# Affect and Affective Trust in Agile Requirements Engineering

**Abstract:**

Agile practices overcome many challenges in Requirements Engineering (RE); but they contribute to create new challenges, such as a lack of customer trust and consensus during the iterative RE. Recently, researchers have shed light on affect and affective trust as influential factors on individual behaviour in software development. This position paper proposes a framework to consider the role of affect and affective trust within agile practices for RE in order to recognize the positive and negative influences of affect and affective trust. The framework considers the positive affects as an indicator for increasing the amount of affective trust between agile team members, including customers. Further, the framework highlights the possible role of negative affects in order to recognize the negative consequences on agile practices along with the amount of affective trust during the iterative RE. This ongoing research intends to collect and analyze both quantitative and qualitative data in the forms of survey research and interviews in order to test the framework and confirm the research hypotheses.

SECTION I.

## Introduction

Ultimately, RE is a decision-making process; and the adoption of agile practices in RE activities has changed the nature of this decision-making process into an iterative process. The iterative process in agile practices requires increasing the level and quality of communication between all members in agile processes, including the stakeholders. Shore et al., have highlighted the problem of people not communicating effectively, as a main contributor to poor software quality [1]. Agile processes, as people-oriented processes, account for the role of human factors more than the traditional development processes as they enhance communication. Many researchers have investigated human factors that influence the outcome of software product development. Examples of these factors include personality [2], cognitive ability [3], and experience [4].

Recently, affect has attracted many researchers to highlight the positive and negative influences that can either enhance or hinder positive communication among software team members, especially in agile development. For example, Alhubaishy and Benedicenti have proposed a model for testing the role of positive and negative emotions in agile decisions [5]; and they have also proposed another model for testing the role of emotional contagion in agile processes for producing critical systems [6]. An earlier investigation was conducted by Colomo-Palacios et al. to examine the role of emotion in RE [7].

Few researchers have shed light on the role of affective trust in software development. For example, Calefato and Lanubile proposed a model for investigating the role of affective trust in distributed software teams [8]. However, within the field of RE, there is a lack of studies that explicitly target the influence of affect and affective trust on agile team members when they elicit, analyze, specify, validate, and manage the requirements. Therefore, we propose a model to theorize and understand the role of affects and affective trust in agile RE.

SECTION II.

## Related Work

### A. Agile Requirements Engineering

Agile practices in RE are concerned with acquiring customer requirements while considering all constraints for the systems being developed [9]. Agile methods depend on frequent communication with customers and other team members in order to share information during the software development instead of having detailed documentation at the beginning of the development process [10].

Agile practices have been discussed and investigated by many authors. Paetsch et al. have discussed all practices and techniques used in RE and how they are utilized in agile methods and practices [11]. Sillitti and Succi have discussed the influence of agile practices in eliciting and managing requirements [12]. They have concluded that these practices manage requirements in an effective way for small projects under the condition of continuous involvement of the customer during all RE activities.

Based on an empirical study, Ramesh et al. elicited six agile practices that enhanced traditional RE [13]. They identified seven risks that agile practices do not mitigate, but rather, exacerbate during the iterative RE process. One of the seven challenges includes the lack of customer trust and consensus.

### B. Affect and Affective Trust in Software Development

During the past decade, researchers have been exploring the role of affect, emotions and moods, in software development. Some of the proven influence of affect on software development includes the influence on individual developer performance [14], productivity [15] and [16], and problem solving [17]. The role of affect has been discussed within software teams such as in [18]. Colomo-Palacios et al. have investigated the relationship between emotion and RE and found that knowledge-intensive tasks are highly related to different types of emotions [7]. A number of studies have investigated the role of emotion in agile processes such as [5], [6], [19], and [20].

Two types of trust relative to this discussion are affective trust and cognitive trust. Affective trust is the social perspective of the trust while the cognitive trust is the rational perspective of the trust [21]. Although many studies have investigated the role of affective trust in other industries, fewer studies have been conducted on the role of affective trust in software development. Stewart and Gosain have proposed and tested a model that considers the influence of affective trust on software team size and effort [22]. The authors have concluded that affective trust plays an important role on team effectiveness. Calefato and Lanubile have proposed studying the affective trust between developers from distributed teams; while they hypothesized the success of collaboration between the distributed teams are highly related to the amount of affective trust between all parties [23]. However, affects and affective trust have not been explicitly investigated within the agile practices for RE activities.

SECTION III.

## Proposed Model and Hypotheses

The agile practices contribute to the RE activities in an incremental way. One of the main reasons for investigating the role of affect and affective trust during RE activities is that the iterative process requires agile team members to discuss, meet, cooperate, resolve conflicts, and make decisions continually. This exposes the communication and cooperation of agile team members to be more influenced by affect and affective trust than traditional RE activities. For this reason, we propose to test the role of affect and affective trust during RE activities when applying the agile practices. The main question in this research is as follows:

How are affect and affective trust related to agile practices and RE activities?

To test the influence of affect, we test both positive affects and negative affects along with their roles on building the affective trust between agile team members. We intend to test the role of affective trust on RE activities while adopting the agile practices. Figure 1 illustrates the research model and the following hypotheses are proposed to test the main research question:

**The increased amount of affective trust between agile team members enhances the process of effectively validating the requirements.**

SECTION IV.

## Research Methodology

We will test the proposed model throughout the course of two steps. During the first step, we will design a survey to collect quantitative data. The targeted population is software developers, managers, stakeholders, customers, and any other agile team member. The survey will have four main categories of questions. The first category will contain demographic information, such as experience, gender, and role of the agile team member, to examine whether or not the demographic information influences the results of the study.

The second category of the survey questions will adopt the I-PANAS-SF scale (which contains 5 items to measure the positive affect and 5 items to measure the negative affect) in order to measure the agile team member's positive and negative affect [24]. We choose the I-PANAS-SF scale over other scales, such as the original PANAS scale [25], for two reasons. First, because we intend to collect data from agile team members regardless of their locations, we need a scale that is internationally validated such as the I-PANAS-SF scale. All I-PANAS-SF scale items will be understood not only by developers whose first language is English, but also by developers who have a basic understanding of the English language. Second, the I-PANAS-SF scale can measure the participant's affects for up to two months. All agile processes require short time periods for each iteration/phase which cannot exceed the specified time for measuring the team members affects. Participants will be asked to recall their affects within the last two months if they were involved in agile development process. If participants were not involved during the specified periods, their responses will be excluded from the study.

The third category of the survey questions will adopt the scale of measuring the affective trust from [26]. The adopted scale will contain 5 items that measure agile team members' affective trust. Eventhough the adopted scale was originally modified from McAllister's study [27], we choose the modified scale because the items were modified to directly measure the relationship between clients and project managers. Similar to this, we intend to measure the relationship among agile team members, including customers.

The last category of questions in the survey will intend to gather information about the applied agile practices during all RE activities. This information will concentrate on which agile practices were successfully applied and in what conditions they were not successfully applied. There is no scale of measurement to be used for this category; therefore, we will build and validate our own items for measuring RE agile practices.

During the analysis phase in this step, we will investigate the link between positive affect, negative affect, and affective trust from one side and the agile practices during all RE activities from the other side. We will link the role of affect to the increased or decreased amount of affective trust during the agile RE practices. Therefore, each category of questions will be compared to investigate the link between them.

The second step for testing the proposed model is by collecting and analyzing qualitative data from interviewing agile software team members. The questionnaire will contain similar questions to the survey designed in the first step regarding the demographic information and adopting the affect and affective trust scales. The interviewee will be asked four open-ended questions regarding which agile practices were influenced by the positive and negative affects and whether or not the cumulative affective trust assists or hampers the success of applying these practices in all RE activities.

We will analyze the qualitative data using the thematic analysis approach which is one of the most used methods in qualitative research [28]. This approach enables us to identify the main themes from the collected data and associate each theme with its codes and quotes. Interviewee data will be analyzed to extract all possible themes, following the six phases in thematic analysis as explained by [29]. We anticipate finding themes that confirm an existent role of affect and affective trust along with highlighting a detailed description of how the affect and affective trust participate in agile practices during RE activities. The anticipated findings of confirming the hypotheses will shed the light on actual roles of affect and affective trust. By characterizing these roles, agile development processes can be enhanced through avoiding or minimizing the recognizable consequences of negative affects and affective trust; hence, avoiding the consequences of conflicts and enhancing the cooperation between agile team members. Further, positive affect and affective trust can be characterized and maximized to decrease the conflicts and enhance the cooperation.

SECTION V.

## Conclusion

This paper describes a proposed framework for understanding the role of positive and negative affect in requirements engineering for agile practices. Further, it models the role of affective trust for agile practices during different requirements engineering activities such as requirements elicitation and management. We build our model based on literature that have recently focused on the influence of affects on software developers. This research intends to test the proposed model and hypotheses by adopting both quantitative and qualitative methods in order to confirm and enrich the results of this model.