



Conceptual model of working space for Agile (Scrum) project team



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ABSTRACT

IT project management according to the Agile principles will be less effective if the space where the teams work is not arranged properly. In this paper, a model of office space arrangement for the needs of teams using the Agile methodology is proposed. The main aim of the model is to support Scrum Teams in carrying out project tasks in a more efficient and effective way. The conceptual model is based on requirements that should be fulfilled by offices destined to have Agile (Scrum) working teams and can be adopted in any organization. The model has been implemented and validated.

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1. Introduction

Efficiency and flexibility in IT project management are nowadays not only a necessity, but also a duty. Currently, we can observe a high variability of IT requirements. Adaptability to customer needs is thus one of the factors that influence the final success of a project (Wysocki, 2009). Suggestions for an adequate improvement of IT project management were given by experienced practitioners in the *Manifesto for Agile software development* (agilemanifesto.org, 2001). One of the benefits of agile software development practices is the ability of software development teams to adapt to changing requirements from customers while identifying and reducing certain risks that arise during software development (Dingsøyr et al., 2012). Agile methods became in fact a weapon allowing the opening of new markets and helping to maintain relationships with current customers. Agile software development has been defined as a way of producing software that complies with the following rules (agilemanifesto.org, 2001):

- i People and interaction over processes and tools;
- ii Working software over comprehensive documentation;
- iii Customer collaboration over formal arrangements;
- iv Responding to change over following of the plan.

That is, while there is a lot of value in the items on the right, we value the items on the left more.

The most common method belonging to the Agile group is Scrum: 53% of Agile practitioners use Scrum in their projects (Version One, 2014). Due to the popularity of Scrum in IT project management the conceptual model of office space agreement proposed here is designed for the needs of teams managed in Scrum.

Scrum itself is not a strictly described method. It is rather a set of general procedures within which it is possible to use different types of processes and techniques (Schwaber and Sutherland, 1991–2013). Scrum is described in a number of scientific papers (Dybå and Dingsøyr, 2008; Dyba and Dingsøyr, 2009; Holmström et al., 2006; Moe et al., 2010; Rising and Janoff, 2000; Schwaber and Sutherland, 1991–2013.). The guidelines contained in the *Manifesto for Agile software development* and the rules contained in *The Scrum guide* (Schwaber and Sutherland, 1991–2013) require, if Scrum is to be implemented in an organization, several changes: in the organization of work; in the mentality of team members; in management style; in relations with customers; and also in the office layout. The high importance of the office layout in project management is confirmed in the existing research. (Zhu and Zhu, 2013) carried out a survey among 498 employees working in the technical services. The main goal of the survey was to investigate whether the physical office environment had an impact on the work. The majority of the respondents shared the opinion that the physical office environment had a significant impact on satisfaction (73%), privacy (72%), productivity (74%), communication (62%) and collaboration (56%). (Lee, 2010) defines the term ‘office layout’ as

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the way in which the arrangement and boundaries of workspaces are laid out.

The main purpose of this article is to propose a conceptual model of office space arrangement for the needs of IT project teams working according to the Scrum method, which will have a positive effect on the efficiency of the execution of Scrum projects. The model was implemented in a specific real-world project and team, where it was validated, but the aim of the authors was to obtain full scalability of the model. This means that it should be possible to adopt the model to the needs of project teams consisting of various numbers of Scrum Teams and teams with different numbers of Scrum Team members. The paper is structured as follows. The second section provides an overview of literature in the field of space arrangement for IT project teams in the context of Agile teams. The third section contains a systematic summary of the requirements necessary to design a model of office arrangement for a Scrum Team. In the fourth section the authors propose a general model of office space arrangement for Scrum Teams with the description of all components. The fifth section contains a description of the organization and its office in which the model was implemented. The sixth section describes the implementation of the model in the selected organization. Section 7 contains the validation of the implemented model in the context of improving IT project management in the examined organization, based on a single case study. Conclusions and discussion are contained in the eighth section.

2. Related work

In the literature, several papers exist related to the subject of office space fulfilling the needs of Agile project teams (Beck, 2000; Heerwagen et al., 2004; Sharp and Hugh, 2004). Mishra et al., (2012) and Cockburn, (2006) give several examples of the arrangements of the floor plan dedicated to the Agile methods. In both papers the authors highlight the important role that workspace plays in improving coordination, collaboration and communication.

Six lessons learned from the transformation are discussed in those papers. On the other hand, Mishra et al. 2012 studied and evaluated empirically the effect of different constituents of physical environment on communication, coordination and collaboration in Agile Teams. The study showed that an open working environment and a communal space are immensely helpful in collaboration.

Clarke and O'Connor (2012) and Chow and Cao (2008) mentioned physical working arrangements as factors that affect the software development process. Dagenais et al. (2010) identified main features that characterize the, what they call, project landscape; among them physical layout arrangement was identified (Santos et al., 2013), basing themselves on studies by Santos et al. (2015) and Santos et al. (2013), present practical indications for internal knowledge sharing in Agile Teams. Five language patterns are defined and described. The patterns refer to the space used by Agile Teams. The plans for the arrangement of office space, along with examples of implementation, are presented.

Grapenthin et al. (2015) report dropping down the ratio of late-discovered tasks in the development process from the average of 26% to that of 5%, achieved through the introduction of an interaction room (Book et al., 2012; Grapenthin et al., 2013). An interaction room is a physical room that is outfitted to visualize and facilitate the discussion of key aspects of the information system: surrounding a conference table, the walls of the room are covered with large sketches of models describing those system aspects that are most critical for the success of the project. Cases of real Scrum projects presented in (Grapenthin et al., 2015) suggest that increasing communication among all stakeholders of a project leads to a more reliable identification of the tasks to be performed in a sprint.

D'Mello and Eriksen (2010) describe the office arrangement in a global software organization in India. The authors highlight multicultural aspects of the organization and write that the office was organized around several bays or open-plan structures in order to maximize space, reduce hierarchy differences and increase opportunities for social exchange. (Kirwan, 2000) outlines a framework for the understanding of human factors in a socio-technical system. The author shows several relationships between human factors and safety, design and operations. Among the different ergonomic functions to be implemented in each socio-technical system he lists several civil engineering/architecture functions (the workplace concept, the space size, the layout of rooms, the windows and lighting, etc.).

The literature review conducted for the purposes of this study also covered the literature items dealing with the phase of adapting the organization to the Agile project management method, during which, in our opinion, the problem of space rearrangement should be seriously considered. In almost all the publications about this phase in small and large organizations the aspect of office space rearrangement is not mentioned at all (Block, 2011; Gandomani et al., 2013; McHugh et al., 2012; Paasivaara and Lassenius, 2011; Schatz and Abdelshafi, 2005; Sienkiewicz and Maciaszek, 2011; Srinivasan and Lundqvist, 2009). Drury et al. (2012) identified six decision obstacles in Agile Teams and provide a detailed description of them. The research material includes a case study of the phase of the organization's adaptation to the Agile method. However, the authors do not consider the aspect of the physical office space. Kettunen (2009), in his practical tips on the transformation of organizations towards the use of Agile methods, mentions the need to move people around and sees the need to provide, in terms of space, constant access to the Product Owner. However, he does not make these tips more precise. Hajjdiab and Taleb (2011) acknowledge that in the adopting phase it is necessary to solve the IT project team location problem, but no further details are given. Duka (2013) mentions that during the transformation of an organization toward the use of the Agile methods changes in the appearance of offices were made. Several small individual offices had been replaced by one open space. Despite the initial resistance of the employees, it was finally agreed that thanks to the changes the communication had been improved.

Hallikainen (2011) describes the transformation of a workspace from one dedicated to the Waterfall (traditional) model to one that fulfils the needs of Scrum Teams. The concept presented in (Hallikainen, 2011) is developed to geographically separated teams (and is thus not directly applicable to the problem treated in this paper, which concerns co-located teams). The work in a multisite environment should be supported by common round tables and the teams should share information via whiteboards, flip charts and information radiators. Rizvi et al. (2015) conducted a systematic literature review (from 2007 until 2012) on distributed Agile software development. Their review aimed to study organizations' adoption of distributed Agile software development. Hallikainen (2011) highlighted the importance of having an infrastructure for communication and collaboration that address the challenges of distributed Agile software development.

The authors of the present paper also reviewed popular science and industry reports both on designing office space and Agile methods. Cheng (2015), in training material, shows the characteristics of office space adopted for Scrum. Several web pages (Comfortablyscrum, 2015; Saddington, 2011; Velocity Counts, 2014; Zotin, 2013) and present ready-made office space solutions for Agile Teams based on their tips for Agile office layout. (MITIE, 2013) published a guide presenting several aspects of creating, delivering and managing an Agile working environment, starting by reaching an agreement upon initial strategic objectives, up to running the new environment. Examples of organizations harvesting gains in

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