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# Improving IS development teams' performance during requirement analysis in project—The perspectives from shared mental model and emotional intelligence

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**Abstract**

Numerous studies have investigated factors affecting the project requirement analysis of information system development (ISD) teams from the view of technology, but our research focused on how developers' behaviors affected project team members' requirements analysis work from the emotional intelligence (EI) and shared mental model (SMM) perspectives. Specifically, we separated SMM into task-related SMM and member-related SMM to examine their impacts on ISD teams' performances during requirement analysis phase. Then we chose four scales of EI to research the relationships between them and SMMs. Using the approach of structural equation model, the results indicated that two aspects of SMM both have significant and positive impact on team performance, and EI could be the antecedents of SMM. The results indicate that SMM could enhance the influences of EI on project team performance, so the choice of individual team members and the team building are both significant to ISD teams for better performance in project requirement analysis.


*Keywords:* Requirement analysis; Emotional intelligence; Shared mental model; Information system development; Project team performance

## 1. Introduction

Requirements analysis is the first step in the system development life cycle (SDLC), which is the most important part in project management (Guinan et al., 1998). In this stage, the users tell the developers what information systems (IS) they need to meet their requirements in detail, and the developers should understand these statements accurately and elicit the real requirements from users' talking (Cooper and Swanson, 1979, Davis, 1982, Mekeen et al., 1994, Linberg, 1999). The quality of works in requirement analysis phase impacts the whole project performance directly. A large number of system projects have failed because of the poor quality of requirements analysis (Sutcliffe, 2002, Yang et al., 2015), such as the investigation of Lindgaard et al. (2006), showed that 31% of the projects they surveyed were canceled before accomplishment by the problem in requirement analysis phase. Therefore, how to improve the performance in the process of requirement analysis is the first and fatal problem that the industries and scholars should be solved in the area of ISD project management.

Successful requirement analysis needs enough participation of the end users during the projects' development and management process, and developers should contact with their users to gather, explicate, and understand users' needs (Lamb and Kling, 2003, Markus and Mao, 2004). During the connections, ISD team members' behavioral modes affect requirements analysis quality, such as their communication abilities, friendly manners of speaking, and proper body languages. All the behavioral modes of a person are determined by his/her mental model, which is defined as an information processing mechanisms (Mathieu et al., 2000). Individual developer uses his/her own mental model to perceive, describe, explain, and forecast the thoughts of the users, so the requirement analysis is an integration of various and complicated

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mental activities (Lee and Truex, 2000, Yang et al., 2008). However, during the requirement analysis phase, the developers do these works with their teammates, not by an individual one. If the ISD team members could share the common goals and deal with the users through the similar procedures and languages, the users may feel that the ISD teams are professional and optimistic and could cooperate of requirement analysis works more willingly and effectively (Xiang et al., 2013). Such working style of the ISD teams exhibited is the aggregation of the individual developer's mental model into the team level, which is termed as shared mental model (SMM). A plenty of researchers find out that a high level of team's SMM could improve the team performance (Yang et al., 2008, Yang and Farn, 2009, Xiang et al., 2013). Therefore, in this paper, our first research question is whether SMM of ISD teams could influence the ISD teams' performance in requirement analysis process.

Second, in the research of human behavioral interactions of project management scope, the idea of emotional intelligence (EI) has ability to explain how people play in social networks and communicate with others (Druskat and Druskat, 2006), which is defined as "individual's ability to monitor one's own and other's feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions" (Salovey and Mayer, 1990). EI could improve the human interaction by linking emotion and cognition, so it is significant to improve the workplace behavior and performance (Aritzeta et al., 2007), especially team behavior and performance (Jordan and Lawrence, 2009). It is also deserved to research whether EI is the antecedent factor for the formation of SMM. Therefore, the second research question of this paper is to investigate which components of EI could impact on the building of ISD teams' SMM in the requirement analysis phase.

The rest of our paper is organized as follows. In Section 2, we review the prior literature and present our research model and hypotheses. We conduct a discussion of the research methodology in Section 3, followed by a results discussion in Section 4. Finally, we conclude and discuss the implications of our findings in Section 5.

## 2. Theoretical background and hypotheses development

In the research of Lee and Truex (2000), they investigated the impact of formal training on information system developers from the view of cognitive structure. They used mental model theory and personal construct theory to build their research model, which contains two relationships: (1) the impact of personal construct on individual's mental representation and (2) the influence of actions based upon individual's mental representation to the production of information systems. Our research is the extension of Lee and Truex's works. There are two steps in the overall concept model, which is depicted by Fig. 1. According to the previous research of SMM, the outcomes of IS project development depend on the similarity of each team members' mental models and mental models' consistency with the projects' characteristics (Yang et al., 2008, Jo, 2012). Therefore, the aim of step 1 is to research the impacts

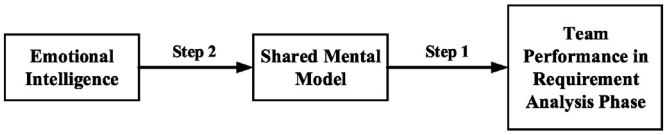


Fig. 1. The overall concept model.

of SMM on project team performance and extend the research scope of SMM to the phase of project requirement analysis. Although the importance of SMM on positive organizational behaviors has been under various and worthy studies, the formation and the distinction of each team member' SMM is vaguely defined. Thus, in step 2, we use EI to explain the antecedents of SMM and aggregate the personal constructs from individual level to team's constructs in team level. The detailed explanations of our research are described in the following sections.

### 2.1. Team performance in requirement analysis phase

When starting a new ISD project, the first step is to analyze the client's requirements (Jayaswal and Patton, 2008). Developers understand and abstract the client's requirements through meetings and telephone or Internet contact (Ashleigh and Nandhakumar, 2007). A great deal of extant literatures note the communications between developers and users can be very difficult. For example, clients cannot always express the specifics of their real needs. Other times, the client's requirements are ambiguous, diverse, dynamic, or even hidden (Kirsch and Haney, 2006). In other cases, developers assume that—because they think they are professionals—they know the clients' needs better than the clients themselves (Guinan et al., 1998). These characteristics above lead to complications in the requirements analysis process (Ancona and Caldwell, 1992). When misunderstandings occur during the requirements analysis phase, the final ISD projects are often doomed to failure (Holtzblatt and Beyer, 1995).

Because administering an accurate client requirements analysis is so important, many studies have been done on how to increase the quality of requirement analysis. Barki and Hartwick (1994) conducted a field study of 74 information systems projects to explain the conflict and to identify the resolution for user participation in requirements analysis. Their research indicated that conflict and resolution are complex issues, and that the influence of conflict has both positive and negative effects on the development process. Their studies also showed that users participating as actors during software responsiveness reviews also had positive influences on conflict resolution by decreasing the degree of requirements uncertainty (Hsu et al., 2008). Mathiassen et al. (2007) analyzed the risk and techniques of requirements analysis. They prescribed techniques that should be adopted to help developers and clients manage risk in the requirements analysis process. Guinan et al. (1998) researched software development team performance during the requirements analysis phase; they found that team skills and managerial involvement better enabled team performance than development tools and methods. Yang et al. (2015)