The Role of Communication and Meta-Communication in Software Engineering with Relation to Human Errors

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Abstract

This paper examines and focuses on some issues and questions relating to how the use meta-communication concept in Software Engineering process to reduce human errors. The role of IT project communication and the project management tools, which can be regarded as vital for Software Engineering are investigated. Socio-cognitive modeling of Integrated Software Engineering using the TOGA meta-theory, has been discussed. Today the focus is especially on the identification of human and organization decisional errors caused by software developers and managers under high-risk conditions, as evident by analyzing reports on failed IT projects. Software Engineer’s communication skills are listed. Several types of initial communication situations in decision-making useful for the diagnosis of Software developers’ errors are considered. The developed models can be used for training the IT project management executive staff.

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1. Introduction

The current research was based on the assumption that human error is an important cause of software defects. Communication and meta-communication studies were used to develop a deeper understanding of the human errors...
that occur during the software development process and help IT practitioners to detect and prevent those errors early in the software development lifecycle.

Early elimination of mistakes will improve software quality and reduce overall development cost. The target of the research was to develop an approach and model useful for miscommunication reducing in IT project activities. The research is related to the Software Engineering Master Program graduates competence evaluation project (Misnevs and Yatskiv, 2016) with the emphases on master students’ communication skills.

The main attention was paid to understanding of meta-communication role in IT Project communication processes. The term “meta-communication” was suggested by Bateson in 1951, and then he elaborated in 1956 a critical fact that every message could have a meta-communicative element, and typically, each message held meta-communicative information about how to interpret other messages. He saw no distinction in type of message, only a distinction in function (Bateson, 1972).

The prefix can have various meanings but as used in communication, philosophy and psychology its meaning is best recognized as about. Thus, Meta-communication is communication about communication; meta-language is language about language; meta-message is a message about a message. You can communicate about the world - about the human errors in the software engineering process, the computer you are using, or the text you’re reading right now. We refer to this as object communication; because you are talking about objects. And the language you are using is called an object language. But notice that you are not limited to talking about objects; you can also talk about your talk; you can communicate about your communication. And this is referred to as meta-communication. In the same way, you can use language (i.e., meta-language) to talk about language (i.e., object language). And you can talk about your messages with meta-messages.

Meta-communication mostly is the nonverbal cues (tone of voice, body language, gestures, facial expression, etc.) that carry meaning that either enhance or disallow what we say in words.

The distinction between object communication and meta-communication is not merely academic; it’s extremely practical, and it is recognized that the difference between these two forms of communication is essential in untangling lots of conflicts and understanding a wide variety of interpersonal communication interactions. Actually, we use this distinction (as a meta-communication) every day, mostly without realizing it. For example, when you send someone an e-mail with a seemingly sarcastic comment and then put a smiley at the end, the smiley communicates about your communication; it says something like “this message is not to be taken literally; I’m trying to be humorous.” The smiley is a meta-message; it’s a message about a message. When you say, in preface to some comment, “I’m not sure about this but.....” you’re communicating a message about a message; you’re commenting on the message and asking that it be understood with the qualification that you may be wrong. When you conclude a comment with “I’m only kidding” you’re meta-communicating; you’re communicating about the communication.

Frits Staal (2010) related the term to meta-language concept that is found in logic both in Western and Indian traditions. Staal considered the term meta-language, or its German or Polish equivalent, to have been introduced in 1933 by the logician Alfred Tarski.

In this research we discuss our ideas on the software quality improvement by the integration of the human factors engineering into the development process using Socio-cognitive Engineering methods.

2. Literature Review

There are many studies of human factors, however most of them are solely oriented on human-machine operations in terms of system and program usability, but not in terms of software engineering process (Spichkova et al., 2015) or they are dedicated to so called Engineering Error Paradigm (Redmill and Rajan, 1997). By this paradigm humans are seen as they are almost equivalent to software and hardware components in the sense of operation with data and other components, but at the same time humans are seen as the “most unreliable component” of the total system.

Meta-communication studies in Computer Science mostly are related to Human Computer Interaction (HCI) and Semiotic Engineering. Semiotic perspectives on HCI take human-computer interaction as a special case of computer-mediated human communication.
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