Socio-Intentional Framework for Agile Methods Tailoring: Past, Present, and Future

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Abstract

Many software development teams have been implementing agile methods. As a result, a vast amount of knowledge can be found in both academic and industrial databases. Based on this information, many approaches have been developed to guide and facilitate practitioners in finding the most suitable practice. Nevertheless, not many of these approaches could gather these available experiences and make them systematically reusable to help practitioners understand agile practices in depth. In our previous work, we built an evidence-based tool to ease agile practices adoption by efficiently and effectively providing information on agile practices. In addition, we proposed a socio-intentional framework for tailoring agile methods that allows practitioners to analyze agile practices and define the right strategies for adopting them. Even though the evidence-based tool has been validated by a cohort of experts using illustrative examples, a more extensive evaluation of the framework remains to be done. The present paper aims to summarize how the evaluation of the framework in a real-life context will be conducted in future work.

Keywords

Agile Practice, Systematic Literature Review, Ontology, Knowledge Representation, Real Case Study, Survey, Interview.

1. Introduction

Agile development is nowadays one of the most popular approaches to build software. To gain the full benefit from adopting agile methods, software development teams can choose to adopt them on a custom-basis depending on the context and defined criteria [1]. As many software development teams have started to adopt agile methods, a vast amount of valuable experiences can be found in both academia and industrial knowledge bases. Intuitively, a team adopts agile methods because there are some things it wants to achieve [2, 3, 4, 5, 6, 7]; we call this the goal-orientation. Once the team identifies the right practices to achieve its goals, the adoption result highly depends on factors including the individuals, their interaction, and collaboration [8, 9]; this is the social aspect. Although there is a vast amount of knowledge about agile practices adoption and many approaches have been proposed to guide practitioners in finding the most suitable ones, not many of them are systematic or focus on a socio-intentional perspective.

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In our previous work [9], we proposed a socio-intentional framework for tailoring agile methods that allows practitioners to analyze agile practices and to define the right strategies for adopting them. Our framework aims to help practitioners decide which agile practices to implement to achieve their goals and identify how team members should work together to achieve these goals.

2. Background: Socio-Intentional Framework for Agile Methods Tailoring

In order to build the socio-intentional framework, we started by building an ontology using papers extracted through a Systematic Literature Review (SLR) that was presented in [10]. Similarly to many models that have been created to represent various aspects of agile methods [5, 2, 11, 6], using ontologies is a way to share common understanding among practitioners, eliminate ambiguity, and simplify and reuse processes. As a result, 86 case studies out of 79 individual papers were extracted for building and theoretically validating our model. By following the corpus-based approach, we validated that our ontology can represent the information related to agile practices adoption with minimum refinement for the unseen knowledge [12]. Figure 1 illustrates the ontology in the form of a UML class diagram. After the ontology validation, we created a user-friendly tool that allows practitioners to retrieve the information from the ontology without any experience or knowledge required [13]. This prototype-tool, named *OBAMA - Ontology-Based tool for Agile Methods Adoption*, was written in Python programming language. It was created in a notebook-style where each page serves for a functionality. Using our tool, users can easily access all the information that has been inserted. In it, by simply choosing one of the concerns from the combo-box list, the relevant information is displayed underneath the list in a table format. Users can also filter for more specific information by providing their goals and team's situations in our input pages. Figure 2 is an example of how to describe team's situations, where *Daily Meeting* is the practice the team wanted to adopt. To understand the advantages/disadvantages of our tool, we gathered expert's opinions through the same survey we used to validate the ontology. The results show that, despite some functional limitations, they agree the tool is good enough to serve our purpose.

The socio-intentional framework for Agile Methods tailoring presented in [9] focuses on the intentional (why?) and social (who?) dimensions. In the framework, we propose a methodology to analyze agile practices and define the strategies the team members should apply to successfully adopt a practice based on the teams' goals, their situations, and dependencies between team members. In our framework, a goal is defined as something a team intuitively wants to achieve, or something drawn from the problems they are experiencing or obstacles they are facing during their current development process. As an example of the latter, if a team does not understand the requirement, we can then formulate multiple goals, such as improving customer understanding and improving communication with customers. In addition to the *intentional* and *social* dimensions, the proposed methodology also addresses most of the important concerns related to agile practice adoption found in the literature. In other words, in every step in the process of analyzing agile practices, practitioners can use our OBAMA-tool to easily get the needed information. As it is hard to analyze the information listed by the tool in textual format,

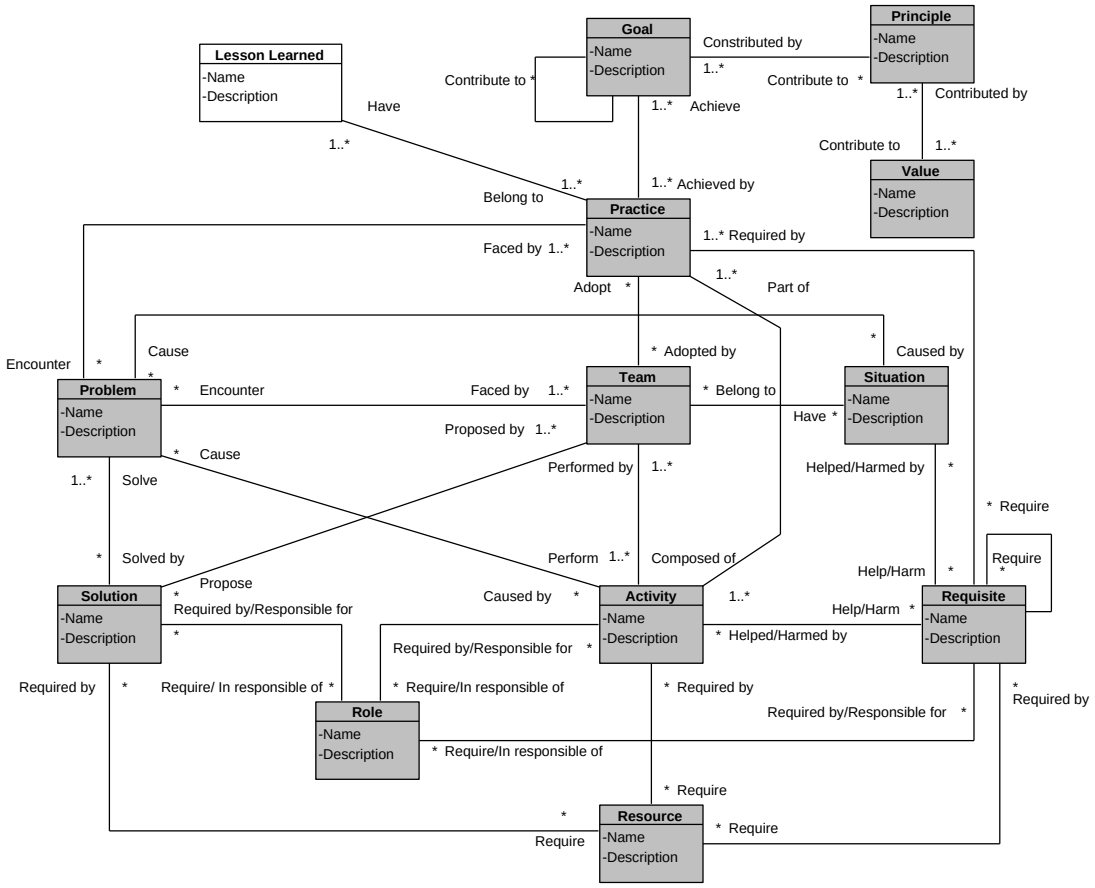

Figure 1: An evidence-based ontology for agile methods adoption.

we proposed to represent the information in graphical models before the analysis. To do that, we identified suitable modeling languages and notions by mapping the concepts and relationships in our ontology model with the notions of different modeling frameworks that can represent either goal or social dimensions. As result, iStar 2.0 [14] was chosen to be used in our framework as its notions match best with our agile elements. For the agile concepts that cannot be mapped, we propose extended notions for the representation. Finally, we demonstrated how to use our framework by applying it to the case of a software development project.

3. Future Plans for Framework Evaluation

We have demonstrated how to analyse agile practices with the help of the OBAMA tool and iStar 2.0 using a feasibility study in [7]. It was however only based on an illustrative example, and there is room for broader evaluation on this framework. To fully understand the usefulness of the framework, we indeed need to conduct more sophisticated empirical research with a real

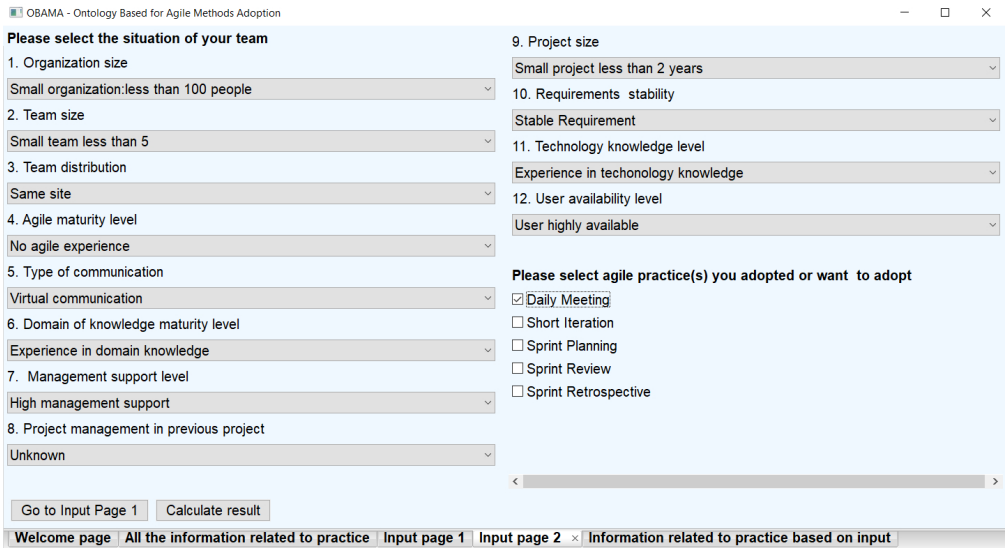

Figure 2: Describing team's situations by using *Input page 2* of OBAMA-Tool

software development team.

3.1. Research Design

The goal of the research is to evaluate the socio-intentional framework with respect to its outcomes and users' acceptance in the context of agile practice adoption within software development teams. To achieve it, there are two main points that should be investigated: (1) *the effectiveness of the framework*, and (2) *the perception of the team members during agile practice adoption while following the framework*. The former aims at evaluating if our framework can help software development teams to advance their agility level. The latter aims at evaluating whether or not the team members find the framework useful and easy to use.

The research is designed based on the guidelines for conducting case study research in software engineering [15].

From the goal of the research, we derived into three research questions:

- *RQ1: What are the overall outcomes of the application of socio-intentional framework?*
- *RQ2: What are the perceptions of the practitioners on the usefulness of the framework?*
- *RQ3: What are the perceptions of the practitioners on the ease of use of the framework?*

To answer these questions, triangulation—combining different types of data collection methods will be used. Precisely, we conduct both quantitative and qualitative research using semi-structured interviews. To answer RQ1, we will design the questionnaire, and measure and compare the results from one sprint to another by following the guidelines of Patel et al.[16]. In this framework, the authors proposed a set of questionnaires we can use to evaluate the agility level of a team. In addition, the calculation and interpretation of the results were also explained. The results for the RQ1 serve for validating the *usefulness* of the framework based on

the outcome. Questionnaires to answer RQ2 and RQ3 are designed based on [17] which were developed to validate two specific variables, *perceived usefulness* and *perceived ease of use*. These two variables are also known to be fundamental determinants of user acceptance.

Table 1 lists a sample of the questions. The complete survey questions can be found at https://shorturl.at/sYZ57.

Table 1
Sample of Questionnaire of the Survey.

Question: On a scale of 0 to 100, to what extent do you agree with the following statements?
To Agility Level Indicators
- Our customer is always available - The business decisions are made by the customer representative - We identify inconsistency between story cards and customers' original requirements - We can manage requirements change - ...
The perceptions of the practitioners on the usefulness of the framework
- It would be more difficult to understand agile practice with the framework - The framework allows me to plan my adoption better - Using the framework can improve my performance as a team member - The framework addressed my needs for agile practice adoption - ...
The perceptions of the practitioners on the ease of the framework
- The framework is confusing - I perform wrong activities frequently when using the framework - Using the framework is often frustrating - I need to consult the person in charge often to keep using the framework - Using the framework requires a lot of my mental effort - ...

3.2. Research Procedure

Our framework aims to help a *novice* team that *does not dispose of any help from an Agile Coach or Scrum master*. This kind of team generally is *not aware of where to start* and *what they need to focus on* to successfully adopt agile methods. To meet these criteria, we will select two groups of master-level students in Computer Science that have been assigned to develop software in an agile fashion in the context of their curriculum. The selected groups will have the most similar background in terms of knowledge and experience in software development. To compare the results, one group will be introduced to the framework that includes the tool and the methodology, while another will manage and discover how to implement agile on its own.

For both groups, the survey will be conducted in multiple rounds. Each round is conducted at the beginning of each sprint during the project and it is divided into two parts. In the first part, the participants will be asked to answer survey questions that would take between 10 to

20 minutes. The purposes, the questionnaire, and the procedure are however different between the two groups. One group (Gr1) will be asked only the questions related to the RQ1 without any introduction to the framework. For another group (Gr2), the framework will be introduced in the first round of the survey. During the introduction to the framework, participants will learn how to select and adopt agile practices using the tool and methodology. Gr2 will be asked to answer the questions related to all research questions. In the second part, a semi-structured interview will be conducted. The interview provides the chance to discuss with the participants the answers they give in the survey. For both groups, we gather insightful information and in-depth understanding of the teams' situations so that we can evaluate the teams' agility levels. In the case of the Gr2, the interviews aim to also investigate the perceptions of the usefulness and the ease of the framework. The data collected from the interview will be used as supportive information for the survey.

4. Conclusion

This paper presented a summary of a case study we plan to use to evaluate the socio-intentional framework. In a real-life context, groups of master-level students are chosen to conduct a case study. The three main points we aim to investigate: (1) the overall outcome generated by the application of the framework, (2) the usefulness of the framework, and (3) the ease of the framework. A combination of surveys and semi-structured interviews will be used for data collection. While the data from the survey will be regarded as the primary data, the interviews will be used as supportive information.

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