring the organisational aspects of the strategies that emerged during the analysis we identified the following five themes (Table 1): 1. Management and decision-making, 2. Culture, 3. Team and team environment, 4. Organisational structures and activities, and 5. Development process. Here the focus was on the organisational aspects that need to change to mitigate the challenges faced when being Agile in a non-Agile environment.

The most frequently mentioned mitigation strategies related to **Management and decision-making**. Many respondents suggested improving managers' understanding of Agile. A respondent proposed *"taking leaders on a 'tour' to an Agile organisation"*, and another had tried to *"get executive leadership to agree to attend some Agile training"*. Management support was seen as crucial for Agile adoption. Respondents emphasised winning management over, convincing them on the benefits of Agile, or making them understand agility. Management buy-in and having executive engagement with agility were considered important and, for instance, *"management buy-in / awareness / knowledge"* and *"executive engagement / sponsor"* were reported as strategies that were working in respondents' organisations. Moreover, it was seen that a flatter organisational structure would better support agility. For instance, *"Influence decision-making to move towards Agile in general"* was seen as a possible strategy in the future. Changing decision making from traditional command

and control style to empowering the Agile teams and allowing them to make decisions was suggested. Furthermore, strategic-level decisions should be made on which parts of the organisation should be Agile: *"Make everybody Agile"*, *"Don't do Agile"*, *"Only work with Agile partners"*, and *"Make the business Agile"* were suggested as future possibilities.

The second theme, **Culture**, includes strategies on developing the organisational culture for agility. One respondent said that *"Creating no-fear culture / environment"* had been a successful strategy in their organisation. Moreover, strategies such as *"Willingness to change"* and *"Having a critical mass of competent people willing to learn how to make Agile work"* had been in use in some of the organisations. On the other hand, some reported that they did not believe their organisation was capable of developing the culture and leaving the organisation was seen as the only option: *"Leave the organisation, one cannot force square pegs into round holes"*.

Being transparent and aware of what others are doing was also a strategy that had been in use in respondents' organisations, for instance *"Make everything explicit, i.e. transparent and discuss for a consensus"* and *"An awareness of what others are doing"*. Furthermore, maintaining visibility and close cooperation between management and development and other organisations was suggested. Transparency was connected with increased cooperation and better understanding of what will work and what will not: *"be close to the organisation and management and understand what will work and what won't work"*.

Table 1. Organisational themes and suggested strategies. Number of strategies related to the theme is in brackets.

	Organisational theme	Characterisation
1.	Management and decision-making (21)	Ensuring managers understand and buy-in to Agile
2.	Culture (17)	Creating an organisational culture that fosters agility
3.	Team and team environment (14)	Creating an Agile team environment
4.	Organisational structures and activities (10)	Identifying organisational structures and activities for Agile
5.	Development process (7)	Using Agile practices properly

The **Team and team environment** theme includes strategies on ensuring teams use Agile values and Agile practices properly. The most frequently suggested mitigation strategy in this theme was to have co-located teams. Also having small teams, using video calls in distributed teams, and ensuring a permanent workforce were suggested. Considering the team environment, strategies for involving stakeholders when needed were suggested: *"Inception sessions to include business when agreement on sprint consent"*, *"Forcing people to go sprint reviews"*, and *"Making board [visualisation of team's progress] visible for everyone! Not just sprint teams"*.

Strategies in **Organisational structures and activities** were mostly about identifying the areas where improvement is needed: *"Identifying whether the organisation has a need to improve and then showing how Agile is helping"*, *"Learning from others (e.g. Spotify)"*, and *"... workshop on Agile and governance to find out where opinions differ"* had been tried in respondents'

organisations. Other strategies included amending reward mechanisms for Agile or appointing new roles such as “*product owner champion*”.

Mitigation strategies with regard to **Development process** were often compromises between traditional and Agile approaches: “*Have tried combining waterfall up front requirements and design with more Agile approach to development*”. For others, traditional testing was performed in a separate department, but efforts towards Agile testing were being made: “*Gradual agreed testing transformation strategy and tactics*”. Some strategies related to inadequate use of Agile practices. An example is a strategy from a team member against the changing scope of the current Sprint: “*agree with product owner that whatever he adds new into the Sprint, he must remove another story of the same value*”. Thus, the product owner was adding new tasks in the ongoing sprint—which is against the inherent idea of Sprint. The mitigation strategy was to negotiate how to accommodate the product owner’s behaviour.

4.2 Change Perspective

When investigating the change aspects of the strategies that emerged from the analysis nine change themes were identified. These are listed in Table 2 and are ordered by size according to the number of strategies found in each group, largest first.

Table 2. Change themes and suggested strategies. Number of strategies related to the theme is in brackets.

	Change theme	Characterisation
1	Being open (13)	Openness in terms of work environment, practices and thinking
2	Using specific approaches (12)	Specific tactics for ways of working
3	Educating (10)	Providing training or opportunities to learn
4	Forcing (9)	Imposing change
5	Introducing change gradually (6)	Transition to Agile needs to be introduced gradually
6	Finding evidence (5)	Providing evidence to show need for change or success of new approach
7	Giving up (5)	Leaving and other radical solutions
8	Persuading (5)	Influencing decision makers and colleagues
9	Facilitating (4)	Employing people who can facilitate change

The theme containing the most strategies is **Being open**. This covers tangible, physical openness such as “*Colocated team*” and “*Making [the] board visible to everyone! Not just sprint teams*”, and also intellectual openness such as “*Creating a ‘no fear’ culture*” and “*Encouraging independent thinking*”.

The second theme **Using specific tactics**, is a group of detailed operational suggestions. This contains strategies that do not clearly indicate which change approach would be used. Strategies in this grouping include using “*defined roles*”, having an “*internal/permanent workforce*” and “*use small teams*”. One of

this group suggests using rewards, “*reward with X (pizza) Agilers that score points*”.

The **Educating** theme is the third largest group. Most of these strategies were already being tried. Suggestions include training approaches such as “*trying to get executive leadership to agree to attend some Agile training*”, learning by doing, “*management getting involved in the detail*”, and “*learning from others (e.g. Spotify)*”. Future possibilities include “*have a Ketso session to think about Agile*”.

The **Forcing** theme contains strategies that include words such as ‘pressure’, ‘make’ and ‘force’. Strategies that were already being tried include “*forcing people to go to sprint reviews*” and “*peer pressure i.e. retrospective group*”. Future possibilities cover a range of options from positive approaches “*make everybody Agile*” to negative ones such as “*only work with Agile partners*”.

The **Introducing change gradually** theme contains high level strategies such as “*If [you] move to a new way of working – ensure a structured and gradual transition*”. Some strategy suggestions apply to specific parts of the organisation such as testing, “*gradual agreed testing transformation strategy and tactics*” and teams “*introduce iteratively to teams*”.

The **Finding evidence** theme includes strategies ranging from general assertions such as “*showing how Agile is helping*” to more focused ones such as “*provide evidence that current management methodology seems ineffective to create desired outcome*”. All of the entries in this theme had been tried.

The **Giving up** theme contains some of the most radical proposals such as “*don’t do Agile*” and “*sack management*”, although these were both future possibilities. All three responses that had been tried already are about leaving organisations which could not be Agile. One states “*I quit and took a different position*” and another says more generally “*Agile must prevail or perish. There is no peaceful coexistence with other ways*”.

The **Persuading** theme involves general strategies such as “*winning them over to the approach*” and “*influence decision making to move towards Agile in general*”.

The **Facilitating** theme focuses particularly on introducing new roles, such as suggestions to get a “*good coach*” or “*hire/appoint a product owner champion*”. These roles provide a means through which change can be facilitated in the organisation.

5. DISCUSSION

The biggest two thematic groups in Table 1 are ‘Management and decision-making’ and ‘Culture’, accounting for just over half of the strategies collected. This indicates that these are important organisational areas where change is needed when looking at the challenges of doing Agile in a non-Agile environment. Major reasons for tailoring Agile are related to adapting it to non-Agile hierarchical organisations [6] and to the fact that in many companies Agile is adopted only in those parts of the organisation that practitioners can influence, principally development teams [25]. Thus, management and culture may be areas that either stay non-Agile or adopt agility slower. Traditional management practices hinder the use of Agile and changes in management are required [14]. Changing management and culture necessitates major alterations to work procedures, tools, communication channels, problem-solving strategies, and roles of people [14]. Commitment of high-level executives is necessary when addressing those issues and they are challenging for practitioners to change from the bottom up.

From the change perspective although Agile transformations are often initiated from the bottom-up [1], they involve process changes that affect more than software development. In Table 1 the thematic group of strategies related to software development processes was the smallest in the second thematic analysis. Agile working requires a systemic change in management and organisational style including a move away from a hierarchical controlling management style towards a lighter touch approach [2], and a need for business and software development personnel to work closely together. It is therefore not surprising that many of the strategies were categorised in the theme ‘Management and decision-making’ and focus on the need for management to understand Agile and to make Agile more widespread across the whole business. The second largest theme ‘Culture’ is closely linked to the first, since organisational culture is closely linked with management style, although it is also a complex concept with many sources and drivers [26]. Strategies in the Cultural theme were about transparency, a willingness to learn and the need for the whole organisation to make changes. The three other thematic groups ‘Teams and team environment’, ‘Organisational structures and activities’ and ‘Process’ are more focused on the detail of Agile. These indicate that there are many specific strategies that can be used to mitigate problems.

Table 3. Kotter and Schlesinger's Strategies for Change - table adapted from [11]

Approach	Characteristics	Commonly use in situations
Education and communication	Educate and communicate ideas to help people see the need for and the logic of change	Where there is lack of information or inaccurate information and analysis
Participation and involvement	Initiators involve potential resisters in some aspect of design and implementation of change	Where the initiators do not have all the information they need to design the change, and where others have considerable power to resist
Facilitation and support	Being supportive, i.e. providing training in new skills, or giving time off after busy period or listening and providing emotional support	Where people are resisting because of adjustment problems
Negotiation and agreement	Offer incentives to active or potential resisters	Where someone or some group will clearly lose out in a change, and where that group has considerable power to resist
Manipulation and co-option	Covert attempts to influence resisters, for example co-opting a resister into the change team	Where other tactics will not work or are too expensive
Explicit and implicit coercion	Force people to accept change by explicitly or implicitly making threats	Where speed is essential, and the change initiators possess considerable power

One of the interesting facets in Table 2 is that four themes are similar to approaches listed in Kotter and Schlesinger’s model for managing change [11], shown in Table 3. ‘Educating’, ‘Facilitating’ and ‘Forcing’ in Table 2 map respectively to the approaches ‘Education and Communication’, ‘Facilitation and Support’ and ‘Explicit and Implicit Coercion’ in Table 3.

‘Finding Evidence’ in Table 2 also can be mapped to ‘Education and Communication’ as it proposes providing evidence to show the need for and logic of making changes.

No change themes in our analysis exemplify Kotter and Schlesinger’s other three approaches ‘Participation & Involvement’, ‘Negotiation and Agreement’ or ‘Manipulation and Co-option’. One strategy in our data mentioned a reward, ‘reward with X (pizza) the Agilers that score points’. This would fit into Kotter and Schlesinger’s Negotiation and Agreement’ approach, but as this was the only example it was not sufficient for us to pick out a trend in the data. We suggest that the absence of these other approaches in our data is because Kotter and Schlesinger’s model assumes change is being driven by managers who have power and control over the situation. Being able to request participation, negotiate or manipulate the situation all require power. However, Agile practitioners and even Agile managers are usually not at the top of the hierarchy and only have influence within their own organisational function. When faced with the challenge of doing Agile in a non-Agile environment they seek changes above or to the side of them in the organisational hierarchy. But because they are not in a position of power they cannot drive those changes. Four of the themes in Table 2, ‘Persuading’, ‘Introducing change gradually’, ‘Being open, and ‘Giving up’ suggest the relative powerlessness of Agile parts of the organisation and illustrate the need for persuasion and encouragement. The theme ‘Giving up’ suggests that sometimes nothing will work.

Where Agile transformation is driven from the top down [18] we would expect to see potential for managers to use a wider range of change strategies, however we found no evidence of this in our data.

6. VALIDITY

Researcher triangulation was used both in study design and an independent inter-rater participated in the analysis. In addition, we used two data collection methods: an online survey and an interactive workshop. There are, however, limitations regarding the data. First, as the data was collected using two different methods, it might be less consistent compared to data from one single source [15]. Moreover, we do not know the context and challenge behind all suggested strategies which is a threat to internal validity. As we do not have detailed demographics on the interactive workshop participants, we could not run analysis comparing responses between work roles, for example, between managers and developers which might have been interesting especially from the change management view. Thus, further studies are required to understand what strategies are used for upward and downward influencing in organisations. The study is prone to question order bias since respondents were asked to answer questions considering specified challenges before they were asked about other challenges they might have experienced, and what strategies they had tried to mitigate them.

7. CONCLUSIONS

We present and explore strategies collected from two studies about doing Agile in a non-Agile environment. Our analysis focused on two aspects of the strategies, the organisational perspective and the change perspective. Organisationally we found that over half the strategies were related to management and culture. Both these themes relate to aspects of the wider organisation not just the software development function. From the change perspective we identified nine change approaches, but found that there are some omissions when we compare these approaches with those in the change literature.

While Agile can be adopted only in some parts of an organisation, eventually Agile transformation necessitates change in surrounding parts of the organisation or even in the whole company. Strategies for change suggested by practitioners as a result of using Agile need to be understood both in their organisational context and in their change context. Although the change management literature assumes top-down change, Agile change is often accomplished from the bottom-up. The Agile community needs to better understand how to achieve change from within the organisation.

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