## Functional and Non-Functional Requirement (FR and NFR) Formation Based on Requirement Elicitation Using Text Semantics in IdVar4CL Artifact

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Abstract— Elicitations are mandatory in establishing both Functional Requirements (FR) and Non-Functional Requirements (NFR). One of the challenges in software engineering is to ensure that Requirement Elicitation (RE) is accurately converted to well-structured FRs and NFRs in Software Requirements Specification (SRS) documentation. However, traditional approaches for requirements gathering often face challenges such as incomplete information, evolving requirements, and lack of stakeholder involvement. To address this problem, we adopted agile methodologies in software development. Hence, this study proposed to form FR and NFR based on RE through a semantic text process. The results showed that we have been successful in establishing FR and NFR on the RE process using text semantics in the IdVar4CL artifact, which included 29 documents (d1-d29), consisting of 12 RE documents, 10 FR documents and 7 NFR documents. In detail, the list of Requirement Specification tabulations in Subject, modals, Verb, Object format. Semantic similarity through comparison of the elicitation documentation with the SRS documentation results in a difference of 0.09 as a reference to subsequent SRS artifact formation improvements. Hence, this approach improves the clarity and alignment of requirements using agile development.

Keywords—Requirement Elicitation, Functional Requirement, Non-Functional Requirement, Text Semantic Similarity.

## I. INTRODUCTION

In software development, the project's success depends heavily on the accuracy and completion collection of requirements [1]. Furthermore, most of studies referred the activity to collect the project's requirements as Requirement Elicitation (RE) that, involves various techniques, such as interviews, document analysis, and observations to understand users' needs for software systems deeply [2]. As a results, the RE process could describe the project's requirements that divided into two types, such as Functional Requirements (FR) and Non-Functional Requirements (NFR). On the one hand, the FR is a material in software development that will later be a reference in creating all software features based on user needs [2]. On the other hand, NFR defines system quality attributes as subjective, playing an essential role in architectural design [3]. Both FR and NFR as the foundation information for the Software Requirement Specification (SRS) Documentation, which guides developers in building software that matched stakeholders' requirements [4]. However, one of the challenges in software engineering is ensuring that RE is accurately converted to well-structured FRs and NFRs in SRS documentation. Moreover, traditional approaches to collect the requirements often face challenges, such as incomplete information, evolving requirements, and lack of stakeholder involvement [5]. Hence, to address this problem, we adopted Agile methodologies in software development. It is because Agile uses iterative and incremental techniques, allowing the requirement to evolve through continuous feedback loops with stakeholders [6].

In Agile, each stage is not a one-time process but a continuous activity throughout the project's life cycle. The sprint cycle allows regular re-evaluation of requirements as stakeholder feedback is included in real-time. Therefore, the iterative approach ensures that FR and NFR remain aligned with the growing needs of stakeholders and project objectives.

Furthermore, we used SRS Documentation named IdVar4CL, a prototype application for performing variable identification in a loop diagram causal as an object for this research case study. It is because, based on the activity of elicitation results in the previous study showed that, the Idvar4CL artifact still has the problem of conformity to the formation of FR and NFR. This documentation can be traced to the https://www.scopus.com/record/display.uri?eid=2-s2.0-85148961794&origin=resultslist link.

Therefore, this study aimed to form FR and NFR based on Requirement Elicitation (RE) through semantic text processing. Similarity text with semantic similarity measures the extent to which two words or phrases have the same or similar meanings. Thus, there are novelty and contributions that can be used in the development of prototype application artifacts:

- 1. Performing Requirement Elicitation produces documentation through an elicitation technique.
- 2. Functional Requirements and Non-Functional Requirements form a Requirement Specification tabulation list using the Subject + (modals) + Verb + Object format.

3. Measure the result of the conformity of Requirement Specification to Requirement Elicitation based on a validation range value by using Gwet's AC1 formula, which yields a value between 0 and 1.