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Challenge of validation in requirements engineering

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HIGHLIGHTS

- Framing the issue of validation in Requirements Engineering.
- Classification and taxonomy of existing techniques in requirements validation.
- A validation techniques is intended for a particular area.
- The combination of validation techniques is essential.
- Several iterations are necessary because of the multidisciplinary projects.

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ABSTRACT

This paper will review the evolution of validation techniques and their current status in Requirements Engineering (RE). We start by answering the following questions: What validate? Why the benefits of having the requirements validation activities during the RE process? Who are the stakeholders involved in the requirements validation process? Where applied the validation in the RE process? and How the techniques and the approaches of requirements validation?

1. Introduction

To error is human, and there is no reason to think that it does not occur during the development of the system. Problems can result from a misunderstanding between analyst and the customer an ambiguity in the documentation, etc. Errors that occur at this stage and are not corrected are often the most persistent and costly. It is therefore important to set in motion steps that will minimize errors, detect and correct them as soon as possible. Error prevention is a matter of good practice in software engineering. However, it is wise to assume that errors will occur and establish procedures to prevent. Thus,

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the requirements engineering process (such as sub-processes of the larger systems engineering and software engineering processes) must be validated. Validation has the purpose of ensuring that the correct functionality of the solution-system has been defined:

- If the problem domain behaves as described (in the requirements document);
- If the requirements are properly recorded;
- If the new system behaves as described (in the requirements document);
- If the inventive step (design interactions) is correct when the requirements are met.

The objective of validation is to ensure that all manufacturing steps result in a product that meets the requirements of stable and reproducible way. While the objective of requirements validation is to certify that the requirements on the set of specifications conform to the description of the system to implement and verify that the set of specifications is essentially: complete, consistent, consistent with standards standard, requirements do not conflict, does not contain technical errors, the needs are not ambiguous, etc. During our study in requirements validation, a problem set are appeared, we have classes in: Problems associated with validation in the software life cycle: the nature of information, what? How? When? Who? How (by what means technical)? Where? Duration the position of the validation activity compared to the software life cycle, etc. Problems related to validation during the requirements engineering process: is what an activity or phase? Which is the result of the validation, how can we validate requirements? What types of validation processes is best suitable for a project? How to ensure that the solution meets the needs of stakeholders and company? What is the best technique to use in validating? How to agree all stakeholders? The different validation modes (formal, semi-formal, informal) level verification model where requirements, validation of non-functional requirements and functional control of changing requirements, insufficient in negotiation techniques for validation, the lack of activity of Validation in RE in some ways, the lack of validation methods, lack of expert analysts, lack of business experts with a high level of analytical and communication and experienced users, etc.

The paper is organized as follows: After the introduction we will present the what, validation in RE and some quality criteria that must be based evaluation of requirements to Section 2. Then we describe the Why requirements validation in Section 3, before giving in Section 4 Who should be involved in the process. In Section 5, we will see, speak as validation against the RE process; Spent Section 6 for the techniques that can be used during requirements validation process. Finally we come to a conclusion and some prospects.

2. What is requirements validation?

Many areas merge between the definitions of validation and verification. Thus, it is necessary to agree on their explanations.

According to Artem Katasonov [1] Validation of the requirements is the process to determine whether the requirements as defined, do not contradict the expectations of the various stakeholders of the system and do not contradict each other; this is the control of the quality requirements. Requirements validation is concerned with the process of review of the requirements document to ensure that it defines the right software (the software that users expect). According Kotonya and al. in [2] "requirements validation is concerned to check the requirements document for consistency, completeness and correctness", and in [3] states that the requirements should be checked to: validate, understand, consistent, traceability, completeness, realism and verifiability.

Because the terms verification and validation are often confused, Terry Bahill [4] defined requirements verification as a process to prove that each requirement has been satisfied. Verification can be done by logic, inspection, modeling, simulation, analysis, examination, testing or demonstration. Requirements Validation to ensure that (1) all of the requirements are: correct, complete and consistent, (2), a model can be created that meets the requirements, and (3) real-world solution to be built and tested to prove that it meets the requirements (see Fig. 1).

The requirements validation process is not so clear. According to the EIA632 standard, the requirements validation process ensures that the requirements are necessary and sufficient for the appropriate design phase to meet the exit criteria for the lifecycle software phase and lifecycle phases of the company in which efforts occur for the engineering phase or reengineering.

3. Why requirements validation?

There are processes models in RE, which do not take the validation as sub-phase during the RE overall process [5,6]. To ensure a better support of requirements, requirements must be good quality; the guarantee of that quality is assured through the stages of validation and verification. These activities take place throughout the life cycle, when approving the interim filings for reserved phases. Most of the existing methods or practices are only to identify and gather the requirements. Compared to customer needs, validation activities fit naturally in the harsh process [7]. Jose and al in [8] show that only a few approaches provide techniques for requirements validation. Most of them only set guidelines on how developers and customers will need to review the specification of requirements to find inconsistencies and errors and to complete. A comparative study between web development methodologies and supported the activities of the RE process, they mention that only 4/10 of the methods considered by this validation and mention technique without any approach or methodology.

Lulu He and all [9] realizes that the requirements validation is often not sufficiently covered not only in the practical world but even in the academic world. As said Siew et all [10] consider that most books present it as a list of "best practices" and this validation requirements as much as a heterogeneous process based on the application of a variety of independent techniques. In their towers Nuseibeh B and