

Proposal Title (tentative): A Framework to Evaluate Creativity in Requirements Engineering
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Much of traditional requirements engineering (RE) has considered that requirements exist in the stakeholders' minds in an implicit manner [1]. However, as the industry has become extremely competitive with multiple software serving the same customer domain, a software needs to enchant customers constantly with novel and useful features in order to improve its sustainability [2]. Thus the concept of creativity in RE, which is the capture of requirements that are new to the project-stakeholders but may not be historically new to humankind [2], has recently been emerged. Creativity research in RE has mostly focused on developing frameworks and tools to support techniques and heuristics [3, 4]. Despite such initiatives, evaluating creativity in RE has received very limited attention. Furthermore, the evaluation methods found in the literature are seriously constrained in their ability to measure all the aspects of creativity from an RE perspective [4]. Therefore, the RE field strongly needs a comprehensive framework that evaluates the creative merits of the requirements in a complete manner. In this research proposal, we plan to develop such a novel and comprehensive framework to evaluate creativity in RE.

We develop this project based on the findings and experience from our previous creativity work [4]. To that end, our research methodology includes a systematic literature review (SLR) and developing an evaluation framework from a grounded theory. The SLR portion, which is already in-progress, involves an in-depth review of creativity in different disciplines, including psychology. The objective is to explore various aspects of creativity, including novelty, appropriateness and level of surprise, and to identify different measures that could be used to evaluate those aspects. The later part of the research is closely guided by the outcome of our SLR. It involves two major tasks: i) empirically studying large-scale software systems and software development teams focusing on what makes the requirements creative to the stakeholders; and ii) developing and evaluating a comprehensive framework building upon the findings of the SLR and empirical studies.

This research possesses highly promising values in advancing RE research and training the software engineers. Utilizing the evaluation framework, researchers will be able to evaluate their creativity techniques and tools in a systematic manner. The outcome of this research will be a bedrock for including creativity related topics in the RE curriculum, thereby training our future software engineers with the cutting edge knowledge of creativity in RE. Furthermore, our research will have a strong impact on the software industry as the developed framework will help software engineering practitioners in delivering innovative features and will provide them with competitive advantage.

References

1. B. Nuseibeh and S. Easterbrook, "Requirements engineering: a roadmap," in Proceedings of the Conference on the Future of Software Engineering, ser. ICSE'00, 2000, pp. 35–46.
2. N. Maiden, S. Jones, K. Karlsen, R. Neill, K. Zachos, and A. Milne, "Requirements engineering as creative problem solving: A research agenda for idea finding," in Proceedings of the International Requirements Engineering Conference (RE), 2010, pp. 57–66.
3. J. Horkoff and N. A. Maiden, "Creativity and conceptual modeling for requirements engineering," in Proceedings of the International Working Conference on Requirements Engineering: Foundation for Software Quality (REFSQ Workshops), 2015, pp. 62–68.
4. T. Bhowmik, N. Niu, J. Savolainen, and A. Mahmoud. "Leveraging Topic Modeling and Part-of-Speech Tagging to Support Combinational Creativity in Requirements Engineering," Requirements Engineering Journal (REJ), vo. 20, no. 3, 2015, pp. 253-280.