On the Experiences of Practitioners with Requirements Elicitation Techniques

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On the Experiences of Practitioners with Requirements Elicitation Techniques

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ABSTRACT

Requirements elicitation is a crucial process in software engineering, which involves identifying and understanding the needs of stakeholders to define system requirements. Several techniques are used for requirements elicitation, each with unique advantages, disadvantages, and challenges. This paper presents the findings of a survey conducted among 33 practitioners in the software development community to investigate their experiences with requirements elicitation techniques. The results revealed that practitioners find the elicitation process highly challenging due to difficulties managing the relationship between the development team and the client, understanding complex business processes, and the lack of knowledge among stakeholders. The survey also assessed the participants' familiarity with various elicitation techniques. The most well-known techniques were brainstorming, data analysis, use cases, interviews, user stories, and prototyping. In contrast, techniques such as ethnography, Quality Function Deployment (QFD), Joint Application Development (JAD), blueprint, and laddering were less recognized. When providing the pros and cons of some techniques, participants considered techniques' clarity, speed of use, resource cost, and stakeholder involvement. This research contributes to the field by highlighting challenges, providing insights into practitioner experiences, and guiding informed decision-making in requirements elicitation.

CCS CONCEPTS

• **Software and its engineering → Requirements analysis**; *Software design techniques*; *Programming teams.*

KEYWORDS

requirements elicitation, requirements gathering, requirements engineering, elicitation techniques, challenges

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1 INTRODUCTION

Requirements engineering is a critical aspect of the software development process, with a substantial influence on project outcomes [55, 59, 67]. However, numerous software development teams encounter failures stemming from inadequate comprehension of essential product requirements [26]. The process of requirements gathering, elicitation, or requirement engineering is a decision-centric activity encompassing the specification of both functional (FR) and non-functional (NFR) requirements [1, 35, 72].

Jarzebowicz et al. [35] highlight the holistic nature of the requirements engineering process, aiming to capture all requirements and their interrelationships. Designing a separate and isolated process for specific requirement categories, such as non-functional or security requirements, proves challenging. Instead, the requirements engineering process serves as a mechanism to comprehend customer desires, analyze needs and their relationships, verify feasibility, and negotiate solutions in a generic manner [69].

Requirement elicitation, defined as the process of collecting actual requirements for a project [31], involves defining system functionalities and operating constraints [39]. While agile software development may have less explicit requirements engineering activities compared to traditional approaches [20], it remains imperative to gather opinions, choices, and constraints from various project stakeholders, including clients, end users, and development teams [31].

Despite agile methodologies accommodating requirements changes by integrating requirements, design, implementation, and testing, they occasionally overlook the significance of requirements engineering, often perceiving it as bureaucratic [47]. Requirement elicitation, considered the most critical stage of requirements engineering, necessitates the use of effective practices and techniques to ensure precise gathering [46, 61].

Requirement elicitation techniques are employed to determine software requirements based on stakeholders' needs [60]. These techniques provide structured approaches and procedures for obtaining user requirements and translating them into system functions that satisfy the needs of all involved stakeholders [49].

Given the challenges of achieving consensus or common understanding of requirements, especially in complex or distributed contexts, the importance of requirement elicitation techniques cannot be overstated. In this study, we aim to explore the knowledge and experiences of software practitioners with different requirement elicitation techniques. By conducting a survey among software

practitioners, we seek to gather insights into the effectiveness, challenges, and benefits of various techniques, considering different project contexts, environments, and complexities. Through this investigation, we hope to contribute to a better understanding of the practical implications of requirement elicitation techniques in software development projects.

This work is organized into five sections, in addition to this one: Section 2 presents the most relevant works found on this study; Section 3 presents the survey protocol and questionnaire design that was used to the target audience; Section 4 presents the results of the survey, in special with the cited challenges and techniques, as well as the level of knowledge of each discussed technique; Section 5 presents the threats of validation that could be jeopardize some of the results of this work; Section 6 presents main conclusions of this work and the future work.

2 RELATED WORKS

Wang et al. [71] presents a comprehensive survey with 108 participants aiming to investigate the treatment of requirements engineering (RE) in practical agile development. Their investigation involves an examination of eight agile groups from four diverse software development organizations. The authors aim to find the importance given to RE and each type of requirements, as well as what methods and tools do agile practitioners often use. Participants identified that interviewing and user story are the most important requirements elicitation practices whereas user story and use case are the most widely used requirements representation practices. However, these practices require intensive interaction with clients.

Liebel et al. [41] explored the challenges and approaches to overcome challenges concerning automotive Requirements Engineering (RE) by conducting a case study involving an automotive car manufacturer and a supplier. Data was collected through 14 semi-structured interviews with 15 participants from various engineering domains. The study identified seven key problems/challenges in organization structure and communication, including the lack of product and context knowledge, mismatched abstraction levels, insufficient communication channels, lack of interdisciplinary understanding, unclear responsibilities, and insufficient resources for understanding and maintaining requirements. These findings were further validated through a questionnaire completed by 31 practitioners from the automotive industry, affirming the frequency and importance of these challenges.

Martins et al. [30] identified 12 challenges in requirements elicitation for agile projects and 31 Design Thinking (DT) techniques in a systematic literature review. To assess the effectiveness of DT in addressing these challenges, a case study was conducted, observing the use of DT techniques during the development of a software module. Stakeholders provided feedback through questionnaires and interviews, indicating their perception of the techniques and their contribution to the identified challenges. The correct combination and usage of artifacts were considered the responsibility of the team rather than DT itself. Additionally, the team did not execute a DT technique correctly for evaluating new requirements, and challenges related to cost estimation and usability testing did not show clear evidence of contribution. Overall, DT was deemed beneficial for most of the challenges in agile requirements elicitation, but further improvements and considerations are necessary.

Anwar and Razali [7] conducted interviews with five analysts to understand how they select requirements elicitation techniques. Among the factors for selecting techniques, interviewees mentioned the technique's capacity to transfer knowledge, analysts' experiences with it, ease, speed, and cost use, in addition to stakeholders' preferences. Moreover, Requirements are elicited from three main sources, namely stakeholders, documents. Lastly, stakeholder characteristics and project environment may also influence the selection of RE techniques.

Palomares et al. [54] conducted empirical studies at 12 Swedish companies, involving 24 practitioners. The findings indicate that group interaction techniques, such as meetings and workshops, were the preferred requirements engineering (RE) techniques, particularly in larger projects. However, these techniques were rarely used in isolation and were often combined with other methods like interviews, questionnaires, reading-based techniques, and market research. The dominant challenges identified in the study were related to stakeholders and requirement stability, particularly in large organizations, rather than challenges related to the elicitation process, communication, or adopting a long-term view of the system.

Based on a multiple case study, Alsaqaf et al. [4] contributes to the body of knowledge on agile requirements engineering (RE) by identifying 15 challenges faced by agile practitioners in large-scale distributed projects when dealing with quality requirements (QRs). The study goes beyond identification and also uncovers 13 mechanisms underlying these challenges and 9 practices currently utilized by agile teams to mitigate their impact. The study highlights that while certain practices can mitigate specific challenges, they may also introduce new challenges. Therefore, the authors recommend that agile teams carefully evaluate the practices they employ and gain insights into the challenges that can be alleviated or introduced by their use. Some participants perceive user stories, commonly used to express customer desires in agile practices, as distinct from the concept of requirements.

As seen in this section, there are several works approaching the challenges of the requirements elicitation process and the use of techniques by practitioners. However, we have not identified works that aim to analyze more deeply the advantages and disadvantages of using some techniques in the perception of practitioners, since the challenges approached by works are commonly concerning the process as a whole.

3 SURVEY SETTINGS

The survey follows the protocol suggested by Linaker et at. [42], which aims to clarify the objectives, population, design, and procedures considered when creating and executing the survey. The objective of the opinion-based survey was to verify which requirement elicitation techniques are known and used by the community, their advantages, and the challenges they face when using some of these techniques.

3.1 Target Population

The target for this survey is the community of engineers and analysts that work with Requirements Elicitation (RE). Therefore, we did not select the so-called specialists to answer the poll. Instead, we left the survey open to the software community. The reason for this is that we understand that any selection of experts to answer the survey would be subjective and, consequently, biased as we appoint experts based only on our circle of relationships and areas of knowledge. Still, we emphasized that the survey was targeted at technology practitioners.

Although the questionnaire can be applied to anyone in the interest area, i.e., engineers, analysts, managers, or others related to the requirements area, since participants were recruited primarily through personal contacts, most of the participants are from Brazil due to relationships on or our social media, university or work that were used to disclose the questionnaire.

3.2 Questionnaire Design

The survey was presented in two main languages, English and Portuguese, with fourteen (14) questions. The questionnaire was built and distributed through the Google Forms platform, was opened for around ninety days, and the burden time to provide the answers was about twenty (20) to twenty-five (25) minutes.

The target audience had to consent that participation was anonymous, voluntary, and with the exclusive purpose of contributing to the success of the research, in addition to the fact that the responses collected could be stored in perpetuity, which could be used anytime for journal publications, conferences, and blog posts. Moreover, they could leave the survey any time before clicking the send button without any discomfort since the process of responding was unsupervised. Finally, an email was provided in case participants had any problems or questions for the researchers.

The survey begins by gathering information about the respondents' qualifications, including location, gender, age, education level, and employment status. It also asks about their area of expertise, experience, and preferred development methodology. The second part of the survey assesses the respondents' difficulty level during requirements elicitation and their evaluation of commonly used elicitation techniques, extracted from a literature review and seen in Table 1. Participants are also invited to share their views on requirement elicitation challenges, strengths, weaknesses of the cited techniques, and suggest additional techniques. The survey questions are shown in Table 2.

Table 1: Elicitation techniques found in the literature

Technique	References
Analysis of Legacy Systems	[29]
Blueprint	[13]
Brainstorming	[3, 8, 29, 34, 35, 51, 61, 70, 73–77]
Design Thinking	[53]
Data Analysis	[47]
Empathy Map	[17]
Ethnography	[2, 8, 27, 29, 34, 44, 49, 52, 65, 68, 74, 77]
Exploratory Research	[17]
Feature-Driven Design	[47, 49]
Focus Groups	[3, 8, 52, 73, 75, 77]
Interview	[3, 12, 31, 34, 35, 47, 49, 52, 57, 65, 68, 74, 75, 77],[8, 27, 29, 56, 70, 73, 76]
Joint Application Development	[3, 8, 21, 27, 40, 46, 51, 52, 58, 65, 68, 73, 77]
Laddering	[3, 8, 34, 65, 68, 74, 77]
Mind Mapping	[21, 45, 46, 52, 61, 62]
Observation	[3, 8, 35, 38, 44, 47, 49, 68, 73–75, 77]
Persona	[29, 33, 44, 53, 62, 64]
Prototyping	[3, 9, 21, 31, 33, 35, 44, 52, 53, 61, 62, 68, 74, 75],[5, 8, 29, 34, 37, 38, 65, 70, 73, 77]
Questionnaires	[3, 29, 31, 34, 38, 49, 57, 65, 70, 74–76]
Quality Function Deployment	[31, 52]
Scenarios	[19, 27, 29, 44, 48, 51, 52, 62, 68, 74, 77]
Stakeholder Analysis	[24]
Story Boarding	[44, 53, 64, 70, 77]
Test-Driven Design	[10]
Use Cases	[68, 70]
User-Centered Design	[62]
User Journey	[53]
User Stories	[2, 5, 21, 33, 35, 43, 48–50, 62, 64]
Workshop	[3, 35, 49, 51, 57, 68, 70, 74, 77]

4 RESULTS AND DISCUSSION

4.1 Sample Profile

The initial questions were defined to qualify the respondents in terms of country or location, gender, age, employment status, and level of education. Due to our own location and community relationship, the qualification showed us, as expected, that most of the respondents are from Brazil. However, it is interesting to highlight that two answers came from different countries, one from the United States of America and another from Portugal. We had a total of 33 responses and the statistics about participants' profiles are presented in Figure 1.

Regarding the other qualification questions, most of the respondents are men, with no one self-declaring as non-binary or not declaring an option, which reaffirms the underrepresentation of women in software development teams [15, 18]. Another statistic with a much more prone result to one option was regarding development methodology since ≃94% are working with agile, reaffirming the tendency of software development teams to become agile [14, 16] over traditional methodologies.

Only the age variable had results well distributed among the available options, with numbers not overly prone to a specific age range. In accordance with the fact that around half (57.6%) have more than ten years of experience in the area, if we sum

Table 2: Survey questions

ID	Question
Q1	Please state the country, state, and city you work from.
Q2	What is your gender?
Q3	What is your age range?
Q4	What is your level of education?
Q5	What is your employment status?
Q5	How many years of experience do you have in Software Development?
Q7	Do you work or are involved with agile projects?
Q8	What is your main area of expertise (or main role)?
Q9	How difficult do you consider gathering or eliciting the correct requirements for a project, system, or application?
Q10	Please state which of the following tools and practices you are familiar with and your level of knowledge.
Q11	What are the main challenges in the requirements specification/gathering/elicitation phase?
Q12	From your knowledge, please state the pros and cons of the tools, practices, or techniques you most use.
Q13	Are you familiar with any technique, tool, or practice not listed? Please describe the pros and cons of it.
Q14	Based on your answers, is there any tool, practice, or technique that your knowledge is not good or excellent and you would like to learn and use?

the percentages of ages over 36 years, we have around the same percentage (60.6%). This may indicate that most started working in the area as their first career path around their twenties.

Regarding the level of education, results showed ≃67% as being graduated, while ≃24% declared themselves with a master's degree. Moreover, ≃88% are full-time employed, whereas 3% presented themselves as either self-employed or part-time employed, and ≃6% not working and being students full-time. Using students as experimental subjects is reasonable and can provide valuable insights as long as they do not represent the majority of the sample [28].

Finally, regarding the area of occupation, participants are mostly working with development or management. According to a report on the results of an interview-based empirical study involving 12 IT companies and 24 experienced senior practitioners, requirements elicitation is performed by practitioners from different backgrounds, including requirements engineers, business analysts, project managers, and developers [54].

4.2 Challenges in Requirements Elicitation

The survey approached the challenges faced by practitioners in requirements elicitation in Q9 and Q11. Requirements elicitation is considered one of the most challenging phases of software development due to various factors [23]. Moreover, choosing the appropriate techniques is also challenging due to the multiple options available [25].

We asked respondents to rate their difficulty level in gathering or eliciting the correct requirements for a project, system, or application in Q9. Figure 2 presents the responses' statistics for Q9 seen in Table 2. If we consider any level eight or higher as very difficult, levels one to four as not difficult and levels five to seven as regular,

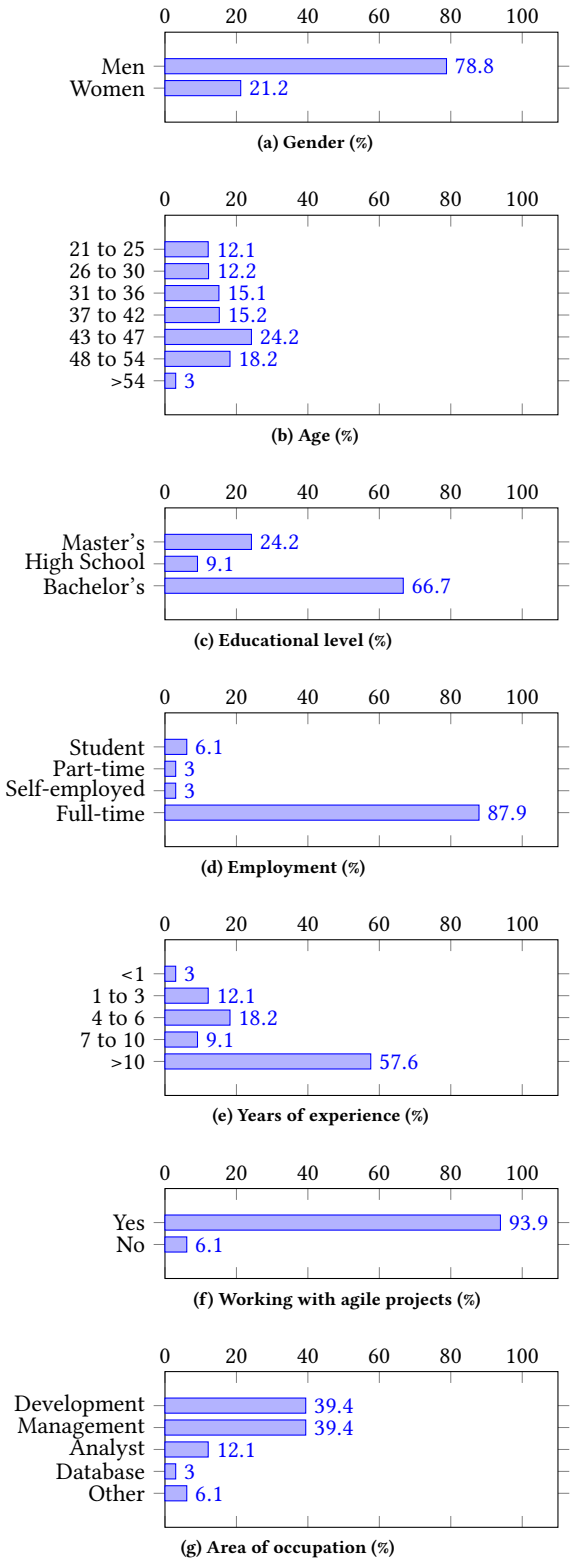

Figure 1: Profile of survey respondents (n=33).

the requirements elicitation phase is perceived as very difficult by 42%, regular by 45%, and not difficult by 12%.

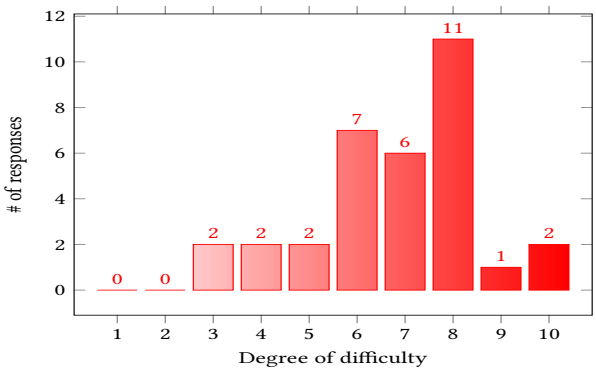

Figure 2: Difficulty perceived by the respondents in eliciting requirements.

In Q11 seen in Table 2, we asked for participants to optionally list in free text the specific challenges they face in this process. The most mentioned challenge was the **relationship between the software development team and the client**. More specifically, practitioners frequently assume that the client does not know their own needs and fail to convey them to the development team. Below there are some transcripts supporting this finding:

> *"1) Usually client doesn't know exactly what need. 2) In the interview, the client explores irrelevant matters and does not provide what is needed for the job"*

> *" Extract requirements from clients. Sometimes they don't cover everything they need to in the system, or they aren't clear enough. This generates rework on top of the developed features."*

> *"Get correct and complete user information. User engagement for a more assertive solution"*

> *"User knowledge about his needs; User availability for the project;"*

> *"The user doesn't know exactly what wants; The user has no knowledge of systems; user availability"*

> *"Find out what customer *really* wants since not rarely it is not what it requests Also it is.often incomplete and miss alternative scenarios."*

Another challenge that was mentioned by many respondents was the **difficulty in understanding the business process** that will dictate how the software will function as well as translating them to functional requirements. Sometimes this challenge is due to the multiple sources of information that seem not to agree or the inherent complexity of the process. Below there are some transcripts supporting this finding:

> *""To do an interview/questionnaire, I need to understand the business. To understand the business, I need to know what to ask in the questionnaire/interview"*

> *"Understand the problem to be solved. Have a common understanding about the requirements from the various stakeholders."*

> PDF *"Requirement elicitation — one of the challenges is trying to identify what the client does not inform; Another challenge is the time to clearly reproduce complex information to the development team."*

> *"Understand the business problem, which data is relevant for the project, and identify where the data is settled and how to access it."*

The third challenge most mentioned was related to the **level of knowledge of the people involved** in the requirements elicitation process. If sometimes the problem is the user who cannot understand the technical solutions that are proposed to solve his needs, at other times it is the lack of experience of professionals eliciting requirements that reflect on the quality of the requirements generated and the clarity of the documentation delivered. Below there are some transcripts supporting this finding:

> *"Commitment of business managers; Business managers' understanding of the software development process; Maturity level of the business analyst team; Maturity level of the development team;"*

> *"[...] the quality of the document ends up directly corresponding to the experience of the analyst(s) who are present during the gathering and development."*

> *"Inconsistency between what the customer wants and the data he believes he has and too much euphoria due to ignorance of the technology's capacities."*

> *"Look for people with knowledge about the requirements and know the expertise of the teams to decide what is applicable"*

> *"Incomplete knowledge of the work process due to specialization in certain activity(ies), tendency to think of the solution as a computerized imitation of the manual process."*

These answers are, in essence, similar to the ones retrieved from the literature, which mostly described issues such as: poor communication [32, 33, 36, 47, 50, 61, 75], stakeholder engagement and availability [3, 4, 4, 36, 47, 63], difficulties in translating requirements [12, 35, 36], prioritization problems [4, 50, 61, 66], poor documentation [4, 12, 32, 33, 47, 61, 62, 66].

4.3 Experiences with Techniques

In Question 10, as shown in Table 2, we inquired practitioners about their familiarity with each of the techniques listed in Q10. The purpose was to determine which techniques were most well-known within the community and to what extent. Participants had four options to choose from (Poor, Regular, Good, Excellent), or they could choose not to answer, as they could be uncertain about some techniques due to the name presented. The distribution of responses for Q10 is illustrated in Figure 3.

We determined a knowledge score for each technique by summing the product of the frequency of responses per option and a

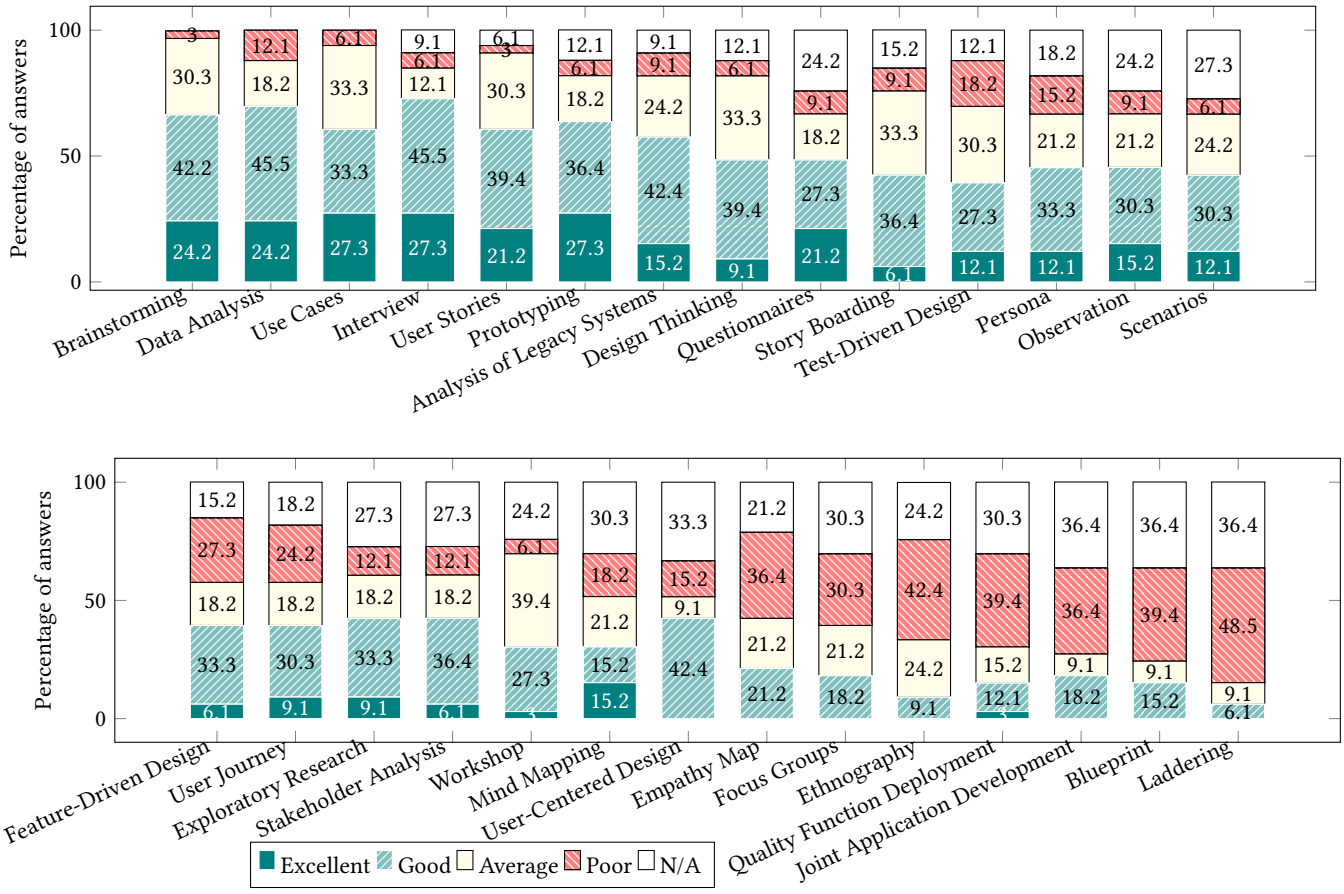

Figure 3: Participant's knowledge of requirements elicitation techniques.

weight ranging from 1 to 4. The weight increased with higher knowledge levels. Table 3 presents the calculated scores, highlighting that brainstorming, data analysis, use cases, and interviews are the techniques most commonly known. Conversely, ethnography, Quality Function Deployment (QFD), Joint Application Development (JAD), blueprint, and laddering are the least familiar techniques.

When examining the five most well-known and least known techniques, it becomes apparent that practitioners are less familiar with structured approaches like JAD and QFD, while more freely conducted techniques like brainstorming enjoy greater recognition. This suggests that structured techniques face challenges in gaining popularity. On the other hand, use cases are an example of a well-structured and widely known technique, likely due to its long-standing use in requirements engineering.

While the popularity of brainstorming can be attributed to its openness to unstructured contributions, the popularity of data analysis may stem from the fact that it does not require the coordination of multiple stakeholders to conduct the analysis. When relying on documents and data as sources of information, data and document analysis obviate the need for scheduling meetings, facilitating discussions, and managing interpersonal issues, thereby expediting the elicitation process. The same applies to the analysis of legacy systems. In Q12, as indicated in Table 2, respondents were asked to identify the pros and cons of the techniques they were familiar with. Table 4 provides a consolidated overview of the participants' responses regarding the advantages and disadvantages of their chosen techniques.

Multiple participants expressed strong enthusiasm regarding the speed and simplicity of working with user stories. However, this technique was perceived as somewhat limited in its ability to encompass all the necessary aspects for requirement implementation. In fact, user stories are renowned for their inability to provide a comprehensive view of the requirement's domain [11].

Prototyping also received numerous responses that emphasized its positive aspects, primarily attributed to its ability to anticipate issues prior to implementation by offering a detailed visual representation of the requirements. However, it is important to note that prototyping can generate expectations among clients that may not be fully realized in the actual implementation.

Use cases, on the other hand, garnered mixed responses from participants. While some found use cases to be user-friendly and easy to comprehend, others regarded them as complex and time-consuming. It is worth noting that use cases require textual descriptions adhering to specific styles and templates to ensure readability,

Table 3: Knowledge score for elicitation techniques

Technique (t)	Score (S)*
Brainstorming	287,9
Data Analysis	281,8
Use Cases	281,8
Interview	275,8
User Stories	266,7
Prototyping	260,6
Analysis of Legacy Systems	245,5
Design Thinking	227,3
Questionnaires	212,1
Story Boarding	209,1
Test-Driven Design	209,1
Persona	206,1
Observation	203,0
Scenarios	193,9
Feature-Driven Design	187,9
User Journey	187,9
Exploratory Research	184,8
Stakeholder Analysis	181,8
Workshop	178,8
Mind Mapping	166,7
User-Centered Design	160,6
Empathy Map	142,4
Focus Groups	127,3
Ethnography	118,2
Quality Function Deployment	118,2
Joint Application Development	109,1
Blueprint	103,0
Laddering	84,8

*$S(t) = 1*\%Poor(t)+2*\%Average(t)+3*\%Good(t)+4*\%Excellent(t)$

consistency, and verifiability [22]. The favorable viewpoint may stem from experienced practitioners who possess the proficiency to generate such artifacts more efficiently and clearly compared to novice practitioners. In the hands of experienced practitioners, use cases are a powerful artifact extending their usefulness from requirements gathering until software testing and maintenance. More broadly, other techniques were also appraised by their capacity of effectively documenting requirements for further consultation, such as test-driven design and user journey.

Participants also seemed to struggle with techniques that demand human resources. For example, one mentioned that design thinking is challenging to use because it depends on gathering stakeholders and their engagement in the meeting. Other participant mentioned that the use of questionnaires is challenging because it is difficult to receive enough responses. This reinforces the need of people management and building good relationships among stakeholders for better requirements elicitation.

Additionally, the respondents were divided in four main areas, Developers, Analysts, Management and Others. The results indicated that practitioners in development roles preferred techniques like User Cases, Brainstorming, Prototyping, and User Stories. Conversely, respondents from management and other related areas exhibit a stronger inclination towards utilizing techniques such as Documentation or Data Analysis, Interviews, and Brainstorming for requirements elicitation. Furthermore, our findings indicate that Analysts/Engineers are more inclined towards utilizing Prototyping, Interviews, and Analysis of Legacy Systems as part of their requirements elicitation practices.

Moving forward in survey questions, in Q13, as seen Table 2, we were able to uncover techniques not listed in Q10 but known by participants, such as scrapping, product vision box, elevator statement, and Business Process Modelling (BPM). However, it should be noted that some participants mentioned techniques or methods that are not specifically related to requirements elicitation. This reveals a lack of knowledge among practitioners regarding the purposes of existing tools and techniques. Some answers indicated practices that are actually development methodologies, such as Scrum, Lean, Kanban, DevOps, and Process Automation.

Moving forward, as depicted in Table 2, Q14 asked participants if they were interested in further improving their understanding of any technique presented in Q10. A few techniques were mentioned, highlighting the recognition within the community of their knowledge gaps. The techniques mentioned were Design Thinking, Persona, Mind Mapping, Test-Driven Design, Laddering, and Joint Application Development (JAD), Analysis of Legacy Systems, Stakeholders Analysis, Laddering; Blueprint, Quality Function Deployment (QFD), User-Centered Design, Use Case.

While most of the techniques mentioned in Q14 were only mentioned once or twice, Design Thinking stood out with five mentions. By referring to Figure 3 and Table 3, it becomes apparent that Design Thinking is one of the top ten most well-known techniques. Hence, the participants' interest in further exploring Design Thinking may be attributed to its widespread popularity.

5 THREATS TO VALIDITY

Below, we present some threats to validity should be considered when interpreting the findings of the study, acknowledging their potential impact on the scope, generalizability, and reliability of the results. *Selection Bias* — A potential limitation of this study is the possibility of selection bias of the techniques used in the survey. There is a chance that other relevant techniques were not captured in the literature review since it was not a systematic search.

Sample Size — The limited number of participants in the survey may impact the conclusiveness of the results. The findings should be considered indicative rather than conclusive due to the small sample size. *Location of Respondents* — The majority of participants being from Brazil may limit the generalizability of the survey results to other profiles or countries. The regional aspect and the specific characteristics of the participants may not represent the entire software development community.

Questionnaire Understanding — There is a possibility that participants may have interpreted the survey questions differently, leading to varying responses. To mitigate this threat, the questionnaire was initially reviewed by an advisor and reviewers outside the information technology area.

6 CONCLUSION

In conclusion, our study shed light on the experiences and challenges faced by practitioners in the software development community when utilizing requirements elicitation techniques. Through a

Table 4: Pros and cons of some elicitation techniques according to practitioners

Technique	Pros	Cons
Interview	- can be planned to be simple and straight forward - useful to direct initial requirements	- might be time consuming - cannot elicit implicit or intuitive requirements - depends heavily on the ability of the interviewer - client needs to understand the business very well
Prototyping	- very visual and straight forward - useful for interfaces and for testing real-feel of the solutions - early detection of problems	- risk of customer oversimplifies the time for the real solution depends on the client's constant validation
Data Analysis	- less expensive that collect the data - once access is granted does not require aligned agendas with customer	- bias in selecting documents - time to find useful information throughout the documents - difficulties in accessing the data
Brainstorming	- when people are willing to participate it gathers much more volume of requirements - for simple requirements it can help consensus among stakeholders	- not all stakeholders have the profile and good will to participate - it requires someone experienced to conduct the sessions
User Stories	- simple format - easy to document - easy to understand	- sometimes shallow and imprecise making hard to discover the real requirement - quite time consuming and repetitive - superficial
Use Cases	- useful to confront users in case of questions or discordance on the delivery requirements - useful as the system's documentation - easy to use	- time consuming and usually hard for customers to read and understand - not adequate for complex systems - as long as become more extensive it is harder to be updated
Test-Driven Design	- tests can be used as documentation	
User Journey	- broad visualization in a single picture	
Questionnaires	- simple and rapid - focused on the problem	- difficult to change after sharing - diffilcult to get answers
Design Thinking		- difficult to gather all stakeholders - depends on people's engagement
Analysis of Legacy Systems	- identify business rules more easily	
Observation	- more clarity on the user needs	
Scenarios		- time consuming
BPM & Mind Mapping	- makes the process easier and transparent	

survey involving 33 participants, we gained valuable insights into their perspectives.

The survey results highlighted the widespread difficulty practitioners encounter during the elicitation process. Challenges primarily revolved around the relationship dynamics between the software development team and the client, as well as difficulties in comprehending complex business processes and a lack of knowledge among those involved.

In terms of the practitioners' familiarity with requirements elicitation techniques, the study revealed a range of techniques that were both well-known and less recognized. Brainstorming, data analysis, use cases, interviews, user stories, and prototyping emerged as the most commonly known techniques. Conversely, techniques such as ethnography, Quality Function Deployment (QFD), Joint Application Development (JAD), blueprinting, and laddering were less familiar to the participants.

Furthermore, participants evaluated the pros and cons of various elicitation techniques based on specific criteria. They considered factors such as clarity, speed of use, resource cost, and the level of stakeholder involvement required. This assessment provided valuable insights into the practical considerations that practitioners take into account when selecting and utilizing requirements elicitation techniques.

Overall, this research contributes to the body of knowledge on requirements elicitation in software development. It highlights the challenges faced by practitioners and provides an understanding of their experiences. The identification of commonly known and less recognized techniques helps practitioners make informed decisions about their approach to requirements elicitation. Additionally, the evaluation of techniques based on specific criteria offers practical guidance for selecting the most suitable technique for a given context.

Moving forward, further research can explore potential solutions to the challenges identified in this study. Investigating strategies for improving the relationship between software development teams and clients, enhancing understanding of complex business processes, and promoting knowledge sharing among stakeholders would be valuable areas of inquiry. Additionally, exploring the effectiveness of less recognized techniques, such as ethnography, QFD, JAD, blueprinting, and laddering, may provide new insights and expand the repertoire of elicitation approaches.

ARTIFACT AVAILABILITY

The data that support the findings of this study are openly available in Zenodo at https://doi.org/10.5281/zenodo.7945593 [6].

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