



## The Research Roadmap of Requirement Validation

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**Abstract:** The requirement validation is vital for every successful software development. In this process, the requirements from the users are checked and analyzed with its consistency, completeness and correctness. The validation of requirements is a very vast research area in software engineering. In this presented article, some quality research approaches are cited for the software engineering researchers and software professionals.

**Keywords:** requirements, requirement validation, requirement engineering, software development, specification

### I. INTRODUCTION

Requirement engineering is the most effective phase of software development process. The target of requirement engineering is to gather the quality requirement from the stakeholders. Also, it helps to analyze information system and planning of software systems [1, 2]. Requirement engineering is a systematic approach through which the software engineer collects requirements from different sources and implements them into the software development processes [12]. Requirements engineering contains a set of activities for discovering, analysing, documenting, validating and maintaining a set of requirements for a system [3]. An effective requirement engineering process model consists of mainly four major parts namely requirement elicitation and development, documentation of requirements, requirement validation and verification, and requirement management and planning [4].

Requirement validation is one of the research aspects of software engineering. It is a most important exercise to fulfil the requirement for a particular system and its main aim is to collect perfect information from the organisation/Users and then implement step by step in the correct manner. This concept implies that output of the finding is correct and it can be verified by everyone. It is important for every organisation to develop quality software product that can satisfy user's need [13]. Checking information for its perceived correctness and completeness is a main part of the specification development process and is known as requirement validation. The successful implementation of proposed requirement process can have a great impact on the production of quality software product.

Requirement validation examines the requirement specification to ensure that all software requirements are unambiguous, inconsistent throughout the project. In this process errors have been detected and corrected; and the work products confirm to the standards established for the process, the project, and the product. The principal of requirements validation mechanism is the formal technical review. The review team that validates requirements includes software engineers, customers, users, and other stakeholders who examine the specification for errors in content or interpretation, areas where clarification may be

required, missing information, inconsistencies, conflicting requirements, or unachievable requirements.

System requirements specification and their validation play a key role in the development of software. It checks the correctness, completeness and feasibility criteria which will provide a great impact on the production of quality software product [14]. The organization of the synopsis is as follows. In section 2, we have placed the literature review of the latest research trends in the area related to requirement validation techniques. Section 3, discussed the research proposal and finally section 4 presents the concluding remarks.

### II. RELATED WORK

Requirement validation process assures that the product development team completed its task and produces a system that satisfies user needs. The software validation focuses on the method whereby the end users check the completeness and correctness of the requirements specification. User validation involves the end users of the system approving the specified system with regard to their tasks, goals and responsibilities [9, 10]. This method indicates whether the specification is complete and adequately supports the role of the users. It is important to validate with appropriate users and with an adequate range of individual reflecting the variety of roles which are to be supported by the proposed system [19]. The impact of requirement validation in software development process has very vast research scope. The validation process consists of three main steps [20]:

- a. The analyst chooses a set of requirements to focus the validation on particular aspect of the specification.
- b. The analyst defines a set of problems, each one consisting of a set of objects and a set of scenarios and problems.
- c. The analyst checks the defined problems and analyzes the results.

The above validation steps can be iterated arbitrarily, by correcting formalized requirement fragments and/or the corresponding categorized requirement fragments. Furthermore, if necessary, new scenarios, new properties can be created and different aspects of the requirements specification can be analyzed [18, 20]. This role of requirement validation for software development process is

a very significant field of research having good amount of research work and has a great scope of software development with more reliability and satisfaction. For the successful achievement of software development process it is necessary to follow the right information, function and behaviour of the system and move forward according to fulfil the customer needs [5, 6].

From literature survey, it is found that the consistency is the main key for requirement validation in software development process [7]. At the present stage, the cost of correcting an error after delivering the system is an order of magnitude higher than the cost of correcting a similar error during the requirement analysis. So as a result it is detected that all patterns before the software development process should be properly analyze so that as a result it provide a solid foundation for software design [8]. To resolve this problem, testing plays an extremely important role for requirement validation. Finding errors before they become defects will improve defect removal efficiency which reduces the amount of rework which has to be performing by software team [11]. Research indicates that the requirement validation is an important factor for software development process. Also they suggest for the basic problem occurred during software validation.

Requirement validation is the process of ensuring that the application meets functional and non-functional requirements before coding and during development. Additionally, validation is an approach, in which the analyst finds out the actual requirements before coding will start [16, 17]. Software validation takes place primarily during the system requirements analysis and design phase. There are also numerous validation techniques, including formal methods, fault injection, and dependability analysis are used and it provides security, high assurance to the required products. Requirement validation usually takes place at the end of the development cycle, and looks at the complete system as opposed to verification, which focuses on smaller sub-systems [15, 23].

Over the past years, software development has evolved from small tasks involving a few people to enormously large tasks involving many people, due to this major change, requirement verification and requirement validation has similarly also undergone a change. Previously, requirement verification and requirement validation was an informal process performed by the software engineer himself. However, as the complexity of systems increased, it became obvious that continuing this type of testing would result in unreliable products. It became necessary to look at requirement verification and validation as a separate activity in the overall software development life cycle. Requirement validation of today is significantly different from the past as it is practiced over the entire software life cycle. It is also highly formalized and sometimes activities are performed by organizations independent of the software developer. Hence, the requirement validation has given a substantial attention to developers and researchers for designing or planning quality software products [19, 24].

### III. RESEACH PROPOSAL

The development and gathering of good requirement is the basic activity of any organization to develop quality software products. It is noticed that Requirement validation is a process that focuses on an overall objective, features,

source, information, function and behaviour of the system to be built. Also, it is observed that the requirement validation is a procedure for determining stakeholder's needs during the software development process. Thus, the successful implementation of proposed requirement process can have a good impact on the production of quality software products [21]. The analysis of requirement validation techniques helps to improve the quality of the software products as well as it satisfies the customer needs. Finally, the proposed research work will focus on following issues:

- a. A framework for requirement validation can be developed to analyze the role of requirement validation in requirement development .It can be done by requirement analysis techniques.
- b. The Impact of requirement validation in software development process can be analyzed to improve the consistency and quality of the required products.
- c. The effective techniques of requirement validation can be discover, that gives a solid foundation for designing the good products for the organization/users., etc.

### IV. RESEACH METHODOLOGY

To develop requirements validation techniques, various requirements approaches will be used in co-located software development. The most commonly used tools techniques are as follows:

- a. **Prototyping:** A prototype is an operational model of the application system. It helps in discussing a particular problem, clarifying a particular question, or preparing a particular decision, and thus, supplemented with written system specification.
- b. **Animation:** Animation of a specification is the process of providing an indication of dynamic behavior of the system by walking through a specification fragment in order to follow some scenario.
- c. **Inspection:** Inspection is a well-known formal evaluation process whereby a group other than authors examines the software requirements in detail in order to detect faults, infringement of development standards and other miscellaneous issues. This examination includes the detailed review of code and design as well.
- d. **Reviews:** Review is a manual process which involves multiple readers to check the omission and anomalies in the requirement document.
- e. **Natural language paraphrasing:** Natural language paraphrasing is a validation technique which has been devised in order to tackle the problem caused by two conflicting concerns i.e. concern of the analyst to develop a formal requirements model, and the users' need to communicate their requirements in their own universal, widespread terminology.
- f. **Expert System Approaches:** Expert system is the method or domain knowledge of some aspects of requirements engineering process that they represent. To assist the validation of requirements, this category of approaches includes a number of automated tools.

### V. CONCLUSION

The development of requirement validation techniques involves formal methods, fault injection, and dependability

analysis which produce quality products for the organization/users. The research related to requirement validation can be described with the importance of requirement validation over the requirement elicitation, requirement specification and requirement management. Requirement validation and its scope in requirement development is also a research area in requirement engineering research.

## VI. REFERENCES

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