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Nuottila, Jouko; Aaltonen, Kirsi; Kujala, Jaakko

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Agile project management in a public context: Case study on forms of organising

Jouko Nuottila*

Industrial Engineering and Management research unit

University of Oulu

*Corresponding author

Kirsi Aaltonen

Industrial Engineering and Management research unit

University of Oulu

Jaakko Kujala

Industrial Engineering and Management research unit

University of Oulu

Abstract:

Agile development methods were developed to enhance innovations and productivity in software projects, increase customer collaboration and flexibility, and enable dynamic approach to change management. These key principles of agile approach responded to the challenges that project management faced with software projects. The agile methods are increasingly adopted by the public sector which traditionally is not considered as agile but control-oriented and bureaucratic. In this paper, a single case study method is used to explore how the adoption of agile methods is managed in the context of a large governmental agency. This study examines a public software development project utilising agile methods and analyses the form of organising in the agile project using a framework focusing on the universal problems of organising: task division, task allocation, reward distribution and information flows. As a result, the paper presents the case project's solutions to the problems of organising and discusses the differences between agile project setup and the traditional project management approach to manage a project organisation in the public sector context. In the case project, task division was centralised and owned by a project owner, task allocation was done by an autonomous agile team, reward distribution was not used to create additional incentives, and information flows were based on virtual communication tools and occasional meetings.

Keywords:

agile; project; project management; agile project management; project organisation, temporary organisation, public project procurement; public project management; form of organising.

Biographical notes:

Jouko Nuottila is doctoral student and researcher in Industrial Engineering and Management at the University of Oulu. His primary research interests lie in studying the forms of flexibility in project contracting with a particular interest in agile development methods and agile project management. He holds an MSc in Industrial Engineering and Management. He has industrial experience in technology marketing and software product management at Nokia Corporation.

Kirsi Aaltonen (Dr. Tech) is Assistant Professor of Project Management at University of Oulu, Industrial Engineering and Management in Finland. Prior to that she has worked as Senior Lecturer at Aalto University in Finland. Her current research interests are in areas of stakeholder and uncertainty management in large and complex projects. Her publication list includes more than 40 academic papers and book chapters in the area of project business. She has published for example in *Scandinavian Journal of Management*, *International Journal of Project Management* and *International Journal of Managing Projects in Business*.

Jaakko Kujala is Professor of Project and Quality Management at University of Oulu. His current research interest include simulation as a research method, stakeholder management in the project business context, governance of complex project networks with specific focus on collaborative project delivery methods such as agile and project alliancing.

1 Introduction

Software projects were originally managed similarly to more traditional projects in the industries of construction, machinery and manufacturing (Boehm and Ross, 1989; Liu and Horowitz, 1989). However, traditional project management techniques are unable to exploit the full potential of the dynamic nature of software development (Curtis et al., 1987; Boehm, 1988; Warsta, 2001). Traditional project management also faced major challenges related to integrating customers and their continuously changing requirements into the software development process (Davis and Sitaram, 1994). Software practitioners and researchers confronted these challenges by introducing a spiral model of software development (Boehm, 1986; 1988; Warsta, 2001). At the same time, the Scrum model of product development (Takeuchi and Nonaka, 1986) was introduced. The Scrum model was soon imitated by software practitioners for use as a software development model (Schwaber, 1995; Sutherland, 1995). The ideas behind the Scrum model and other similar models were combined, and the principles and values of these agile development methods were declared and summarised in the “Agile Manifesto” (Beck et al., 2001; Highsmith and Cockburn, 2001).

There are several conflicting perspectives in the philosophies of traditional project management and the agile approach to projects. Especially interesting are possible conflicts between traditional project management and agile methods; the role of the project manager vs. that of self-organising teams; controlling change vs. embracing change; isolated project environments vs. inviting the customer; and project autonomy by self-organising vs. project governance. The selected approach to these questions defines how a project is organised and managed. The form of organising in projects utilising agile methods is rarely discussed in project journals, and it is even more rarely discussed in the context of public organisations. Abrahamsson, Conboy and Wang (2009) identify several research gaps in their guest editorial for a special issue of agile processes in software development. They call for further research in the field, arguing that, “With agile methods being routinized and infused in the adopting organisations, one of the most pressing issues is the need to develop a better understanding of the implementation of agile at the organisational level” (Abrahamsson et al., 2009). Abrahamsson, Conboy and Wang (2009) speak for the field of software engineering research; however, similarly, in the field of project research, Gemünden (2015) calls for papers to explore “the role of agile approaches for the management of projects”.

Based on earlier research on agile projects, scholars have reported challenges related to role definition and task allocation (Boehm and Turner, 2005; Conboy et al., 2010; Drury et al., 2012; Moe et al., 2012). These challenges might be related to the organising of agile projects, and thus they represent an interesting research question for exploring how agile projects are organised in the public context. Conforto et al. (2016) suggest that agility “might be dependent upon a combination of organisation, team and project factors”. Thus, it is important to study the forms of organising in agile projects. Lundin and Söderholm (1995) suggest a useful framework for studies on projects as temporary organisations. This widely accepted framework includes elements of time, task, team and transition to discuss temporary organisational forms. Bakker (2010) updates this framework and suggested context as a replacement for the element of transition. Both of these frameworks are useful for studies considering traditional projects as temporary organisations, and both frameworks were considered to be used in this particular research. However, because of the dynamic nature of agile project set-up, also alternative framework options were considered. Ultimately, the framework proposed by Puranam, Alexy and Reitzig (2014) was chosen, as it was found to be the most suitable for observing possible new forms of organising and new practices in organising projects. This framework was built to identify novelty in forms of organising, Puranam et al. (2014) suggested that it is useful for observing new organisational forms, or, to be exact, forms of organising. This view particularly suits the study, since the agile approach is often seen as a novel way of organising. The framework includes elements of task division, task allocation, reward distribution and information flows. The present study aims to answer the following research question: How does the public agency organise itself to utilise agile methods in a software project? Furthermore, the question of novelty within forms of organising in agile projects of public organisations was investigated. The paper presents the theoretical background and the framework first and then describes a case study of an agile project in a government agency. Finally, the findings are discussed and the paper concludes with a summary of the research results and suggestions for the development of future research.

2 Organising for an agile project

Agile methods promote, for example, (a) lean organisational structures, (b) self-organising teams, (c) embracing change instead of strictly following a plan, (d) inviting customers to be integral parts of the implementation project, and (e) dissolving formal project management authority into collective authority of the team (Cockburn and Highsmith, 2001; Cockburn, 2002; Schwaber, 2004; Boehm and Turner, 2005). These ambitions are now widely accepted in the software industry, but some of their

underlying concepts conflict with traditional project management concepts (e.g. Gaddis, 1959; Atkinson, 1999; White and Fortune, 2002). Traditional project management, or, to be exact, the management of projects, is based on a hierarchical organisational approach and the strong authority of the project manager. For example, Lock (1992) suggests that the purpose of project management is to plan, coordinate and control project activities. Morris (1997) proposes that the most important role of project managers is to integrate all activities and resources required by a project, to manage the project through its life cycle utilising dedicated tools and techniques, and to work together on a team basis. Turner and Müller (2003) describe the project manager as the chief executive of the temporary organisation; in addition to planning and execution responsibilities, they suggest that the project manager must also lead the objective setting and motivate the team members. However, the need for autonomous, self-organising teams has been recently recognised in project management literature (Fernandez and Fernandez, 2008; Batra et al., 2010; Riol and Thuillier, 2015).

Traditional project management has been reluctant to allow changes during the project implementation phase. Lundin and Söderholm (1995) describe the execution phase of the project by saying, “once the plan has been agreed upon, the whole operation should proceed like a train... without any unwanted stops”. Traditional project management approaches tolerate uncertainties in the planning phase, when innovations are facilitated and many implementation options are considered; however, once a plan is completed, one of the most important tasks for the project manager is to minimise and manage risks and uncertainties (Lock, 1992; Morris, 1997; Dvir and Lechler, 2004; Lenfle and Loch, 2010). In a project manager’s vocabulary, change equals risk, including the risk of running late, the risk of exceeding budget, the risk of lacking required resources and the risk of endangering the quality of the content. On the other hand, project management literature recognises that there are projects which include several sources of uncertainty and thus accept that change is inevitable (Atkinson et al., 2006; Bröchner and Badenfelt, 2011; Hanisch and Wald, 2011). The need for flexibility to manage uncertainties and complexity is also recognised (Kujala et al., 2015). Agile methods, again, promote seeing changes as beneficial reactions to learning and innovations created during the project and as ways to steer outdated plans back to the correct track. Cockburn (2002) suggests that “agile processes harness change for the customer’s competitive advantage”.

Lundin and Söderholm (1995) use the term “planned isolation” to describe how a project, as a temporary organisation, withdraws inside its organisational boundaries to minimise any disturbance to project plans or “action imperative”. They also suggest that a project entering its implementation

phase moves “from relative openness to relative closedness” (Lundin and Söderholm, 1995). Though these phenomena have traditionally been the case, agile methods promote a different approach. Agile projects do not isolate themselves; instead, they seek to continue communication across organisational boundaries on a daily basis (Cockburn, 2002). Customer co-operation is an integral part of agile project practices, and the dialogue of defining features is maintained throughout the implementation phase (Highsmith and Cockburn, 2001). On the other hand, one could argue that there are phases of isolation also in agile projects. During a sprint, a time-boxed period of fixed length for developing a set of features, an agile project does not accept changes to the contents of the sprint (Adolph et al., 2012). A sprint is typically from three weeks up to six weeks and although the content changes are not accepted, communication is still ongoing across project boundaries.

As described above, agile methods rely on self-organising teams (Cockburn and Highsmith, 2001; Boehm and Turner, 2005). However, this autonomy is not limited to task allocation within the team; it also includes the authority to make project-related decisions. This approach challenges the formal authority of the project manager, as traditionally described in the project management literature (Cockburn and Highsmith, 2001; Turner and Keegan, 2001; Turner and Müller, 2003). From an academic perspective, the relationship between the authority of self-organising agile teams (in a temporary organisation) and the governance of agile projects (enforced by/from the enduring environment of a temporary organisation) is not clearly presented in the literature. However, numerous works have demonstrated the tensions and confusion that exist in this relationship (Cockburn and Highsmith, 2001; Augustine et al., 2005; Boehm and Turner, 2005; Nerur et al., 2005; Cao et al., 2009; Drury et al., 2012).

2.1 Framework to study the agile form of organising

Project organisations are often called temporary organisations to distinguish them from permanent forms of organisations, such as companies, divisions and business units (Lundin and Söderholm, 1995). In reality, these forms of organisations are also not permanent; however, unlike project organisations, they do not have exact termination dates. Project organisations are designed to exist as long as they are valid for the tasks they were created to complete. A project task is to be completed by a team selected for the task. Once the task is completed, the results are transitioned to the customer or to an enduring environment in the relevant context of the temporary organisation (Lundin and Söderholm, 1995; Bakker, 2010). This is a widely accepted presentation of the most important

elements of a temporary organisation: time, task, team and transition to a relevant context. In addition to these basic elements of temporary organisation forms, Lundin and Söderholm (1995) present four phases of action in temporary organisations. They suggest that, in the beginning, the focus of action is on *action-based entrepreneurialism* and then *fragmentation for commitment-building*. During implementation, the focus of action is on *planned isolation* and, finally, *institutionalised termination*.

These four phases of action follow the sequential stages of a traditional development project. Dedicated stages exist for conception, development, implementation and termination. However, for various reasons, this type of sequential model is not an optimal framework for studying the organisational forms of agile projects. One of the founding principles of agile methods is to innovate throughout the project life cycle: that is, to define and implement features in short, iterative cycles and to deliver working software for integration after each iterative cycle. These characteristics of agile projects do not fit well into the sequential stages of traditional projects, thus, the framework proposed by Lundin and Söderholm (or Bakker) was not selected for this study.

On the other hand, Puranam et al. (2014) suggest a framework for identifying new forms of organising. Based on a long legacy of organisational research, they suggest four areas of organising that are universal to any organisation. These are task division, task allocation, information flows and reward distribution (Puranam et al., 2014). *Task division* in project context includes defining project goals and target accomplishments (cf. Lundin and Söderholm, 1995; Bakker, 2010). Depending on project size, task division might also incorporate dividing the project into sub-projects or smaller tasks. Task division also includes the authority to decide what is to be done with the resources temporarily available for the project.

Task allocation refers to the activities and authority to coordinate available resources inside the project organisation and to assign project tasks to teams and individuals (Puranam et al., 2014). Traditionally, in project organisations, these coordination activities have been centralised, and the project manager has been responsible for overseeing task allocations (cf. Lundin and Söderholm, 1995). *Information flows* are needed in a project organisation to ensure that project task division and task allocation activities are synchronised (Puranam et al., 2014). The project organisation must have information on the tasks to be completed and be aware of responsibilities related to these tasks. In addition, project organisation needs to have relevant information in order to execute tasks and coordinate co-operations with others in the project organisation. Finally, Puranam et al. (2014) suggest that *reward distribution* works as an incentive for organisations' members. Both monetary

and nonmonetary rewards are believed to motivate the members of project organisations to work toward project goals, execute defined tasks and co-operate with other project members.

3 Research method and the case study

3.1 Research approach

The existing scientific knowledge related to forms of organising in public agile projects is still limited in academic discussion. Thus, an explorative, single case study approach was selected for this research (Eisenhardt, 1989; Darke et al., 1998). According to Darke et al. (1998), a single case study can be used to achieve an in-depth investigation and a rich description for exploratory research. The case study organisation was selected based on the information acquired in an agile adoption seminar of governmental actors in early 2015. Several public organisations were reviewed and finally Agency qualified as an interesting and unique case in a rarely researched context. First, interviews were conducted in the spring of 2015 to confirm Agency's relevancy as a case organisation and to select a case project for further investigation. The case project was selected based on several factors. It needed to be large enough to have all agile related roles and activities in place but it could not be too large as a single agile team was selected to be a starting point for this research. The case project also needed to create a new, unique software product so it could not be a maintenance project or an upgrade project. The intent was to investigate an ideal agile project innovating and creating a new product as for example customer involvement was assumed to be more central in this kind of context. After the selection of the case project, all key actors related to the project were identified and interviewed during the summer 2015. The unit of analysis for this research is a software development project with an approximate budget of 500 000 euros. The specific focus of the analysis was to identify how the four areas of organising, as suggested by the framework introduced above (Puranam et al., 2014), were organised and solved in the case project. The case project provides a concrete empirical context to study the processes and practices and, consequently, how the form of organizing of agile projects is managed in Agency.

3.2 Empirical context

The case study organisation is a government agency that operates as an appointed commission under the Ministry of Transportation and Communications in the Finnish government. This government

agency, herein referred as Agency (pseudonym), is responsible for the oversight and administration of a specific area of public and private services to citizens, companies, non-profit organisations and other government offices. Agency is a pioneer among government agencies in Finland in terms of its wide use of agile methods; therefore, it an interesting research subject for this study on agile project organisation in the public domain. Agency manages an annual budget of over 100 million euros and has over 500 employees. Currently, there is a need to deploy more resources to software projects to increase the number of online services; however, Agency's IT (Information Technology) department is relatively small. To access capable resources, Agency's management has increased its software subcontracting and begun to use agile methods in subcontracted projects.

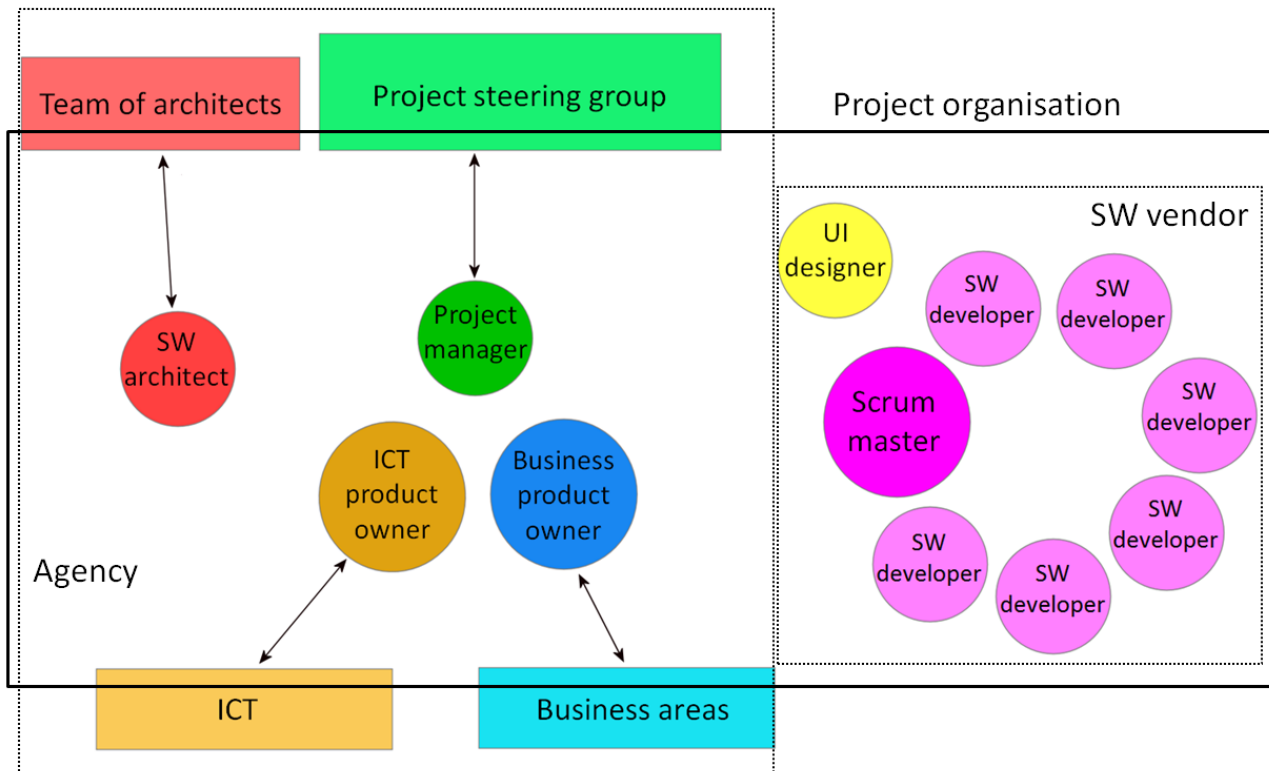
The case project was initiated due to a need to upgrade a digital service solution, including a backend service structure, service content and several service interfaces. In addition, there was a need to enable remote service access through computers, tablets and mobile devices. The project was initiated by a business owner (henceforth, 'Business Product Owner') from an internal organisation responsible for the business area in question. After receiving approval from the management board, a public tendering process was initiated, as required by Finnish law on public procurement procedures. The preparatory bidding process was used to identify a small number of potential vendors, which were invited to a competitive dialogue. At the final stage of tendering, a group of experts from Agency evaluated the competing companies using pre-set criteria, including price, proposed technology and service model. In this format of competitive dialogue, price is not the only defining factor of vendor selection; instead, Agency is able to use several other quantified factors to evaluate possible vendors.

The case project was a software development project which produced a software solution designed to run on a server, access several existing databases and enable remote connections by users. The produced software solution has several interconnected components, interfaces to systems managed by other organisations and interfaces to several databases. Multiple user groups access the service with several types of devices. The solution is a complex system in a dynamic environment, but not particularly large as a software product.

The project governance and project management of the case project were organised as follows. Agency uses a project lifecycle model with milestones to govern all projects, including both software and non-software projects. It has a board of managers to evaluate project proposals made by business owners of specific areas. If a project proposal is accepted, more detailed planning and resource acquisition activities are initiated. If a project includes software development, the resources for

development are outsourced. An approved project is governed by a project steering group, internal resources for the project are allocated and roles are agreed upon and assigned. The project organisation for the case project is illustrated in Figure 1.

Figure 1 Project organisation for the case project. The Scrum master, UI (User Interface) designer and SW (Software) developers are from the SW vendor; all others are Agency employees. (ICT = Information and Communications Technology)



The project implemented Scrum agile methods, and the development was accomplished in sprints of three weeks. The key managing responsibilities were divided as follows:

The Business Product Owner (BPO) was responsible for business requirements. BPO owned the customer interfaces and managed discussions with customers to capture all required features. BPO was also responsible for initiating discussions with representatives of other business areas to synchronise service offerings with other forthcoming solutions. In addition, BPO held responsibility for following the development of legislation related to BPO’s business area and planning features accordingly. BPO wrote user stories based on feature requirements to describe how the solution was expected to work. These user stories were delivered to the scrum team to promote an understanding of the business context and the solution. In collaboration with the Scrum Master, the user stories were

then split into smaller tasks, which were located in the agile product backlog. BPO prioritised these tasks in the backlog, and the Scrum Master allocated the tasks together with the scrum team for development in the next sprint.

The ICT Product Owner (ICTPO) was responsible for technical requirements. ICTPO owned the technical integration interfaces to databases, other internal solutions and stakeholder solutions. ICTPO was also responsible for discussing possible changes to integration interfaces with stakeholders and agreeing on schedules for the changes. ICTPO participated in the sprint meetings, verified the technical compliance of prioritised tasks and monitored the performance of the scrum team. In addition, ICTPO arranged test servers, continuous integration in both test environments and (occasionally) live environments and arranged testing with stakeholders.

The Scrum Master (SM) was responsible for planning and managing the development of the scrum team. SM allocated tasks to software developers in the scrum team based on individual technology competences and skills. SM was responsible for the performance of the scrum team and ensured that the tasks with the highest priority were implemented first from the backlog. SM also participated in the design of the software architecture, coordinated architectural discussions with customer representatives (including the SW Architect and the ICT Product Owner) and initiated user interface discussions with customer representatives (including BPO and the UI Designer). In addition, SM ensured that the tasks completed during each sprint were tested and ready for integration.

The Project Manager (PM) was responsible for administrative project tasks. At the beginning of the project, PM prepared a brief project plan, which comprised a routine check list of all issues that needed to be taken care of during project implementation and that were not included in the development of the solution. PM monitored the budget allocated to the project and followed the project's planned schedule. PM also prepared a monthly report on the status of the project, which was delivered to the project steering group and the project office.

The responsibilities of Agency and the SW vendor were described in the project contract. These included both higher-level responsibilities and responsibilities related to agile practices. In addition, Agency used a RACI matrix (responsibility assignment matrix; RACI stands for *Responsible*, *Accountable*, *Consulted*, and *Informed*) to describe internal responsibilities related to the project.

3.3 Data collection

Semi-structured interviews were used to gain insights into the project organisation, the practices used in the projects and the coordination and management of the project. The key persons in the case project were interviewed. These interviews focused on the case project. In addition, some individuals with important background information on agile adoption in Agency were interviewed. With these informants, the focus was more on the processes of agile adoption and agile project implementations in Agency. The interviews were conducted in the presence of two researchers, except when this was impossible due to conflicting schedules. The interview durations ranged from 50 to 120 minutes, and all interviews were conducted face-to-face at the interviewees' offices. The interviews were recorded and transcribed for analysis (Krippendorff, 1989; 2012). Computer-assisted qualitative data analysis software was used to code the research data and facilitate the data analysis. Information on the informants is presented in Table 1.

Table 1 List of informants. (ICT = Information and Communications Technology)

Informant occupation	Organisation	Experience (years)	Interview duration	No. of interviewers
Business product owner (non-case)	Agency	> 10	70 minutes	2 researchers
Business product owner (case)	Agency	> 15	88 minutes	1 researcher
Development manager (non-case)	Agency	> 5	82 minutes	2 researchers
ICT development manager (case)*	Agency	> 15	87 minutes	2 researchers
ICT product owner (case)*	Agency	> 5	55 minutes	2 researchers
ICT project manager (case)	Agency	> 10	50 minutes	1 researcher
Purchasing manager (case)	Agency	> 25	120 minutes	2 researchers

Scrum master (non-case)	SW vendor	> 10	54 minutes	2 researchers
Scrum master (case)	SW vendor	> 15	86 minutes	1 researcher
Software developer (case)	SW vendor	> 10	57 minutes	1 researcher

* The ICT development manager and ICT product owner were interviewed during a single session.

Secondary data was acquired to support the case analysis. Agency's management summary on agile adoption included data on agile projects and their performance. In addition, there was a process description on agile practices. Tender documentation including procurement practices for agile projects was also acquired. In addition, detailed contracts and documentation on agile practices in the case project was available for analysis.

3.4 Data analysis

The case study analysis was started through a thorough examination of the transcriptions of the interviews to get a clear and complete picture of the case project. Then, secondary data from Agency were used to learn about Agency's procurement practices, tender documentation, contracts and agile practices. Finally, the transcriptions were examined using a computer-assisted qualitative data analysis software. The selective coding was used (Darke et al., 1998), and the categories were derived from the framework (Puranam et al., 2014) chosen to be used in the study. The categories were: task division, information flows, task allocation and reward distribution. After completing the coding under these categories, the form of organising in the case project was analysed. For the validation of data, triangulation was applied with secondary data and background material available from the case (Eisenhardt, 1989; Darke et al., 1998). The findings and illustrative quotes from the interviews are presented next.

4 Research results

4.1 Task division

The project was initiated by the Business Product Owner. BPO defined the business needs of the project and prepared a preliminary plan for the Agency management board, which makes decisions concerning investments and related budgets. After board approval was obtained, procurement activities were initiated. Agency has a team of SW architects, who prepared high-level architectural descriptions of the procurement activities. These included interfaces to other existing systems, but

did not define architectural choices for the new system. Companies participating in the bidding process were asked to develop architectural suggestions as part of their tenders. After completing its procurement decision, Agency worked together with the selected SW vendor to define the SW architecture in details that were later approved by Agency's team of SW architects.

BPO continued working on the requirements after the project was initiated. BPO consulted area experts in Agency to collect information on all required system functionalities. Then, BPO documented the requirements and related user stories in the database to be divided into tasks in the backlog. The ICT Product Owner defined requirements related to technical compatibility with other systems and hardware. BPO was responsible for delivering all requirements to the backlog, and BPO was the one who prioritised the requirements for implementation.

Based on the case analysis, the task division in the case project was organised by Agency, and it was centralised to the individuals who held formal authority to conduct the task division. Agency defined and owned the project budget and operated as a project owner. The Scrum Master described the practices as follows: *“The product owner defines the functionality and creates user stories in the backlog. The user stories are defined so that they can be tested, and our agile team then takes them from the backlog to be divided into implementation tasks for each sprint.”*

The project contract supports the data from informants. It defines that the product owner possesses the authority to decide on the features to be implemented and prioritises them. Agency also emphasises the product owner's role in clearly defining and communicating what is going to be implemented. However, according to the guidelines, the product owner should not interfere on how it is going to be implemented and should leave the software design decisions for the agile team.

4.2 Information flows

The SW vendor who was selected to develop the software system was based in a different city than Agency. At the beginning of the project, key individuals from the SW vendor (i.e. the Scrum Master (SM), the UI designer and the SW developers) spent several days per week at Agency's office. This enabled face-to-face sprint meetings, ad hoc meetings and personal communications. This phase lasted for a few months. After this, SM and the development team spent the majority of their working time in their remote home office and travelled to the Agency office primarily for the sprint meetings. SM visited Agency more often, for example, to participate in the weekly project status meetings with

the Product Owners and the Project Manager. Towards the end of the project, there was no longer a dedicated office space for the development team at the Agency office, and the team rarely visited Agency. Instead, they leveraged virtual communication tools and phone meetings to exchange information. The project used emails and instant messaging for communication, teleconferences and phone conversations for discussions, and three software applications to manage project information: one for user stories, one for backlog and task management, and one for documentation.

Based on the case analysis, the information sharing in the case project was based first on physical collocation, plus virtual support infrastructure and tools. Later, for approximately the last three quarters of the project, the development team was based at the home office, and the information sharing was based on the virtual support infrastructure and tools. However, Agency and the development team still met and physically collocated for each sprint meeting, which occurred every three weeks. A software developer recapped this arrangement in the interview: *“We worked quite a lot independently; we worked at our office instead of being at the customer’s office. And then we had a scheduled meeting at the customer’s office once every three weeks for a sprint review, feature demonstration for completed tasks, status update, and planning and goals for the next sprint.”*

Agency’s learning from earlier agile projects revealed that they need to put more emphasis on communication. Agency planned to have a short agile method training session in the beginning of new products to make sure all project participants have the same understanding of how agile methods are implemented in the particular project. In addition, Agency planned to revisit their guidance and instructions on communication. Good communication skills were found to be essential for project participants because agile methods rely much on individual professionals interacting together. Agency also planned to reconsider collocation practices. While collocated, project participants met more often personally, but when the SW vendor returned to the home office, daily meetings were, for example, not organised anymore.

4.3 Task allocation

The project followed the development processes and sprint meeting procedures defined by the scrum development model. There was one exception, however; after the development team began to spend most of their time at the home office, the daily scrum meetings were discontinued. In the sprint meetings, user stories were divided into story points (i.e. development tasks) based on the estimated

work required. The project used estimations of three, ten and twenty story points for each task moved to implementation. These estimations were done by the development team and SM based on their expertise. BPO was responsible for prioritising the implementation order of the user stories in the backlog, but the development team and SM decided on the allocation of the user stories and development tasks across the team members. These decisions were made based on the skills and preferences of individual developers.

Based on the case analysis, task allocation in was determined through the self-selection of SM and the development team. The team members self-organised for the development and implementation of the development tasks prioritised by Agency. This was also clearly highlighted by Agency's purchasing manager: *"Agile teams decide the order of task implementations, but they do not decide the functionality of the system. Agile teams can decide the order of implementation and how they do the implementation. But what actually gets implemented, it is our decision. Product owners are responsible for what the functionality of the system is and what agile teams are working on."*

The project contract clearly defines the responsibility between the product owners and agile teams. Agile teams are responsible for the design and planning of features and their implementation including task allocation for the sprints. Self-organised teams took more responsibility of projects compared to Agency's earlier project model. Based on the management reports, this contributed to decreasing administrative costs and increasing productivity of programming teams. For example, on a typical software project, Agency reported approximately 25 percent of administrative costs before agile adoption while in agile projects the costs were managed to push down to 5 percent.

4.4 Reward distribution

The SW vendor who was selected to develop the software system committed to providing competent personnel for the project. As discussed earlier, the task division was owned by Agency, but the task allocation was conducted by SM and the development team. The SW vendor was paid by the hour for the development work. The price per hour varied across individual developers based on their skills and experience. The SW vendor then paid its own employees a monthly salary. It is clear that the main reward for the SW vendor was monetary compensation. However, for the software developers, some part of the reward was also the opportunity to learn new technologies and work with challenging tasks.

Based on the case analysis, the reward distribution in the case project was based on salaries and monetary compensations, as determined by related firms. Additionally, the reward was partially formed around intrinsic motivation, learning, new experiences and the feeling of successfully solving technically challenging tasks. Both of these reward types were discussed in the interviews: *“I am a technical person; I do not want be too involved in administrative things. I prefer programming if I have some idle time”* (SM in the case project); *“It is a good question about the incentives. I am not sure if there are any other incentives [in addition to the salary] than personal professional pride that drives you to do your best”* (a Scrum Master in another project); and *“We have monetary incentive for our contractors. Companies are paid by the work they do, and if they do not deliver, we have an option to terminate the contract with one month notice. In this way, we can ensure the contractors work based on our guidance”* (a purchasing manager at Agency).

It is an interesting finding that Agency does not allocate any additional monetary incentives, bonuses or rewards for SW vendor or individuals but only relies on the basic payment scheme. Project contract includes several sanction mechanisms for the situations SW vendor does not deliver according to the commitments. On the other hand, Agency pays attention to non-monetary benefits for working in the project. Good spirit and cooperation with the teams and individuals in the project were emphasised. Agency also emphasises transparency, responsibility and self-governance of agile teams. There are non-monetary factors increasing intrinsic motivation in the case project as revealed by informants during the interviews. It is still a good management question if an agile team should be monetary incentivised.

5 Discussion

The framework built by Puranam et al. (2014) was utilised for the case study analysis to identify novelty in forms of organising. The study contributes to the framework and to the related discussion in three ways. Firstly, the framework was used to analyse a unique type of organisation that complements those presented by Puranam et al. (2014). Specifically, under investigation was a publicly owned agile software project, which can be seen as a temporary organisation. Secondly, confirmation was found for Puranam et al.'s (2014) original suggestion that very rarely a completely novel solution to the four universal problems of organising is invented. Instead, novelty typically manifests in forms of organising created by combining existing solutions to the four universal

problems of organising in new ways. This also appears to be the type of novelty that can be most commonly found in agile software projects and related temporary organisations. In the case study, no new organising solutions were found; however, the way in which existing solutions were combined was novel to the traditional thinking behind project organising and project management. The forms of organising in an agile project owned by a public agency are summarised in Table 2 below.

Table 2 The form of organising in the case project.

Area of organising	Solution used for the area of organising
Task division	Centralised for the individuals holding formal authority to conduct task division at Agency. Agency defined and owned the project budget and operated as a project owner. Project was started without a detailed feature specification but a high-level architecture specification was a basis for detailed planning. Detailed planning was done during the project in cooperation with SW vendor. The Business Product Owner represents Agency's authority to decide on the features to be implemented.
Task allocation	Self-selection by the Scrum Master and the development team. The development team (SW vendor) self-organised for the development and implementation of development tasks prioritised by Agency. The development team reviews the feature requirements, splits them into smaller tasks and allocates them inside the team based on skills and competences and personal interest.
Reward distribution	Salaries and monetary compensations as determined by related firms. Additional intrinsic motivation in the development team as individuals found it satisfying to be part of a team developing new and innovative products. SW developers also enjoyed the possibility to influence the tasks allocated to them and the possibility to learn about new technologies. Project contract however includes several sanction mechanisms for the situations where SW vendor does not deliver according to the commitments and Agency has an option to change individuals in the agile team.
Information flows	Physical collocation first, followed by virtual support infrastructure and tools later. Still, Agency and the development team met and

physically collocated for sprint meetings once every three weeks. However, Agency noticed that they need to put more emphasis on communication. A training session was planned to align agile practices in a particular project. In addition, Agency planned to revisit their guidance and instructions on communication as good communication skills were found to be essential for an agile project.

The third finding related to the framework and perhaps the most interesting finding in the context of project research is the utilisation of self-organising teams. The literature on agile methods (e.g. Schwaber, 1995; Fernandez and Fernandez, 2008) suggests that an agile team should have a certain level of autonomy in order to innovate and pick up learning and innovations created during a project. This autonomy manifested in the case project as an independent, self-organising team responsible for task allocation, thus supporting the objective of agile methods, which is to empower team members to maximise the creativity and innovativeness of the sprints (Schwaber, 1995; Cockburn and Highsmith, 2001; Cockburn, 2002). This represents an approach that differs significantly from the more traditional view (Lundin and Söderholm, 1995; Demirkan and Nichols, 2008; Bakker, 2010; Crosby, 2012) of managing a team towards project objectives. This difference also relates to different management philosophies and to perspectives on the degrees of coordination and management required in a project environment and a temporary organisation (Lindgren and Packendorff, 2009; Lenfle and Loch, 2010; Bourgault et al., 2014; Thakurta, 2015). Agile literature rarely discusses possible challenges in managing individual effort and contributions, instead preferring to be optimistic in considering the coordination and integration of effort (e.g. Cockburn, 2002) and to focus on intrinsic factors of motivation instead of extrinsic incentives or monetary rewards. Literature exists on intrinsic motivation in general (e.g. Prendergast, 1999; Bénabou and Tirole, 2003) and on the open source context in particular (e.g. Lakhani and Wolf, 2005; Shah, 2006; von Krogh et al., 2012), but the topic has not been thoroughly studied in the agile context.

There are also similarities between the agile form of organising and traditional project organising. The task division in the case project is very typical of any traditional project. The project owner is responsible for the budget and the project funding. The owner also ultimately defines and decides the tasks to be developed with the available resources. The owner also has authority to decide on the personnel resources allocated to the project. However, a significant difference between an agile project and a more traditional one is the timing of the product specification work. Traditionally, for example, a product manager assembles a feature specification from several sources of information.

This feature specification then serves as the basis for a project plan, which is completed by a project manager. In the agile approach, these planning documents, the feature specification and the project plan are considered obsolete. Instead, a product owner is available for the agile team, provides the team with clearly defined requirements (i.e. user stories) in a timely manner, contributes to the prioritisation of user stories in the backlog and supports the team in deciding on activities for the next sprint. A project plan is very brief; it is used to identify project interfaces and external issues affecting a project. The project manager does not coordinate the implementation activities in the project; instead, this is one of the responsibilities of a scrum master. Furthermore, in the case project, an ICT product owner contributed to the project by coordinating interfaces with external services, stakeholders and databases. The distribution of project management tasks in an agile project in detail is not yet widely discussed in project management literature.

5.1 Managerial implications

This study suggests that there are significant benefits available for a public organisations in adopting agile methods in software development and software subcontracting. First, it is possible to free in-house resources to concentrate on business requirements of the developed software system while the detailed software design is done during the software project by contracted specialists. Second, it is possible to decrease administrative costs of software projects and increase productivity of resources available. Third, agile methods make it possible for the project owner to constantly monitor and guide development and the project as there is a possibility to flexibly make changes during the project. However, to be able to acquire these benefits, there needs to be a clear understanding among the project participants on the specific agile method in use and how it is implemented in the project and, thus, a project owner needs to prepare to accept related learning costs in the beginning of the project. In addition, role definitions of projects participants need to be clear and understood. Incentive schemes for agile projects should be considered. And finally, the study suggests that collocation of project participants might be required to get the best possible outcome of utilising agile methods as interaction is in such a crucial role in agile implementation.

6 Conclusions

In this paper, the findings concerning forms of organising in public software projects utilising agile development methods were presented. A case project owned by a public agency was investigated and

the project organisation was analysed using an established framework to identify novelty in forms of organising. Mechanisms related to task division, task allocation, reward distribution and information flows in were identified and analysed in the project organisation. Contrary to traditional project management literature, autonomous task allocation in an agile, self-organising team was identified. Other areas of organising were familiar and conventional to project management research.

As additional findings, this research reports significantly decreased administrative costs related to agile form of organising. Also, productivity of self-organised agile teams increased compared to the traditional project setup. However, agile form of organising was found to require intense communication and thus physical collocation is preferred. And finally, reward distribution and incentivising of project participant was found under-utilised.

There are some limitations to the study. The research was conducted as an exploratory, single case study. Thus, more research on agile forms of organising and agile project management is needed. Both theoretical discussions on the subject and further empirical research is needed to elaborate agile projects and agility in project management literature. There is also a lack of agile-related research in the public context. This is especially relevant now, as governments begin to globally transition public services and service infrastructures to a reliance on software platform and digital consumption. The digitisation of public services and e-government projects are trending phenomena demanding enormous public funding. Additional research could contribute to greater efficiency in the public economy.

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