

AI-based Automation in Requirements Elicitation: A Critical Analysis

João Alves

June 2025

1 Introduction

Requirements engineering, or RE, is one of the main aspects to be studied in software development in terms of gathering, explaining and making certain what the stakeholders really need so the most suitable product can be determined. The main phase in RE is perhaps the requirements elicitation, in which the incorrect identification of the real needs will likely lead to projects with far higher costs than expected or even to the failure of the whole project.

In light of the recent advancements in Artificial Intelligence, or AI, emphasis is being placed nowadays on leveraging technologies like Chatbots, Natural Language Processing (NLP), as well as Machine Learning (ML) due to their efficiency and efficacy throughout the process of elicitation. Despite the fact that AI tools can bring significant advantages such as the efficient processing of large quantities of data as well as improved accuracy in registering users' needs with less human effort, the tools have genuine limitations in this central RE step. Concerns such as the scope of the context, the sophistication of human interaction and the need to have human validation show that such AI-driven tools are an adjunct, but not the complete replacement of the analysts or the engineers. This essay critically assesses the potential as well as the main limitations of AI in requirements elicitation automation while proving that despite such tools definitely enhancing the process, they are far from automating real world contexts.

2 Background and State-of-the-Art

AI techniques, in particular those discussed in the introduction, have increasingly been used to try to automate aspects of requirements elicitation. Interviews and the traditional elicitation methods are extremely human knowledge and human analysis intensive, which is likely to lead to inaccuracies as well as inconsistencies, aside from needing a lot of intensive effort.

In the recent past, the proof about the capability to overcome such boundaries with some of the AI-based methods with an attempt to automate the routine functions as well as identify patterns appropriately has appeared [1] [2] [3]. Despite all the unmatched achievements in such AI-based applications, such applications remain deprived of the capability to deeply understand the contextual ambiguity as well as the most complex interactions with the stakeholders. For all such reasons, the existing AI applications are only assisting in the process rather than an isolated solution and as such, human beings with automated systems still need to work in coordination to obtain the optimum outcome.

3 Thesis Statement

Whereas the AI tools can enhance the requirements gathering in automating tedious and time-consuming functions, they can't quite replace human interaction due to the nature of some of the contexts and the

in-depth and context-specific interactions with such contexts in RE.

4 Supporting Arguments

1. Contextual and Interpretive Limitations

AI tools have proven their value when it comes to handling semi-structured and structured data effectively and very fast. However, when it comes to understanding implicit requirements or just deep contexts, it still has a long way to go. LLMs have shown that they can automate some aspects of user story generation, but when it comes to having a deep understanding of semantics, it still lacks a lot in terms of quality, indicating limitations in fully gathering the contextual information [1].

2. Stakeholder Interaction Complexity

AI tools like smart chatbots, have improved requirements elicitation with the automation of some of the stakeholder dialogue [2]. However, these agents still depend on knowledge acquired in the past and can't really replicate the developing of dialogue that is normally managed by human requirements engineers. When a new situation that these chatbots haven't seen in the past emerges, they don't know how to act, so that's why human expertise still remains the key in order to better understand the stakeholders' emotions and unstated requirements.

3. Quality Assurance and Validation Needs

[3] Stated that despite the emergence of machine learning based elicitation methods, the quality checking and the large scale validation remain critically reliant on human input. Outputs of the ML models tend to need human oversight and checking against their accuracy and relevance, as well as real world expectations. This shows that human involvement is still needed in order to obtain the best results out of these types of tools, embracing the idea that full automation is far from being obtained.

5 Possible Counterarguments

1. Counterargument

AI will continue to evolve with advanced machine learning techniques and increasing availability of data, so that full automation of the process of elicitation is inevitable and is going to happen in a short amount of time.

Refutation Despite the huge advancements in the previous years, [1] observed that more refined semantic variations, as well as deep context comprehension, are still big challenges, even for the newer and more powerful AI models. This shows the unfeasibility of trusting and relying exclusively on the AI without any human oversight while doing the elicitation process in some of the more complex contexts.

2. Counterargument

Intelligent conversational agents, or simply chatbots, have proven to communicate effectively with stakeholders with precision, thereby eliminating the need for human interactions.

Refutation Although the use of chatbots is effective in facilitating communication with stakeholders, Surana et al. (2019) noted that it is still dependent on scripts and knowledge bases. So their ability to respond to dynamic, emotional or conflict dialogues, as the nature of stakeholder communication, is always going to be constrained and still require human intervention.

6 Critical Reflection

AI tools undoubtedly deliver great support to requirements elicitation activities in the form of automating mundane work, providing immediate analysis and providing ease of use. However, technological limitations cited in existing research [1] [2] [3] point to inherent limitations in fully automating the activities. The understanding of complex stakeholder interactions, contextual dependencies and continuous validation of automated outputs still requires critical human intelligence as well as technical expertise. Awareness of these limitations allows optimistic expectations as well as cautious integration strategies to avoid human expertise being entirely replaced.

7 Conclusions

In summary, AI tools greatly enhance requirements elicitation but cannot fully automate the critical process. Their use still needs to be seen as complementary to human effort rather than their full replacement. Development in this direction has to be further concerned with human and AI cooperation, combining automated processing with human intuition. Working this way will maximize efficiency as well as precision without sacrificing analytical and context sensitive matters inherent to the effective practice of Requirements Engineering.

References

- [1] Z. Z. Z. R. K. S. P. A. Malik Abdul Sami, Muhammad Waseem, “Ai based multiagent approach for requirements elicitation and analysis,” 2024.
- [2] S. P. S. D. B. G. Chetan Surana Rajender Kumar Surana, Shriya, “Intelligent chatbot for requirements elicitation and classification,” *Russchemrev Journal*, 2019.
- [3] G. W. N. B. Y. X. Cheliger Cheliger, Jingwei Huang, “Machine learning in requirements elicitation: A literature review,” *Cambridge University Press*, 2022.

Appendix: AI Tool Usage Report

During the essay, I used ChatGPT 4.5 to create an Overleaf template for me to have a better structure for my ideas and to have a better text flow and to give me some different points of view so I could think in a deeper way about the themes or situations. In addition, I also used Grammarly writing helper so that I could present an essay without spelling errors and with more understandable writing.