Customer Involvement in Scaled Agile Framework Implementations

Towards a Conceptual Model as a Basis for an Industrial Case Study

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Abstract—**The Scaled Agile Framework (SAFe) has emerged over the last years as an approach which supports the improvement of software and systems development. Several software companies have reported on success stories regarding the implementation of SAFe. SAFe claimes solutions for business challenges, such as shortening cycle's times, improving product quality, increasing team members' satisfaction, and involving the customer in product development. However, regarding customer involvement, there is limited research, both in SAFe and in real-life agile software development projects. This study aims to develop a conceptual customer involvement process model as a basis for case studies in industrial companies which are implementing SAFe. As such, this study reflects work-in-progress, and our conceptual model can be considered as a partial achievement of a longer-term research project.**

Keywords- **SAFe; Conceptual model; Customer involvement.**

I. INTRODUCTION

Software development companies have a lot of challenges nowadays. "They need to deliver software in time, within the budget, and within the quality and functional requirements" [8]. The traditional way of software development is not suitable for the development of large scale and complex systems. Agile is nowadays a popular development approach [7]. Agile has proved to be able to handle large-scale complex systems by using several methods and techniqes [14]. Although the Scaled Agile Framework (SAFe) is rather new, some success stories on implementation have already been reported [20]. Although customers issues can be recognized in SAFe, there is limited research on how to involve customers in real-life agile projects [18]. Customer involvement is an essential factor for developing successful software products [17]. However, often companies are not supported in identifing and selecting the right customer types and the customer skills that are needed. Consequently, customers cannot be assigned appropriately in the various development processes, and their performance cannot be measured. For instance, a customer can have essential knowledge of a product, but can lack authority in development processes to decide for particular product features [15]. Also, customers cannot have sufficient time to participate in software development processes [11]. This can cause declining customer motivation and loss of customer interest to get or stay involved in software development, and in SAFe implementations. SAFe considers user feedback and the usage of intrinsic customer knowledge as key for a successful application [10]. Customers are considered as having a critical role in the various aspects of SAFe implementations [18]. However, although SAFe addresses customer involvement issues in its framework, there is limited research done on how to determine and evaluate customer involvement. There are currently no clear concepts and guidelines to involve customers on the various SAFe levels and in the processes. In Section 2, some related work will be discussed. Section 3 focuses at a literature review and analysis. A conceptual customer involvement model will be introduced in Section 4, to support a case study research on SAFe implementations. This customer involvement model will be based on findings from a structured literature research, and will contain guidelines for application during SAFe implementation projects. Section 5 will finalise the paper with conclusions.

II. RELATED WORK

The Agile Manifesto emphasized the importance of customer collaboration in one of its four pinciples [4]. Also in Scrum and ScrumXP, customers should have responsibilities, for example in review and feedback processes [19]. The SAFe framework covers both organizational levels and processes for agile development practices, see the "4-level view" in http://www.scaledagileframework.com/. Four organizational levels can be recognized in this framework, respectively the Team Level, the Program Level, the Value Stream, and the Portfolio Level. Although SAFe states that customers should be empowered in processes such as requirements management, defining solutions, planning, demonstration, and product evaluations [11], it does not provide explicit guidance for employing customer involvement, for example

with respect to the type of customer to be involved, in what specific activities, and the customer's barriers to overcome [9]. Since pressure on customer involvement and satisfaction has been increased in the current era [3], new approaches for involving customers should be developed. Customers have to be engaged effectively and efficiently into software development and SAFe implementation projects, and barriers have to be overcome.

III.   LITERATURE AND ANALYSIS

Three literature domains provided a basis for our literature search, see Fig. 1. This figure shows the Scaled Agile Framework domain as the main research area, and the highly relevant intersections between the three domains. This study strives at a conceptual customer involvement model for SAFe implementations as an 'integrated concept' of the three recognized domains.
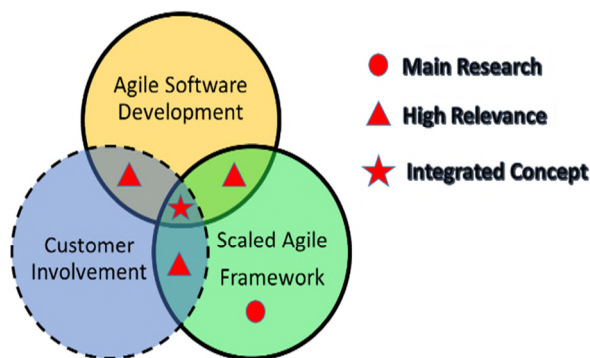

Figure 1. Literature domains.

Regarding the literature on the Scaled Agile Framework, customer involvement is addressed on four levels, respectively: Team Level, Program Level, Value Stream, and Portfolio Level [18]. Analysis results are presented in Table I. Program level and Value Stream are merged because customers have similar activities on these levels, and some activities are closely linked. As can be seen in Table I, customers should be involved significantly at the Program Level and the Value Stream. Most activities are related to validate the product quality in order to meet the customer needs. On the other hand, customers contribute less at the Team Level and seem to not contribute at the Portfolio Level. Regarding the literature domain of agile software development, see Fig. 1, the structured evolution of agile methods has been investigated, see for example [1]. Customers should have an important role in software development processes, e.g., as product owner with critical tasks, such as defining product features, reviewing features, and providing feedback [19]. In the literature domain of customer involvement, see Fig. 1, four main aspects have been identified, respectively: customer role, customer knowledge, customer motives and customer interaction [17].

TABLE I. CUSTOMER INVOLVEMENT ACTIVITIES IN SAFe

SAFe Level	Customer Involvement Activities
Portfolio	-
Program & Value Stream	Evaluating the full system produced, and giving feedback
	Contributing in estimating scope, time, and other constraints
	Attending program increment planning to create the plans for upcoming program increments (PI's)
	Contributing in defining a roadmap, milestones, and releases
	Participating in inspection and adaption (I&A) and workshops to improve next PI's performances
Team	Contributing in creating user stories Performing functional & system acceptance testing at the end of iterations

Three roles have been identified: customers as a resource, customers as co-creators, and customers as users [13]. Regarding customer knowledge, two factors are considered: usage and technology knowledge [12]. On that basis three types of customers are being defined: respectively: ordinary users, experts, and lead users. Regarding customer interaction, literature reports on advances in internet and technology which have changed current product development practices [2]. For example, Nambisan [13] suggested that companies need to design and use virtual customer environments (VCE's) to optimize customer knowledge acquisition and exchange.

Next to these customer involvement issues that SAFe implementations have to deal with, barriers and threaths have also been identified and reported in literature, see [5][16]. Six barriers have been identified in this study, respectively: team diversity (that hinders knowledge exchange, e.g. because of geographical and time differences), team attitudes and values, team competences, team communication, and customer interaction and technology infrastructure.

IV.   CONCEPTUAL CUSTOMER INVOLVEMENT MODEL

Based on the literature study and analysis we developed our customer involvement model to help companies to engage customers and to optimize their 'involvement value'. Our model consists of five stages, see Fig. 2. Because customer involvement can increase project uncertainty, the first stage addresses the identification of risks in the project. In stage 2, the result of the project risk identification is used for the determination of the customer involvement level in the project. To support this stage, customer involvement concepts, such as customer roles (i.e., resource, co-creator, user) [13], and customer knowledge issues have to be applied. Subsequently, the next three stages follow an approach for involving external parties, as developed in [21]. These are respectively, a specification, a selection, and a customer value optimization stage. The latter stage

replaces the contract agreement stage of [21] because in our study legal aspects are out of scope. The motivation for the latter stage is that it has the same goal as contract agreements, i.e., it ensures that external parties (i.e., customers) perform in accordance with company expectations.

Figure 2. Conceptual customer involvement model

V. CONCLUSIONS AND FUTURE WORK

This preparatory study represents a partial achievement of a longer-term project, i.e., the development of a conceptual customer involvement model to improve SAFe implementations. The conceptual model is based on a structured literature review and analysis. Five stages have been developed and have been elaborated on the basis of findings from literature. The conceptual customer engagement process model will be applied on the short term in an in-depth case study, in Company X. In this company, medical embedded software development is carried out in large evolutionay software development projects. Currently SAFe is being implemented in this company in various projects in different departments and business units. Customer involvement is considered in this company as a challenging and promising area in SAFe implementations. In our case study, we will use an inductive approach, i.e., carrying out semi-structured interviews, document studies and team work observations. Regarding the quality of the case study we will address validity (internal, construct and external) and reliability aspects [22]. Based on the case study results we will strive towards an extended, customer involvement oriented, SAFe framework.

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