Invitation

You are cordially invited to the public defense to obtain the academic degree of

DOCTOR OF BUSINESS ECONOMICS

by Anis Rahmawati Amna

ENHANCING REQUIREMENTS CLARITY: ANALYZING POTENTIAL AMBIGUITY IN USER STORIES

Supervisor:
Prof. dr. Geert Poels

Wednesday, 12 June 2024 at 16h00
In the Faculty Board Room, Campus Tweekerken, Tweekerkenstraat 2, 9000 Ghent
Please confirm your attendance no later than 2 June by email to
AnisRahmawati.Amna@ugent.be

EXAMINATION BOARD

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Abstract

Agile Software Development (ASD) has become increasingly prevalent in the past two decades, emphasizing flexibility and adaptability to meet evolving market demands and accelerate project delivery. Effective communication within Agile teams is paramount, as any misunderstandings can lead to various challenges, including non-compliant software solutions and increased development costs. Moreover, cultural differences, spanning language, norms, and communication styles, can exacerbate these challenges, leading to cultural misperceptions, ambiguous misunderstandings, and divergent interpretations and documentations. Addressing these complexities is essential for promoting collaboration and ensuring project success.

To facilitate collaboration between IT and business stakeholders, Agile methodologies advocate the use of lightweight documentation, often in the form of user stories. However, as natural language-based artifacts, user stories are inherently prone to ambiguity, posing risks to software quality. Ambiguity in user stories manifests in various patterns and analyzing it is a complex task. Nonetheless, investing efforts in refining the quality of user stories is essential, as it can mitigate the risk of higher costs in later development stages while enhancing software quality and expediting the development process.

This doctoral project consists of four substantive chapters, framed by an introductory and a concluding chapter, addressing the overarching research question: *How can potential sources of ambiguity in user stories be identified and what is a comprehensive and effective approach to address this problem?* To answer this question, a qualitative interpretive methodology was employed through a systematic literature mapping. This approach provided a deeper understanding of how user story research has been conducted, facilitating informed decision-making and guiding future research endeavors. Further extraction was performed using inferential generalization in a systematic literature review to identify different manifestations of ambiguity in a set of user stories. A framework for analyzing ambiguity in a set of user stories is introduced and initially tested using a controlled experiment to evaluate its potential usability for identifying ambiguity. To enhance performance, a tool-supported method was developed by leveraging NLP techniques. This method not only identifies ambiguity but also refines user stories flagged as "potentially ambiguous".

The efficacy of the AmbiTRUS tool was evaluated through usability testing with professionals in requirements engineering and business analysis. The results of each empirical study support the effectiveness of AmbiTRUS in identifying ambiguity in a set of user stories. Specifically, AmbiTRUS has proven effective in identifying different manifestations of ambiguity at various linguistic levels, helping users quickly analyze and refine problematic user stories. From an academic perspective, Chapter 2 reveals that ambiguity in user stories is a scarcely addressed but relevant topic, with a few solutions reaching the prototype stage. Chapter 3 identifies different manifestations of ambiguity across linguistic levels. From a practical perspective, Chapters 4 and 5 present a comprehensive framework, integrated into the tool-supported method (AmbiTRUS tool), to facilitate ambiguity analysis and requirements refinement. The studies demonstrate that AmbiTRUS is effective and user-friendly, with a high likelihood of regular use as an ambiguity-checking mechanism. Consequently, this dissertation makes a dual contribution to both academia and industry by extending the understanding of ambiguity in a set of user stories and providing a comprehensive and effective tool to facilitate requirement analysis.

Curriculum vitae

Anis Rahmawati Amna (Anis) (born in Kediri, East Java, Indonesia) holds a Master of Computer Science degree in Information Systems (Sepuluh Nopember Institute of Technology, Indonesia), a Master of Business Administration degree in Industrial Management (National Taiwan University of Science and Technology, Taiwan, Republic of China (ROC)), a Bachelor of Computer Science degree in Information Systems (School of Management and Computer Information Kadiri, Indonesia), and an Associate degree in Information Systems (Airlangga University, Indonesia). Anis joined the Department of Business Informatics and Operation Research at Ghent University in September 2019. Before her return to academia, Anis served as a Junior Lecturer at the University of 17 Agustus 1945 Surabaya for three years, specializing in the Informatics Engineering department. During this period, she secured research grants from the Republic of Indonesia Ministry of Education and Culture (DIKTI) for conducting mini-research projects. She actively disseminated the findings of her research at various conferences, including IEEE events. During her PhD, Anis presented the results of her research at prestigious conferences including REFSQ 2021 (online), CAISE 2022 (Belgium), Agil-ISE 2022 (Belgium), and QUATIC 2022 (Spain). Besides the work in her dissertation, Chapters 2 and 3 of Anis's dissertation were published in *Information and Software Technology (IST)* and *IEEE Access*. Currently, she is preparing her fourth chapter and fifth chapter for submission to journals. She looks forward to continuing her career as a lecturer at the Department of Informatics Engineering at the University of 17 Agustus 1945 Surabaya. She also engages as a voluntary postdoctoral researcher at Business Informatics and Operation Research at Ghent University in the upcoming academic year.