A Preliminary Analysis of Communication Methods in Agile IS Development for Controlling Information Asymmetry

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Abstract

Agile information system development (ISD) projects are often characterized by high levels of information asymmetry, a condition when one party has imperfect information about the other. This condition can negatively affect IS development, especially in the agile context, which promises fast development cycles and the ability to cope with frequently changing requirements. The party with imperfect information is likely to develop concerns due to the uncertain or unobservable capabilities of actors or the assumed opportunistic behavior of those with private information. While communication methods in agile ISD have been well documented, extant research has neglected to address which of these are best at controlling information asymmetry in different circumstances. This research-in-progress draws on qualitative data to explore information asymmetry concerns and offer guidance to managers in selecting the appropriate communication methods under given conditions. Preliminary findings also suggest that information asymmetry may not always be harmful, which promises important theoretical and practical implications.

Keywords: Information Systems Development, Information Asymmetry, Communication, Agile, Scrum

1. Introduction

On the twentieth anniversary of the Agile Manifesto one might find it surprising that roughly every second agile project manager complains about insufficient leadership participation, organizational resistance to change and inadequate management support and sponsorship (Digital.ai, 2020). We know little about the underlying causes of these issues but what we know is that the success of an agile information system development (ISD) project is contingent on frequent interactions between numerous stakeholders in various job roles, whose expertise areas are often diverse (Dingsøyr *et al.*, 2012). It is also known that imperfect communication methods can hardly decrease information asymmetry (IA) among parties, that is a common reason of agile ISD project failure (Pikkarainen *et al.*, 2008). IA occurs when a party has private, different, hidden or a shortage of perfect information compared to another party (Bergh *et al.*, 2019) and can take place e.g. between agile project managers and their subordinates.

IA is a common target of control activities in agile ISD projects (Virag, 2020). It has been considered as an antecedent of project escalations and as a cause of goal incongruences, i.e. that subordinates pursue personal goals instead of organizational goals (e.g. Keil, Mann and Rai, 2000; Tuunanen and Kataja, 2006; Wachnik, 2015; Mallampalli and Karahanna, 2017; Waguespack, Babb and Yates, 2018). Therefore, these studies – although without focusing specifically on agile settings – emphasize the importance of decreasing IA between managers and subordinates. While IA may lead to subordinates building behavioral barriers to share private information in order to benefit themselves (Connelly *et al.*, 2011), IA can also raise concerns about the capabilities of actors that are either unobservable or uncertain

(Bergh *et al.*, 2019). These situations may occur in agile projects because agile roles, such as the product owner have diverse competency requirements that others in the team with different job roles may not possess (Thouin and Hefley, 2020). Moreover, IA may also make managers anxious about the structural barriers in the organization that impede information sharing (Bergh *et al.*, 2019). Since about 80% of agile teams work in a distributed manner with large geographical distances among team members (VersionOne, 2015) and many of these projects are outsourced to external vendors (Gartner, 2014), structural barriers can be common in agile ISD projects.

While the different communication methods in both regular and distributed agile ISD projects are known (e.g. Pikkarainen et al, 2008; Dreesen et al., 2016), research has so far missed to address how these can help controlling IA under different circumstances. For example, daily stand-up meetings, a usual communication method in the scrum method (Schwaber and Sutherland, 2020), may not be useful in reducing IA in case of distributed teams with asynchronous working hours. Likewise, decreasing IA by evaluating developers' performance based on completed user story points (another typical agile communication technique) might be impossible if the project manager cannot estimate the amount of work needed to complete the various points. Therefore, choosing optimal methods to control IA depends on contextual factors, and research is needed to guide agile project managers setting up communication methods that fit the conditions. Expanding our knowledge in this area is also important form a theoretical perspective as the agile approach to ISD has unique communication rituals that are quite different in traditional ISD projects (Dreesen et al, 2016). Moreover, maintaining or even increasing IA may have a better benefit-cost ratio than reducing it: knowledge transfers are expensive and may not always be worth it (Jacobides and Croson, 2001). In addition, the agile worldview assumes intrinsically motivated team members, hence goal incongruences may be less likely (De O. Melo, Santana and Kon, 2012). Consequently, in agile settings IA may not always be considered harmful and communication methods can be implemented with different aims, such as for social reasons or for expressing needs (Paasivaara, Durasiewicz and Lassenius, 2009). Thus, the following research question guides this research-in-progress study: *Which concerns related to IA do project managers of agile ISD have and which communication methods are applied to mitigate these concerns?* While our research seeks to investigate numerous contextual factors that may determine the chosen communication method, at this stage of the research, we present preliminary findings related to project managers' perceived primary concerns resulting from IA. Our investigation took place in the IT department of a Danish multinational company that runs several scrum ISD projects in parallel.

2. Short summary of related literature

2.1 Information asymmetry in ISD projects
IA is an important issue in ISD projects due to the intangible character of software development, and the often complex and dynamic and nature of projects (Goldfinch, 2007). Typical sources of IA include ineffective communication (Thompson, Estabrooks and Degner, 2006), the lack of common domain knowledge and unclear requirements (Wang *et al.*, 2007), These can occur, for instance, between developers and product owners and between product owners and business representatives (Nuwangi *et al.*, 2014). In addition, it can also take place between product owners and project managers, which role is still present in the majority of agile projects and who, unlike scrum masters, are responsible for creating and managing the project plan and the project organization (Nuwangi *et al.*, 2014; Shastri, Hoda and Amor, 2016). IA has various negative consequences in ISD projects. It is a key antecedent of requirements volatility, conflicting requirements, and in outsourced projects IA leads to higher financial costs to be paid to vendors (Shan, Jiang and Huang, 2010). Reducing IA also makes performance evaluations and incentive schemes of ISD projects more accurate (Banker and Kemerer, 1992). Last but not least, according to agency theory, IA facilitates pursuing private interests too (Bosse and Phillips, 2016).

2.2. Agile ISD and communication in agile teams

The agile method for software development detailed in the Agile Manifesto (AgileAlliance, 2001) was created primarily with the purpose to enable quicker responses to changes in requirements and to shorten the development lifecycles (Highsmith and Cockburn, 2001). Agile is an iterative approach that relies on continuous interaction and communication among various stakeholders (Pikkarainen *et al.*, 2008). Scrum, a popular choice of agile methods, puts the customer in focus and emphasizes the importance of project management by continuously tracking project status. Scrum events (e.g. sprint planning, daily scrum) as well as scrum artefacts (e.g. product backlog, sprint backlog) are designed to enable transparency of key information (Schwaber and Sutherland, 2020). One of the main differences between agile and traditional software development is that agile puts emphasis on frequent communication both within the development team and with e.g. business representatives (Dingsøyr *et al.*, 2012). In scrum projects regular scrum events give opportunities to periodic interactions within the team (sprint planning, daily scrum and sprint retrospectives) while at sprint reviews the development team presents the results of the last sprint to other key stakeholders. Scrum artifacts, such as the product backlog also provides communication opportunities within the team. The product backlog is an emerging list that contains the necessary steps to improve the product (Schwaber and Sutherland, 2020). In addition to scrum-specific means of communication, there are more generic communication procedures in agile projects, such as *community of practice, user stories, customer presence, story board, monthly meetings, creation of open environment* – for definitions and a complete list see, for example, the study of Dreesen et al. (2016).

3. Research context and methods

Our work follows a single-case study design where agile team members are the units of analysis. The case context was the IT department of a Danish multinational container shipping company where several ISD projects took place simultaneously related to building customer-facing websites, back-end systems and mobile applications. All projects followed the scrum approach to a large degree, although, for instance, Kanban-boards were in use instead of Scrum-boards because Kanban-boards could be more easily adapted to tasks that continuously arrived. Project teams worked in two-week-long sprints that began with a sprint planning meeting, where participants chose items from the product backlog to be included in the sprint. During the sprint, daily scrums were organized to report status and to identify impediments. At the end of a sprint project teams held demonstrations to business stakeholders, at retrospectives, team members discussed what went well and possible improvement areas for the next sprint. Scrum teams were led by project managers, their subordinates included developers, product owners and scrum masters, sometimes borrowed from consultancies.

This case study relies on the theory elaboration method, which builds on empirical research using pre-existing conceptual ideas by contrasting, specifying or structuring them to develop or extend theories (Fisher and Aguinis, 2017). We adhere to "soft positivist" epistemology (Madill, Jordan and Shirley, 2000) to reveal pre-existing phenomena that objectively exists (positivist view, described in e.g. Miles and Huberman (1994)). However, we attempt to explore new phenomena too, maintaining that knowledge is local, provisional, and situation dependent (contextual constructionism, described in e.g. Madill, Jordan and Shirley (2000)). This hybrid approach has already been used in ISD research, for example by Kirsch (2004). We obtained primary data through 21 interviews: 12 with agile project managers and 9 with their team participants, the latter group was used as proxy subjects (Nederhof, 1985) to eliminate potential social desirability bias of answers related to goal incongruences. In the interviews we had open ended questions about situations where IA and communication methods were involved, about how communication affected IA, and about the contextual factors that influenced the choice of communication techniques. For data analysis we used descriptive coding (Saldana, 2013), for which we used existing codes for communication methods in agile ISD projects (Dreesen et al. 2016) and for IA (Bergh et al, 2019).

4. Preliminary findings

As shown in Table 1, our interview participants reported altogether eighteen communication methods, out of which sixteen were initiated with the intention to decrease and two to increase IA between the project manager and the subordinate. We found that only two kinds of communication methods were in place primarily due to the concern that IA may cause opportunistic behavior, namely Kanban-boards and status tracking software. We discovered four communication methods – rotation of on-site vendor employees, personal visit of vendor premises, open office space and synchronization of work hours – that were enacted when project managers had issues with structural barriers of information sharing and associated IA. Strong decrease of IA was observable when new vendor employees were placed on-site and when internal employees personally visited vendor premises. Most kinds of communication methods were, however, initiated due IA related to the uncertain capabilities of subordinates. Mostly in this category, we found situations where the project manager wanted to use communication to enhance collaboration with subordinates, to get to know the status of tasks, to allocate resources in an optimal manner and to remove potential impediments blocking the advancement of the project. Project managers also organized leisure activities after working hours, where they observed how well team members got along with each other. Last but not least, we found evidence that in some cases project managers did not mind IA increasing between them and subordinates and encouraged team members to participate in trainings and in communities of practices.

5. Contributions and next steps

The research question that led our study was *Which concerns related to IA do project managers of agile ISD have and which communication methods are applied to mitigate these concerns?* In the previous section we highlighted eighteen communication methods in scrum ISD projects and presented three perceived primary concerns with IA. At this stage of the research we see two main contributions to ISD literature. First, although much research dealt with communication in agile ISD projects (Pikkarainen *et al.*, 2008) and about IA in ISD projects (e.g. Tuunanen and Kataja, 2006), these research streams were decoupled as IA has only been examined in traditional waterfall ISD projects so far. Our results imply that while IA is present in agile settings as well, project managers mostly do not believe that subordinates would like to intentionally increase it for private purposes. Interestingly, we discovered that when project managers are still concerned about behavioral barriers to information sharing, Kanban-board is a powerful choice to reduce IA that is not part of the regular list of scrum artefacts (Schwaber and Sutherland, 2020). This suggest that the case organization pays little attention to methodological pureness and rather employs a "mix and match" approach to agile adoption.

Perceived primary concern	Communication method	Perceived IA effect	Mentioned
Opportunistic behavior	Kanban-board	Strong decrease	Most projects
	Task, issue and status tracking software	Strong decrease	Every project
Structural barriers	Rotation of on-site vendor employees	Strong decrease	Most projects
	Personal visit of vendor premises	Strong decrease	Most projects
	Open office space	Weak decrease	Every project
	Synchronization of work hours	Weak decrease	Few projects
	Daily scrum	Strong decrease	Every project
	Product demo	Strong decrease	Every project
	Creation of a communication plan	Weak decrease	Every project
	Continuous communication (e-mail, IM, VoIP calls, screen-sharing)	Weak decrease	Every project
	Sprint planning	Weak decrease	Every project
Capabilities of subordinates	Retrospective	Weak decrease	Every project
	User story	Weak decrease	Every project
	Leisure activities	Weak decrease	Most projects
	Product backlog	Weak decrease	Most projects
	Documentation of new IS features	Weak decrease	Few projects
	Community of practice	Strong increase	Few projects
	External trainings	Strong increase	Most projects

Table 1: Preliminary findings

Second, we found that the majority of communication methods were enacted either because of concerns with structural barriers to information sharing or due to the uncertain capabilities of subordinates. For example, outsourced job roles required many personal visits to the vendors' premises and the synchronization of working hours as they often worked at remote locations. Similarly, the uncertain capabilities of subordinates were seen as the consequence of specialized job roles. For example, product owners collected user stories from business representatives and "translated" them to more technical requirements so that developers could understand them. This confirms previous findings that IA can simply be the outcome of having experts in the team (Thouin and Hefley, 2020) and that IA can be natural consequence of task delegation (Sivaramakrishnan, 1994). This is also in line with the finding that scrum events were not organized with the purpose to prevent self-interested behavior – the agile philosophy assumes intrinsically motivated, pro-organizational employees (De O. Melo, Santana and Kon, 2012). Furthermore, we observed that project managers encouraged subordinates to attend external trainings that even increased IA between them. This has important theoretical implications: it seems that an increase of IA can be desired under certain conditions and this can hardly be explained with agency theory (Bosse and Phillips, 2016). This calls for new theories to explain project managers' attitudes to IA agile ISD projects.

We plan to continue this research by exploring other contextual factors that affect how control is configured and enacted in agile ISD projects. For instance, personal characteristics, such as the level of technical knowledge of project managers can influence how well certain communication methods help controlling IA. Another promising path can be to examine how the chosen communication methods affect project control configurations (Wiener *et al.*, 2016). At this point, we intend to describe distinctive control scenarios attached with control configurations that fit the given contextual requirements, which may need to be explained with different theoretical frameworks. Our preliminary results given here not only demonstrate that agile project managers are relying on very different communication methods given certain conditions, but also that decreasing IA is not always the intention of project managers, despite the common notion that high levels of IA have negative effects on IS development.

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