Choosing a Creativity Technique for Requirements Elicitation: an updated framework*

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Abstract

Requirements elicitation can use creativity techniques to generate innovative ideas and solutions. As there is a wide variety of such techniques, it is important to be able to support analysts in choosing the most appropriate ones for a project. This position paper presents an updated version of a logical framework that synthesizes the main characteristics of creativity techniques. Aspects related to artificial intelligence and large language model systems are included in this version of the framework as a preliminary contribution to dealing with their potential.

Keywords

Creativity technique, creativity process, requirements elicitation, Artificial Intelligence, Large Language Models, Generative Artificial Intelligence

1. Introduction

There is a high interest in creativity techniques to support requirements elicitation (the CReaRE workshop itself is at its 12th edition, https://creare.iese.de), however, they are not widely used by companies, except, in a limited way, that of brainstorming [1], [2].

A relevant issue for creativity in requirements elicitation is how to choose the most appropriate creativity technique – recently also referred to also as creative triggers or design thinking techniques – among the large number of those available (see for example, [3], [4], [5]).

The problem becomes even more challenging with the proliferation of artificial intelligence (AI) tools and, in particular, generative AI (GenAi) systems based on Large Language Models (LLMs) [6], [7]. The transformative impact of these systems has only just begun to manifest itself, and it is very difficult to predict how it will evolve [8].

In such a context, the aim of this position paper is to update a logical framework proposed four years ago to help companies choose creativity techniques applicable in requirements elicitation [9]. It is important to highlight that we are not trying to answer general questions like, "Why, if innovative ideas are needed to address business challenges, are creativity techniques not always used by companies in requirements elicitation?", or "How can we promote creativity techniques, and in particular techniques exploiting AI, in requirements elicitation?". Both questions would require large and systematic surveys. We do also not investigate whether and to what extent GenAI systems are creative.

The first version of the logical framework was introduced to address a specific sub-question, "If a company wants to adopt a creativity technique for requirements elicitation, are there guidelines to support the choice among the different techniques?". This paper first summarises the main aspects of the framework and then focuses on the factors to be considered in an updated version of the framework to take into account the recent developments of LLM GenAI. This implies

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answering another question: “Is it possible to use LLM GenAI systems to support the application of existing creativity techniques?”.

2. Updating the framework for creativity techniques

2.1. Creativity techniques for requirements elicitation and AI

Given the need to interact in natural language, with different stakeholders, requirements elicitation is one of the most “relational” steps of software systems design, so that the application of creativity techniques, is the one where LLM GenAI impacts are stronger.

For the aim of this paper, it is important to highlight that a critical aspect of LLM GenAI systems is the so-called hallucinated output, which reduces their usefulness and applicability scope. In the context of creativity, there is an interesting relationship between “out-of-the-box thinking” and hallucinations: it is significant that the primary goal of many creativity techniques (e.g., brainstorming) is to generate new ideas, postponing their evaluation in a subsequent step. The emergence of creativity via hallucination has been investigated for example in [10]. Therefore, what is a problem for many applications of GenAI systems, could be positive for the generation of new ideas. Furthermore, studies on the feasibility of using LLM GenAI to elicit requirements found that the ChatGPT produced requirements that met standard quality parameters [11], and that LLMs generated good user stories [12].

The transformative nature – in terms of game-changer – of LLM GenAI in requirements engineering activities has been investigated in [13], starting from the requirements elicitation tasks. The study confirmed that LLMs can help deal with some of the recurring problems, including the “lack of domain understanding, unknowns, communication issues due to language barriers and technical jargon”. Relevant for the aim of this paper are also two other factors highlighted in a SWOT analysis for LLMs in requirements elicitation: “Interactive assistance”, i.e. LLM GenAI can “actively assist in elicitation, asking probing questions and generating diverse potential requirements based on initial inputs – leading to uncovering unknowns” and “Assisting multilingual and multicultural stakeholders”, a support also for applying creativity technique when international groups and stakeholders are involved. The main lesson learned reported in the study is that LLMs, through the use of well-designed prompts, can help to discover unknown requirements, which were not found by analysts [13]. As with any application of digital technology, LLM GenAI systems can cause three types of changes:

1. First order: automate. This occurs when an IT innovation is introduced that modifies how an existing process is performed.
2. Second order: inform. The way individuals perform processes and the way they interact with the technology change.
3. Third order: transform. A new way of task accomplishment or a new set of tasks [14].

According to this classification, the use of GenAI and LLM GenAI in particular, to apply creativity techniques to requirements elicitation, can be summarized as follows:

- LLM GenAI tools can automate some of the activities needed to apply a creativity technique to requirements elicitation. E.g., for a brainstorming session, supporting the creation of groups, identifying stakeholders, creating a structured report of the ideas generated.
- LLM GenAI tools change the roles involved in the application of the creativity techniques. E.g., thanks to its conversational nature, LLM GenAI allows also non-technical stakeholders or end users to generate requirements, without a facilitator, as an individual task that does not require groups.

- LLM GenAI are used to fully automate the elicitation process. E.g., generating requirements for different types of stakeholders, according to a given technique, describing the idea in a more or less formalized language. The activities and the role of requirements analysts would change in ways that so far have been investigated (almost only) for the coding activities [15].

According to this classification, first-order LLM GenAI-related impacts on the application of creativity techniques are feasible for all techniques and do not imply new factors in the framework. Second order changes are related to the roles required for the application of LLMs GenAI and the relationships between them and can be addressed with appropriate prompts [13]. Last order changes are related to how the activities in the elicitation process are automated and suggest the adoption of a multi-agent approach [12].

2.2. The updated framework to describe creativity techniques

The original framework is based on two matrixes introduced to collect relevant information about creativity techniques, and to compare them in order to identify the most suitable for a given software system project. In the first matrix, each creativity technique is described according to 5 criteria elaborated from a classification described in a paper that was read approximately 6,000 times in 2021, reaching 10,000 times in 2024 [16] (Table 1, partially pre-filled to give an idea of its use). Factors included in the original matrix are the following: Process, Group vs. individual, Advantages and Disadvantages, Sources. All these factors are still useful if their definition is extended to give information on how LLMs GenAI could be used to support the application of a given creativity techniques. The extension is underlined in the list:

- Process, to specify if a given technique also suggests a creativity process, i.e. steps to be accomplished for its applications. If so, AI agents exploiting LLMs could be introduced.
- Group vs. individual, to indicate if the technique can be applied individually, in groups or both. For group techniques, if groups are required to represent different stakeholders or experts in different domains, LLM GenAI could cover all of them, allowing an individual application as well; it could be applied by non-technical users, thanks to its conversational interface, also mitigating group problems.
- Advantages, to highlight the known positive aspects of the technique. These advantages are useful to evaluate which LLM GenAI tool could be adopted, or even if a given technique could not be supported at all (e.g., creative pause implies dealing with empathy and emotion, a feature that existing LLMs systems are not able to support). A sound description of advantages could be used to write proper prompts, e.g. “force to consider different viewpoints” suggests asking the LLMs GenAI to play different roles.
- Disadvantages, to indicate the critical aspects of the technique. Symmetrically to the previous factor, e.g., to translate into a prompt “Requires knowledge of stakeholders’ viewpoints”.
- Sources, to allow an analyst to have more information on the technique and its application. In this case the factor is split in two columns: ‘Technique sources’ and ‘AI application sources’, where the second indicates if a given technique has already been implemented with LLMs GenAI.

The second matrix (Table 2) includes a set of parameters identified in requirements elicitation and project management best practices and guidelines [9].

Table 1
Matrix to describe creativity techniques for requirements elicitation

Name	Process	Group vs Individual	Advantages	Disadvantages	Technique sources	AI application sources
Brainstorming	Yes	Both	Well known High number of new ideas	Disregarded principles	brainstorming.co uk	[17]
Creative pauses	No	Individual	Simply to apply	Unstructured	[18]	
Six thinking hats	Yes	Both	Force to consider different viewpoints	Requires high abstraction skills	debono.com	[19]
EPMcreate	Yes	Both	Performs better than brainstorming	Requires knowledge on stakeholders	[20]	
(…)						

Highlighted in bold those where existing LLM GenAI systems can be helpful: documentation can be translated into many languages, also adapting to different levels of technical language; LLMs can be trained on a company's documents to gather knowledge about the required domains (e.g., if there are no experts in a domain relevant to the application of the creativity technique); the role of facilitator could be played by the GenAI system if necessary. 'Tool support' is split into three new parameters to specify, respectively, if the technique could be applied almost straightfully, i.e. translating the guidelines or principles of a given technique using prompts; AI agents are needed if more activities have to be supported in a coordinated way; prompt library, if there are already prompts for the technique.

Table 2
Candidate creativity techniques matrix

	A	B	C
Costs	High	Medium	Low
Documentation	**Also in Italian**	**Only in English**	**5 languages**
Domain	**Education**	**Finance**	
Equipment		Available	
Facilitator	**Yes**		
Learning curve	Medium		

Maturity	Low		
Popularity	Low		
Process steps	Illumination	Illumination, Verification	Preparation
~~Tool support~~	~~No~~	~~Yes~~	~~No~~
Direct AI application	Yes	Partially	No
AI agents	Yes	Yes	No
Prompt library	No	No	no

Examples of creativity techniques that could be applied with a simple translation of the suggestions into a prompt for LLMs GenAI systems are 'Synapses' ("Seeking stimuli in fields far from the one where the problem arises"), or "Forced relations" ("looking for forced relations between usually uncorrelated ideas") [21]. Further investigations are needed to create a prompt library.

3. Conclusion

The Research Agenda for GenAI for software engineering [13] identified 78 open research questions, classified into 11 areas, but even though "creative requirements generation" is identified as one of the software engineering areas that can benefit from LLM's GenAI tools, none of the open questions deal explicitly with creativity in requirements elicitation.

This paper is a preliminary contribution to address this gap by updating the framework proposed in [9] to support requirements analysts in choosing a creativity technique, adding factors and adapting their interpretation. Updating the framework highlighted a number of open questions and areas needing to be discussed and investigated in future work. Some of them are proposed here as they challenge our global views on creativity in requirements elicitation and would be worthy of discussion by the requirements engineering community:

- Could we use the factors in the matrixes to ask GenAI systems to choose the most suitable technique? And how to apply it?
- How will GenAI change analysts work and software engineers work? Will it be possible to write programs that invent requirements? And how could a human-AI collaboration be established to be creative in requirements elicitation?
- How can we update curricula, certifications and in general education to prepare the future analysts for a world where AI and LLM GenAI is dominant, so that they will be able to use creativity in requirements elicitation [22]?
- What are the risks of using (evolving) LLM GenAI for requirements elicitation? How to address copyright (documents used for training) and explainability problems [23].

Finally, a more disruptive question is: Are creativity techniques still necessary? Or will there be AI-based invention systems that are able to find new ideas and requirements giving companies a competitive advantage? A preliminary answer to this question could be that creativity techniques are necessary to design such general-purpose invention systems. In fact, an AI-assisted invention method has been developed by Iprova, a company that actually applies one of the most classical creativity principles, i.e., "adapting a given solution or idea to a different area". Another invention-producing AI focused on biological problems is the one used by BioMedIt for AlphaFold [24].

Declaration on Generative AI

The author has not employed any Generative AI tools.

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